DEVELOPMENT OF A GENERAL KNOWLEDGE TEST FOR USE IN MOTORCYCLE OPERATOR EDUCATION AND EVALUATION PROGRAMS

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ABSTRACT

DEVELOPMENT OF A GENERAL KNOWLEDGE TEST FOR USE IN MOTORCYCLE OPERATOR EDUCATION AND EVALUATION PROGRAMS

By

Thomas Lee McDole

Statement of the Problem

The purpose of this study was to develop parallel test instruments (written knowledge tests) which would:

a) have the statistical power to differentiate between two groups of motorcycle operators--those operators who possess and can demonstrate that knowledge necessary to operate a motorcycle on the road and those operators who can not demonstrate such knowledge.

b) be able to serve as a comprehensive general knowledge test suitable for use as a final examination in a motorcycle rider education class or as an examination for use in motorcycle operator licensing programs.

Methods of Procedure

Beginning with a set of 463 items, prepared according to a set of criteria from a comprehensive source document, a full scale evaluation and test development project was undertaken. Comments about the items from experts and subjects were used to evaluate and re-write the 463 multiple choice

items. The resulting 282 items were formatted into six tests to be administered to approximately 650 subjects--high school seniors of varying motorcycle riding experience--in a test-retest data collection program. Information was also collected on their riding experience (dependent variable) age, sex, and a reading achievement score. An item analysis was performed on each item by: (1) examining the response distribution; (2) correlating the response to the item with the dependent variable, age, sex, total score, and reading achievement score; (3) calculating the item difficulty; (4) calculating the test-retest reliability. (5) computing an index of discrimination based on the dependent variable. Each item was reviewed according to guidelines for each of the above criterion and rejected if it failed. One hundred and seventy items were retained as good items and included in the final item pool. Of these 170 items, 107 positively discriminated between riders and non-riders and were formed into the parallel test item pool. Forty of the 107 items discriminated statistically.

Inter-item correlations were calculated for the items as grouped by the 24 major content areas.

Two 40 item tests were extracted from the parallel test item pool in such a manner as to maintain a balance of content between the test item pool and the tests.

An effort was also made to assign equal numbers of statistically discriminating items to each form and to fill in the balance of the test with those items which demonstrated a high probability of discriminating between operator experience groups. The items for each test were randomized within each test and the forms were reproduced.

The Major Findings

Tests for parallelism and discrimination were run on each test form. The tests were found to be absolutely parallel (T statistic = .006) and to statistically discriminate between the experienced operator and novice rider--T statistic = 4.82 for form A and 4.99 for form B. This indicates significance beyond the .001 level of confidence.

This test item evaluation and test development exercise has produced two parallel test forms which are suitable for use in measuring the on-the-road knowledge of high school age motorcycle operators. The tests, in theory, have the statistical power to differentiate between two groups of riders--those who know how to operate a motorcycle on-the-road and those who do not know how to operate a motorcycle on-the-road.

DEVELOPMENT OF A GENERAL KNOWLEDGE TEST FOR USE IN MOTORCYCLE OPERATOR EDUCATION AND EVALUATION PROGRAMS

By

Thomas Lee McDole

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to dolores --

my love and inspiration

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. . . found on the back
of a student's answer sheet.

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CHAPTER I

INTRODUCTION

Motorcycles, while with us since the advent of the automobile, have become increasingly popular as a mode of transportation and as a means of spending leisure time. Recently, the number of registrations of motorcycles in the United States has mushroomed exceeding 3,293,400 in 1971. Registrations in the State of Michigan over a five year period from 1964-1969 increased 222.2 percent, growing at a rate of 25.06 percent per year (compound annual growth rate).[1] Several states now require a separate motorcycle operator's license and testing procedure(s) before one can legally operate a motorcycle. In the future, all states will be required to issue separate licenses (or license endorsements) and give separate examinations under the provisions of the driver licensing program standards issued by the Department of Transportation.[2]

Until now there has been little systematic development of tests of operator knowledge for any class of

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[1] Thomas L. McDole, "Motorcycles: Random Particles in the Traffic Stream," HIT LAB Reports (December, 1970) 1-7.

[2] Highway Safety Program Standards (Washington, D.C.: National Highway Safety Bureau, February, 1969), p. 9.

vehicles--including motorcycles. Recently the National Highway Traffic Safety Administration (NHTSA) supported research in the field of driver education and licensing. Two of these projects are of particular interest at this time.

One of these research projects, undertaken by the Human Resources Research Organization (HumRRO), dealt with the development of a Driver Education Task Analysis (hereafter referred to as HumRRO).[3] The other, undertaken by the Highway Safety Research Institute (HSRI), dealt with the development of a "Test Item Bank for Tests of Driver Knowledge."[4] The results of these projects are: (1) source documents describing the tasks necessary to operate various classes of vehicles on the road (products of both the HumRRO and HSRI projects), and (2) multiple choice test items suitable for use in driver education and licensing tests for various classes of vehicle operators (solely the work of HSRI).

The research conducted at HSRI called only for a rudimentary test item development and analysis activity for the motorcycle operator class license while permitting a full scale test item development and validation activity

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[3]A. James McKnight, Driver Education Task Analysis, I, IV (Alexandria, Virginia: Human Resources Research Organization, August, 1970).

[4]U.S. Department of Transportation, Final Report, Contract FH 11-7616, National Highway Traffic Safety Administration.

(including the development of sample tests) for the basic (passenger vehicle) class license. Furthermore, the motorcycle test item analysis was conducted on a small sample (n=35) of experienced riders thus providing only limited data for that riding experience group.

Due to the rapidly expanding motorcycling population, increasing pressure from the Federal Government on the states to implement the provisions of the driver licensing standard, and the desire by some educators to expand motorcycle operator education programs, it has become very important to identify and evaluate a sub-set of these motorcycle test items to serve as the basis for a motorcycle operator knowledge test.

Therefore, the motorcycle test item pool as it currently exists will serve as the beginning point in a comprehensive activity to evaluate the items and develop multiple choice test forms suitable for use in motorcycle operator education and knowledge testing programs.

The Problem

Statement of the Problem

Coupled to the expanding motorcycle riding population and drastically increasing accident rate is an increase in the availability of motorcycle rider education programs. Several organizations are in the process of developing and distributing curriculum materials, teacher preparation

courses, and legislative guidelines[5] aimed at better and perhaps mandatory motorcycle rider education for beginning riders.

Of the multitude of problems facing an area such as motorcycle rider education,[6] two are of interest here:

1. How to identify the various levels of riding knowledge possessed by individuals and hence separate those who know how to ride from the novices. Thus rider education programs can be developed to best serve the needs of each group (assignment to alternative treatments) or to identify those individuals who will benefit from a basic rider education course.

2. There exists a need for a valid, reliable instrument to serve as either a pre-post test and/or final examination. The pre-post test will permit the assessing of the change in knowledge on the part of the student while the final examination will assure that the student has gained the minimum knowledge necessary for safe operation of a motorcycle.

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[5]Including the Motorcycle Industry Council, Inc. (1001 Connecticut Ave.,N.W., Washington, D.C. 20036) has prepared a number of booklets and curriculum guides for use in the classroom as well as providing funding for short courses, including one at Michigan State University, August, 1973. And the U.S. Government through their Highway Safety Program Standards, U.S. Department of Transportation, Federal Highway Administration, National Highway Safety Bureau, February, 1969.

[6]Others include inputs for curriculum development, task analysis, the level of basic traffic (four wheeled vehicle) knowledge.

Origin of the Problem

Over the years the author taught driver education[7] he felt a need to be able to classify students according to entrance level skills--both in the knowledge domain and manipulative aspects (BTW)--and to be able to assign them to alternative treatment programs. Such an assignment would permit a stronger program, geared more closely to the needs of the student and at the same time increase the educational efficiency of the program.

An opportunity presented itself in conjunction with the author's work at HSRI to pursue the development of a device which would classify students entering a motorcycle operator education program based on their level of knowledge of operating a motorcycle. Once developed and tested, such an instrument would pave the way for meaningful assignments to alternative treatment programs in motorcycle education programs.

Purpose of the Study

This paper addresses itself to the development of parallel test instruments (written knowledge tests) which will:

a) have the statistical power to differentiate between two groups of motorcycle operators--those operators who possess and can demonstrate that knowledge necessary to

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[7]The author has over seven years experience as a teacher of Driver Education on both the high school and college (teacher preparation) levels.

operate a motorcycle on the road and those operators who can not demonstrate such knowledge.

b) be able to serve as a comprehensive general knowledge test suitable for use as a final examination in a motorcycle rider education class or as an examination for use in motorcycle operator licensing programs.

Importance of the Study

Students come to a traditional driver education class with varying backgrounds based on their prior experiences, interests and observational skills. The traditional approach has been to take all "comers" and give them the same treatment--namely, begin from what educators think is an appropriate starting point for the class. This approach may bore students who have extensive backgrounds and/or interest in the subject and already know what is being "taught." Often times too, it is assumed that students possess certain knowledges and no attempt is made to verify the assumption. Both situations can be dangerous--either boring the student so that he may miss important information, or by beginning the instruction at a level which is over his head.

Students entering a motorcycle education program are no different than those who are entering a regular driver education program (as described above). In fact, the interest of those entering the motorcycle program may be more intense.

Several test development exercises have been undertaken to develop better tests and items for use in driver education[8] and driver licensing.[9] Likewise, programs have been undertaken to provide for second level driver education courses. However, no test has been devised and widely disseminated which would classify students according to prior knowledge and hence provide a mechanism for assigning them to alternative treatment groups.

Likewise a few attempts have been undertaken to develop test items for motorcycle riders. These include a basic item writing exercise done by the AAMVA[10] to a more sophisticated analysis program done by Texas.[11]

No evidence could be found, however, of an attempt to: (1) develop a general knowledge test which discriminated

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[8]W. G. Berger, T. L. McDole, W. T. Pollock, Development of a National Item Bank for Tests of Driving Knowledge, Interim Report to the National Highway Traffic Safety Administration, U.S. Department of Transportation, Contract FH-11-7616. (Ann Arbor, Michigan: The Highway Safety Research Institute), October, 1971.

[9]Letter, R. S. Coppin (Chief of Research and Statistics, State of California, Department of Motor Vehicles) to W. T. Pollock (Head, Countermeasures Group, Highway Safety Research Institute, University of Michigan), July 31, 1973.

[10]American Association of Motor Vehicle Administrators, Suggested Questions for Motorcycle Licensing, A Report prepared by the Motorcycle Industry Council in cooperation with the National Highway Safety Bureau (undated).

[11]Lewis A. Locke, Motorcycle Operator Licensing: Design, Analysis, and Revision of the Texas Licensing Program, A Research Study Jointly funded by the State of Texas and the U.S. Department of Transportation, conducted in cooperation with the Texas Department of Public Safety and Texas A & M University, College Station, Texas.

between groups of riders for the purpose of assigning them to alternatate treatment groups, and (2) base it on a set of test items developed from a comprehensive source document[12] containing descriptions of riding tasks where the items' content had been selected according to a predefined set of criteria.

Scope of the Study and Limitations

It must be noted that the candidate test items and the resultant tests measure only knowledge necessary for on-the-road operation. Also, the test items do not duplicate those items used in examinations for basic operator licenses. No items concerning the measurement of the attitude or behavioral characteristics (affective domain) of the operator are included. No attempt was made to relate any of the items or tests to the safety performance of the operator (accidents and violations). The tests and items were geared to those with seventh to eighth grade reading abilities. Also, the tests reflect content validity only. The items are based on task descriptions deemed unique or critical to the operation of a motorcycle. No definitive task analysis is yet available which will permit the identification and selection of content areas (and items) crucial to the successful operation

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[12] T. L. McDole and W. G. Berger, Item Writers' Guide for Motorcycle Riding: A Preliminary Outline. Prepared under Contract FH-11-7616 for the National Highway Safety Administration, U.S. Department of Transportation, Washington, D.C. (Ann Arbor, Michigan: The Highway Safety Research Institute, August, 1971).

of a motorcycle and hence the items and tests may lack predictive validity.

The test development is best characterized as a basic test and item development exercise and the resultant tests are at best tentative. While the sample size used in the item evaluation phase of the development is sufficient for reliability, it does not constitute a random sample of all motorcycle operators and hence the results are generalizable only to the parent population (Seniors in the three schools tested). No attempt has been made to provide normative data on the performance of the tests. Hence, any attempts to project student performance on the basis of these tests must await the establishment of normative data. The tests, as developed, are not to be considered as a panacea to the chronic problem of motorcycle crashes and fatalities. Any attempt to use them in this manner constitutes a gross misapplication of the tests. Instead, they are intended to be but one of the tools a practitioner keeps at his disposal to gain insight into his subjects.

Definitions of Terms Used

Dependent Variable: A collection of informational items designed to quantify the on-the-road riding experience and motorcycling interest of the respondent.

N Dep Var: For New Dependent Variable--a revision of the Dependent Variable.

Test Item Pool: A collection of multiple choice test items available for use in forming tests.

Original Test Item Pool: Four hundred sixty three (463) multiple choice test items that served as the input to this thesis.

Revised Test Item Pool: The 282 test items resulting from the revision of the 463 test items in the Original Test Item Pool.

Final Test Item Pool: Those items which were judged "good" after the 282 test items from the Revised Test Item Pool had been subjected to an item analysis.

Parallel Test Item Pool: Those items selected from the Final Test Item Pool which would be available for use in developing the Parallel Tests.

Parallel Test: A test composed of multiple choice test items, for which there is a companion version of like subject matter and similar statistical characteristics which if substituted for the original test would yield similar results.

Multiple Choice Test Item: A statement or question (complete or incomplete) followed by four answer choices for which the respondent is expected to choose the one he feels best or correctly answers the statement or question.

Reliability: How consistently a test item (or test) measures what it purports to measure.

Validity: How accurately a test item (or test) actually measures what it is supposed to measure.

Organization of the Remaining Chapters

In Chapter II, the pertinent literature relevant to passenger vehicle and motorcycle operator testing is reviewed along with that literature pertaining to the development and evaluation of multiple choice tests and their items. In Chapter III the methodological details of the study are presented beginning with an overview of the development of the source document and parent test item pool. The details of the revision and testing of the test items are given followed by the evaluation procedures used. The chapter is concluded with the procedures used to derive the parallel test forms. Chapter IV contains the final test item pool, the parallel test item pool and the data associated with each item that comprises these pools. The Topic Index and items catalogued thereby are also shown. Given also are the parallel test forms and answer keys. A final table gives the results of the pilot test of the parallel test forms. Presented in Chapter V are the summary, conclusions, recommendations for further study, and discussion.

CHAPTER II

REVIEW OF LITERATURE

The review of literature is divided into two major sections dealing with (1) the availability of source information for both motor vehicles and motorcycle operation and testing, and (2) references to traditional methods of test item development, evaluation, and test construction.

Review of Traffic Safety Literature and Testing Materials for Motor Vehicles and Motorcycles

Motor Vehicles

There existed a preponderance of literature associated with owning and operating an automobile. In addition to the legal regulations established by each state and printed in the state driver manuals[13] there existed national guidelines for the establishment of laws and regulations. Two of these guidelines were the Uniform Vehicle Code (UVC)[14] and the Manual of Uniform Traffic Control

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[13] Michigan Vehicle Code, compiled under the Supervision of the Secretary of State, Revision of 1965, Lansing, Michigan; What Every Driver Must Know, Michigan Official Driver Manual, Michigan Department of State.

[14] Uniform Vehicle Code and Traffic Ordinance, Revised 1968, including Supplements (Washington, D.C.: National Committee on Uniform Traffic Laws and Ordinances).

Devices.[15] A wealth of traffic safety literature, teaching materials, course outlines, have been prepared. The most notable of these source documents is the HumRRO Driver Education Task Analysis[16] which performed two functions. First it was in itself a source document containing a virtually complete compilation of tasks associated with owning and operating a motor vehicle and second, it contained a bibliography cataloguing 1006 documents, studies, publications, etc. highly relevant to the field of driver and traffic safety. Malfetti in his A Description of the Driving Tasks Adaptable for a Manual for Beginning Drivers[17] also listed several hundred references pertaining to driver education and traffic safety literature.

Motorcycles

Unfortunately no such preponderance of literature existed for the two wheeled vehicle--namely, the motorcycle.

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[15] Manual on Uniform Traffic Control Devices for Streets and Highways, U.S. Department of Transportation, Federal Highway Administration (Washington, D.C.: U.S. Government Printing Office, 1970).

[16] A. J. McKnight, et al., Driver Education Task Analysis, Volume I, Task Descriptions, prepared under Contract DOT-FH-11-7336 for the National Highway Safety Bureau, Federal Highway Administration, U.S. Department of Transportation, (Alexandria, Virginia: Human Resources Organization, August, 1970).

[17] J. L. Malfetti, A Description of the Driving Task Adaptable for a Manual for Beginning Drivers, prepared for the American Association of Motor Vehicle Administrators under a special Grant by the Insurance Institute for Highway Safety (New York: Teachers College, Columbia University, 1970).

Each state vehicle code[18] contained sections dealing with rules and equipment for motorcycle operation. Many states publish these rules and regulations in their operator license manuals or separately.[19] The Motorcycle Industry Council Safety and Education Foundation (MIC)[20] has prepared a list of references. Other lists of references appear in such documents as Wisconsin's Motorcycle Instruction Series[21] the the U.S. Navy's[22] Motorcycle Safety Course. These documents, in addition to containing bibliographies, are also curriculum guides. Included in the list of curriculum guides is the MIC Beginning Rider Course Guide.[23] The American Motorcycle Association (AMA)[24] has

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[18] Michigan Vehicle Code, op. cit.

[19] An example is the State of Michigan Motorcycle publication, What Every Motorcyclist Must Know, Michigan Department of State, (undated).

[20] Motorcycle Industry Council Safety and Education Foundation, Inc., Selected References and Resources, Motorcycle Safety Education, Connecticut Avenue, Washington, D.C. April 19, 1973.

[21] Frazier Dameron, A Programmed Instruction Series for Motorcycle Riders and Instructors and Other Motorist Drivers (Madison, Wisconsin: Safety Research and Education Center, June, 1972). Prepared under contract #DE-71-005(001) for the National Highway Safety Administration, U.S. Department of Transportation, Washington, D.C. , June, 1972.

[22] The Naval Safety Center, Motorcycle Safety Course (Norfolk, Virginia: Naval Air Station, June, 1972).

[23] Motorcycle Industry Council Safety and Education, Inc., The Beginning Rider Course Guide, Washington,D.C., July, 1973.

[24] American Motorcycle Association, Two Wheeled Wisdom. Columbus, Ohio (undated pamphlet).

has a number of pamphlets, etc. available including Two Wheeled Wisdom. A collection of articles originally published in Cycle World have been reprinted in the booklet Intelligent Motorcycling.[25] Popular magazines such as Cycle World[26] are also sources of information on how to ride. The cycle companies themselves publish riding materials such as Suzuki Motor Corporation's Freedom of the Road.[27] In addition there are some research reports relating accident and driver characteristics. Examples of these would include The California Motorcycle Study by Harano and Peck[28] and "Motorcycles: Random Particles in the Traffic Stream" by McDole.[29] A rudimentary set of task descriptions has been prepared by McDole and Berger which attempts to describe many phases of owning and operating a motorcycle. Titled Item Writers Guide for Motorcycle

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[25]William Kaysing, "Intelligent Motorcycling," Published originally in Cycle World, Long Beach, California: Parkhurst Publishing Company. First Printing, June, 1966.

[26]Cycle World, Long Beach, California: Parkhurst Publishing Company. Monthly.

[27]United States Suzuki Motor Corporation, Freedom of the Road. Prepared in cooperation with the Public Safety Department, Automobile Club of Southern California, Copyright 1965 (Studio City, California: Consultants to Management, Inc.).

[28]R. M. Harano and R. C. Peck, The California Motorcycle Study: Driver and Accident Characteristics, Research Report 28, California Department of Motor Vehicles, July, 1968.

[29]T. L. McDole, Random Particles, op. cit.

Riding: A Preliminary Outline, [30] it is intended to be a companion to and complement the HumRRO Driver Education Task Analysis. [31]

While this may appear to be a fairly extensive list of references, it nowhere nearly matches the large number of references available for the operation of a passenger vehicle.

Review of Testing Materials for Motor Vehicles and Motorcycles

Motor Vehicles

A variety of tests existed for operators of motor vehicles. These included the tests administered by each state as well as tests developed for use in driver education courses. State driver license examinations traditionally have been prepared and administered without regard to extensive psychometric exercises to test the efficacy of the examination. Some states have begun to examine their driver licensing items in detail and apply the principles of test construction to new and revised tests. North Carolina[32] and

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[30] T. L. McDole and W. G. Berger, Item Writers' Guide, op. cit.

[31] A. J. McKnight, Task Analysis, op. cit.

[32] N. E. Freeberg and F. R. Creech, Development of Measures for a Driver Licensing Program in the State of North Carolina, Phase I: Analyses of Current Licensing Tests, under Contract with Highway Safety Research Center, University of North Carolina (Princeton, New Jersey: Educational Testing Service, July, 1971).

and California[33] are good examples of this. To assist the states in upgrading their tests, the NHTSA issued a contract[34] to prepare and evaluate multiple choice test items based on the HumRRO Driver Education Task Analysis.[35] This is the most extensive undertaking of its kind ever and should provide a guide to those who wish to upgrade driver licensing tests in the future. It also will serve driver education as well.

Test items for driver education have been prepared by many individuals for many purposes, and to varying levels of test construction sophistication. They range from the published tests accompanying textbooks in driver education[36] to the specially constructed and evaluated items used for special studies.[37]

Motorcycles

As in the lack of availability of safety oriented literature for motorcycles (as contrasted to the availability of literature for motor vehicles), there is a similar lack of availability of test materials for motorcycles.

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[33] R. S. Coppin, op. cit.

[34] W. G. Berger, et. al., National Item Bank, op. cit.

[35] A. J. McKnight, Task Analysis, op. cit.

[36] As an example, Sportsmanlike Driving, American Automobile Association, prepared by Driver Education Specialists, McGraw-Hill Book Company, Inc., 1962.

[37] An example, . . . Robinson, op. cit.

The states which require a separate motorcycle license or endorsement generally have a separate test. Currently, less than one third of the states require such a test although it is being encouraged by the Federal Government's Highway Safety Program Standards.[38] Texas[39] has undertaken an extensive study of its motorcycle licensing program including a full scale evaluation and revision of its written test. This represents, perhaps, the best effort in the motorcycle licensing field to that date. A study by Malany[40] suggested that a continuing effort be made to maintain a motorcycle test item book and periodically evaluate it.

The AAMVA has prepared a list of Suggested Questions for Motorcycle Licensing[41] which was subjected to an expert and subject review. No indication of an item analysis was indicated.

In all, no program of motorcycle test item development appears to have taken the direction of this thesis--namely:

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[38] Highway Safety Program Standards, U.S. Department of Transportation, Federal Highway Administration, National Highway Safety Bureau, February, 1969.

[39] Lewis A. Locke, op. cit.

[40] L. L. MaLaney, A Report Developing a Comprehensive State Program of Motorcycle Driver's Licensing, Research Report No. 3 (Urbana, Illinois: Highway Traffic Safety Center, August, 1969).

[41] American Association of Motor Vehicle Administrators, Suggested Questions for Motorcycle Licensing, op. cit.

1. The preparation of test items from a comprehensive source document whose content is supported by data, and then

2. subjected to a full scale test and item development and evaluation program.

Review of Test Construction

A test is a measuring instrument. It is used to measure and quantify--in the educational sense--what a student knows about a particular subject. To construct an adequate measuring instrument, two fundamental questions must be answered: (1) What is to be measured, and (2) how is it to be measured. Micheel and Karnes[42] state that these two questions must be answered in "developing . . . [a] measuring instrument"--namely . . . "(1) Determine exactly what is to be measured and (2) obtain or construct a measuring instrument that will best do the measuring."

These two principles are embodied in this thesis. The first (determination of what is to be measured) is generalized in the title of this thesis (Development of a General Knowledge Test for Use in Motorcycle Operator Education and Evaluation Programs), and the second (construct a measuring instrument . . .) is the thrust of the thesis. The first sub-part of this literature review will detail the accepted principles of test construction and the second will deal with item preparation and evaluation.

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[42] W. J. Micheels and M. R. Karnes, Measuring Educational Achievement (New York: MacMillan Company, 1952), p. 7.

General Principles of Test Construction

Each test should begin from a precisely stated set of objectives of what is to be measured or what is expected of the individual being tested.

> Before a successful test can be constructed, the test maker must be able to answer the question, 'just what am I trying to measure.'[43]

Having established the content of the test through an examination of the objectives of the test and content of the course or expected knowledge of the individual, one can proceed with a degree of assurance that the test will have content validity. Mager concluded his book Preparing Educational Objectives by saying:

> Once armed with objectives that communicate and an intent to demonstrate their achievement, you are ready to accomplish the next step in instructional design--that of preparing your . . . examination.[44]

Berger[45] listed several of the characteristics for a good test ". . . if it is to serve as an effective measuring device." Micheels and Karnes[46] also give a similar

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[43] Ibid., p. 99.

[44] Robert F. Mager, Preparing Instructional Objectives (Palo Alto, California: Fearn Publishers, 1962).

[45] W. G. Berger, Understanding Test Construction: The Design of License Knowledge Tests, Ann Arbor, Michigan, The Highway Safety Research Institute. (Prepared for inclusion in A Handbook for Driver Licensing Knowledge Testing under Contract FH-11-7616 for National Highway Safety Administration, U.S. Department of Transportation, December, 1971).

[46] W. J. Micheels and M. R. Karnes, op. cit., pp. 103-124.

list of good test characteristics in their Chapter 4 "What Makes a Good Test." Summarized from Berger, these characteristics are:

1. The test must be reliable.
    a. The test must be objective.
    b. The test must contain a sufficient number of items.
2. The test must be valid.
3. The test must be economically and logistically feasible.
4. A reliable and valid test begins with good items and a good format.

> Reliability as applied to educational measurements, may be defined as the level of consistency of the measuring device. In general, this consistency reflects the degree to which the test . . . may be depended upon to yield similar test results under similar circumstances.[47]

Objectivity in a test refers to that property of the test which renders it free of bias when evaluated (scored) by different people.

When a test contains a sufficient number of items, "the impression inherent in individual items tends to be less important in determining an applicant's score as more items are added to the test."[48]

"Validity is generally defined as the degree to which a test measures what it claims to measure."[49] Four

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[47] W. R. Borg, Educational Research: An Introduction (New York: David McKay Company, Inc., 1965), p. 84.

[48] W. G. Berger, op. cit., p. 2.

[49] W. R. Borg, op. cit., p. 80.

types of validity are recognized as important, and each test should have all four. However, two are of paramount importance.

> 1. Content validity is the degree to which the sample of test items represents the content that the test is designed to measure.
>
> 2. The concurrent validity of a test is determined by relating the test scores of a group of subjects to some concurrent criterion measure . . .
>
> 3. Predictive validity is the degree to which the prediction made by a test are confirmed by the later behavior of the subjects tested.
>
> 4. Construct validity is the degree to which a test is based upon a particular theory or theoretical construct.[50]

To be economically and logistically feasible, the test must be easily administered and scored--multiple choice questions and mark sense answer sheets for example--as well as be formatted in such a manner as to be easily followed, with clean, concise, and uniform instructions. It must also have that number of questions which can be answered in the allotted or available time.

Finally, the test must consist of good items in a readily readable and consistent format. Figure 1 from Berger provides a good summary of what constitutes a good multiple choice test and acceptable item format.[51]

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[50] Ibid., pp. 80-83.

[51] W. G. Berger, Understanding Test Construction, op. cit., p. 8.

Make the Mechanics of the Test as Simple as Possible

1. Directions should be complete. They should state clearly and concisely:
   a) what the applicant is required to do,
   b) how the response is to be indicated, and
   c) where the answer is to be placed.

2. The directions should include at least one example of an item correctly answered. A large number of the first responses can be traced directly either to failure to understand the intent of the directions or the applicant's failure to read carefully.

3. Examples used in the directions should be taken from the subject matter of the test. Make the examples meaningful.

4. If correction for guessing is to be made when scoring the test, this should be explained in the directions. It is recommended, however, that no attempt be made to correct for guessing.

5. Keep the method of recording responses as simple as possible. The technique of answering test items can easily become more difficult than recalling or recognizing the information needed to make the response.

6. Avoid the weighting of items. Each single item should be numbered and should contribute 1 point. If a particular point is highly important and you wish to stress it in a test, ask several items concerning situations in which the point is involved.

7. Arrange the items in such a manner that it will not be necessary to refer to more than one page in answering a given item.

8. Arrange the choices so that the correct response appears with approximately equal frequency in each position (i.e., 1/4 a's, 1/4 b's, 1/4 c's, and 1/4 d's).

9. If the choices involve numbers, arrange them in order of increasing magnitude (e.g., a) 10 mph, b) 15 mph, c) 20 mph, etc.).

10. Present items in a positive rather than a negative form where possible. If a negative form is used, underline the negative word(s) (e.g., not, except, etc.).

11. Give the applicant ample time to complete the test. The administration of the test should reinforce the test objective--i.e., the assessment of knowledge, not reading speed.

Construct the Individual Items with Care

1. Do not include one item that supplies the answer to another on the same test.

2. Make each item independent of the others. Do not have the correct response to one item dependent upon the response to another on the same test.

3. Make the test comprehensive, but exclude trivial and insignificant items. Sample the whole range of important topics.

4. State questions clearly; eliminate ambiguous items. Well-constructed test items should lend themselves to one and only one interpretation by those who know the subject matter involved. That is, a given test item should mean essentially the same thing to all of the applicants who know the point in question.

5. Include no item for which the answer is obvious to a person who does not know the subject matter.

6. The responses (choices) should all be related to a central point or concept.

7. Do not include a pair of mutually exclusive and exhaustive statements among the choices. For example, "You should pass other vehicles on:
   a) the right }
   b) the left }
   c) steep hills
   d) sharp curves"
   This practice has the effect of reducing a four-choice item to a two-choice one.

8. The distractors should be as informative as the correct response.

9. The stem should be as short as possible (less than sixteen words).

10. The choices should be of equal length and verbal difficulty.

11. Word questions in the simplest manner possible. Confine the terms used to the minimum vocabulary needed.

12. Do not use definitions (e.g., "Highway hypnosis is . . ."). Definitional items tend to measure verbal ability and memory rather than knowledge of the critical driving behaviors involved.

13. Include items at all levels of difficulty to insure a significant range of test scores and to get discriminations.

14. Make out the key or answers to the questions at the same time that the test is made.

15. Use a panel of experts to initially determine the adequacy of the item and the appropriate answers.

Figure 1.--Points to be Considered in the Initial Construction of a Test.

Micheels and Karnes[52] listed twelve steps to follow in building a test. They were:

1. List the major obejectives for which an appraisal is desired.
2. Examine the course content for additional objectives.
3. Analyze and define each objective in terms of expected student outcomes.
4. Establish a table of specifications [reasons for selecting topic or objective for testing].
5. Construct one or more test items for each objective listed.
6. Assemble the items for the test.
7. Write clean and concise directions for each type of question.
8. Study every aspect of the assembled test.
9. Construct the key.
10. Have other instructors (experts) criticize and, if possible, actually take the test.
11. Make any necessary revisions.
12. After the test has been administered to one or two groups of students, analyze and improve it.

Also given in Micheels and Karnes,[53] were guidelines for actual construction of the individual multiple choice items. These guidelines overlapped both the above suggestions and those given by Berger in Figure 1 and, therefore, are not repeated here.

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[52] W. J. Micheels and M. R. Karnes, Measuring Educational Achievement, op. cit., pp. 126-129.

[53] Ibid., pp. 160-193.

Once the tests have been formatted, reproduced, and administered to subjects, the items must be subjected to an item analysis and the overall test scrutinized.

Item and Test Evaluation

With the statement "all tests can be improved"[54] in mind, one begins a careful and prudent analysis of both the test and its items.

To evaluate the test, one can look to Micheels and Karnes and other references on test construction for suggestions on analyzing the total score. However, two questions posed by Micheels and Karnes will be helpful here:

1. Does this test really measure the objectives that I set out to measure?
2. Do the scores on the test provide me with information that is really useful in evaluating my students' achievements and my teaching efforts?[55]

The former is a subjective judgment. The latter can be determined by an analysis of the total score as discussed in the above reference. However, a more important step is an analysis of the individual items.

Under the general heading of Item Analysis, Berger[56] listed several steps in evaluating the individual items.

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[54] W. J. Micheels and M. R. Karnes, Measuring Educational Achievement, op. cit., p. 454.

[55] Ibid., p. 457.

[56] W. G. Berger, Understanding Test Construction, op. cit., pp. 10-37.

Micheels and Karnes[57] and Garrett[58] also gave item analysis techniques.

Summarized, they included: (1) an examination of the item construction and difficulty looking for alternatives (answer choices) which are not performing well i.e., one or more not being chosen by any subjects or for items which are too difficult (no one gets it correct) or too easy; (2) a determination of the inter-relationship between items of similar content so as to determine which appear to be measuring the same thing; (3) a selection of statistically similar items to reduce their number and avoid duplication; (4) reliability of the items to eliminate those which are unreliable; and (5) validity to determine if the items are more closely associated with external factors such as age, educational achievement, etc.[59]

Other measures of item analysis often employed include building an index of discrimination[60] for each item using the responses of the high and low scoring students

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[57] W. J. Micheels and M. R. Karnes, op. cit.

[58] H. E. Garrett and R. W. Woodworth, Statistics in Psychology and Education, Fifth Edition (New York: David McKay Company, Inc., 1958).

[59] The formulae necessary to calculate the statistical values can be found in elementary statistical tests such as Downie and Heath, and Hayes; W. L. Hays, Statistics (New York: Holt, Reinhart and Winston, 1963); N. M. Downie and R. W. Heath, Basic Statistical Methods, 2nd Edition (New York: Harper and Row, Publishers, 1965).

[60] Mimeographed information obtained from Michigan State University Test Score Office.

based on a criterion variable--usually total score. The use of a nomograph can also be used to assign discriminating values to test items.[61]

Items which fail to measure up to acceptable standards can then be either re-written and re-evaluated or eliminated from the test. Thus one is left with good items for a test. The process of item analysis permits one to build a test with the power to discriminate.

Summary

In Chapter II, the literature pertinent to the safe operation of motor vehicle and motorcycles and testing of their operators was reviewed. Also included was a review of the general principles of test item and test construction and evaluation. Described in Chapter III---Methodology of the Study--are the procedures and details of the study. Topics covered include: Origin of the Motorcycle Test Item Pool and Source Document; Preparation of the Test Items; Data Collection; Data Analysis and Test Item Evaluation; Development of the Parallel Tests.

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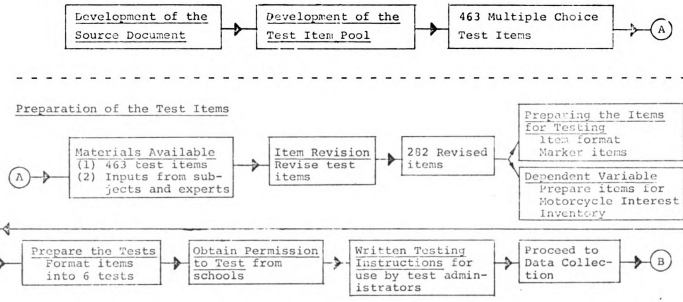
[61] C. H. Lawske, Jr., Principles of Personal Testing (New York: McGraw Hill Book Company, Inc., 1948) p. 190.

CHAPTER III

METHODOLOGY OF THE STUDY

The methodology of the study details the procedures employed and steps taken to extract the parallel test forms and items from the original set of 463 multiple choice test items. Major topics include: Origin of the Motorcycle Test Item Pool and Source Document; Preparation of the Test Items; Data Collection; Data Analysis and Test Item Evaluation; Development of the Parallel Tests; and Summary. The flow chart (Figure 2) depicts the steps described in this chapter and serves as both an overview of the procedures used and as a means of portraying the sequence of events.

Origin of the Motorcycle Test Item Pool and Source Document



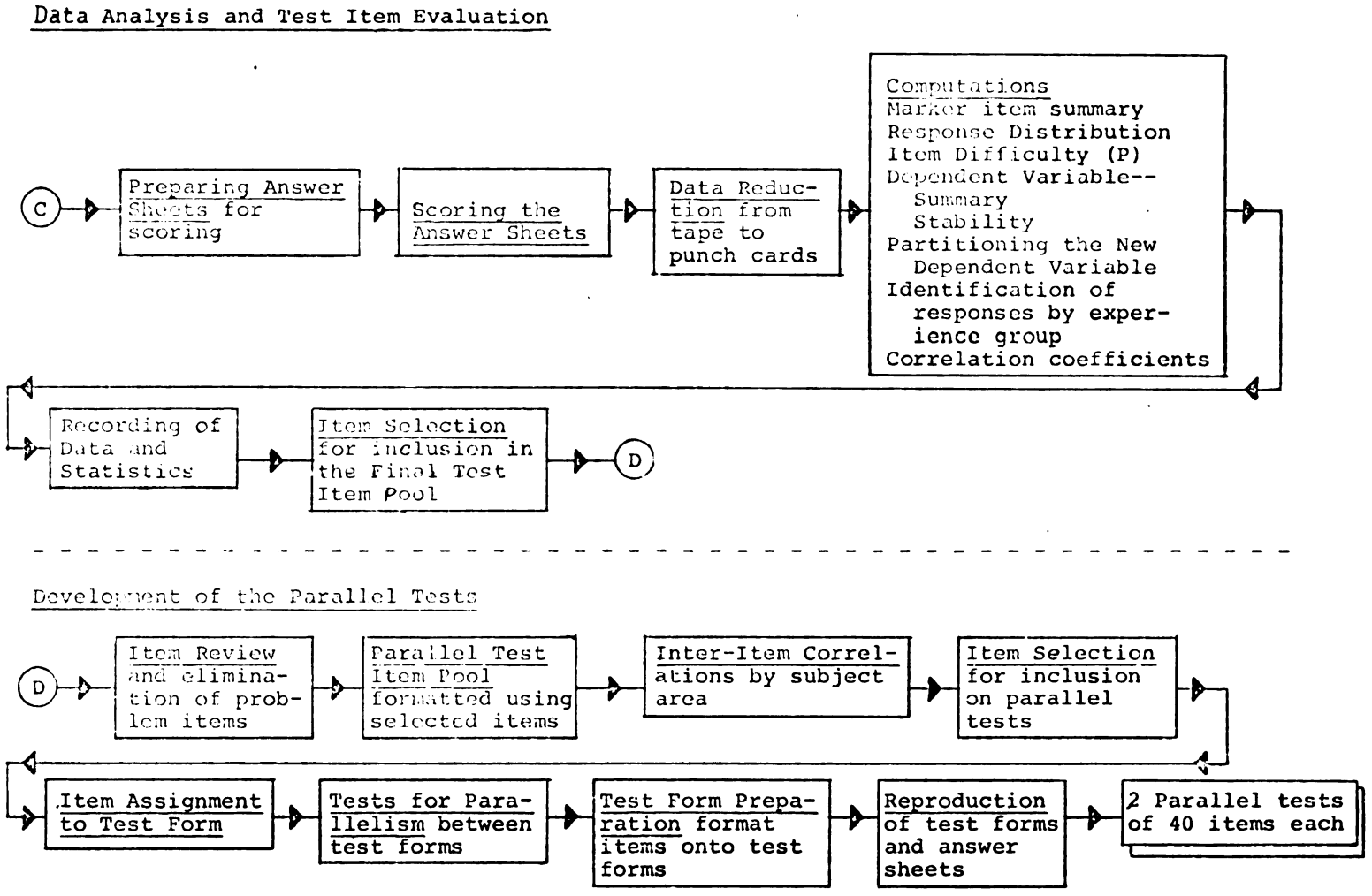


Figure 2.--Flow Chart Depicting the Methodology of the Study.

Origin of the Motorcycle Test Item Pool and Source Document

Overview

The National Highway Traffic Safety Administration (NHTSA) awarded a contract to the Highway Safety Research Institute (HSRI) for the "Development of a National Item Bank for Tests of Driver Knowledge" for all classes of operator licenses and vehicles. Under terms of the contract, HSRI was to use the Driver Education Task Analysis (HumRRO) and the Uniform Vehicle Code (UVC) as source documents for the development of several hundred written driver license test items to be used as an item pool for developing written driver license tests.[62] The test items were to be arranged in four pools corresponding to each of the vehicle classes under the classified license system: passenger cars and small trucks, straight trucks, combination vehicles, and motorcycles. Included in this exercise was to be an in-depth evaluation of the passenger car and small truck (basic license) test item pool.

To complete the activities in Phase I of the contract, each of the states was asked to furnish copies of all of their written driver license tests. The responses were divided into the respective license classes and each item

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[62] Additionally, the Manual of Uniform Traffic Control Devices was adapted to serve as a source document for traffic control signs, signals, and markings. The adaptation is known as An Item Writers' Guide for Traffic Control Devices.

catalogued. The content areas to be used for writing the test items were selected from this catalogue of items and from among the topics rated critical in HumRRO. In all, 1328 test items were written covering the operation of basic vehicles. To adequately cover the other classes of vehicles it became necessary to develop source documents for motorcycle and truck operation. The Item Writers' Guides, as they are called, provide an outline for and information about operating these classes of vehicles. Using these source documents, test items were written for the remaining vehicle classes. The motorcycle item pool contained 463 items; the truck item pools contained approximately 800 items. In each of these item pools, the items covered only those aspects of operation which were different from or critical to that particular vehicle class. Thus, the pools did not overlap in subject matter. The basic item pool is requisite to all other license classes or pools. Each of the test items in all pools was reviewed and rewritten where necessary, catalogued, and prepared for publication.

Phase II of the contract consisted of an evaluation of the items in the basic pool only which closely followed the "classic" methods of test item evaluation. Included in this evaluation were such activities as item prescreening, item analysis, item pilot testing, item norm development, and some preliminary work on item validation.

The motorcycle item pool, while published along with the basic item pool, was only to be evaluated at a much

later date. The truck item pool was not to be evaluated. This left large gaps in important areas of driver knowledge testing.

Development of the Source Document

The motorcycle test item pool and companion item writers' guide (Appendix B, Item Writers' Guide for Motor-Cycle Riding: A Preliminary Outline)[63] were developed through a joint effort of Dr. W. G. Berger and the author. Each shared responsibility for the implementation of the driver license knowledge testing project at HSRI. The following narrative explains the major steps involved in the implementation of the project so that the reader can gain an insight into the preparation of the source document and the item pool--both comprehensive in scope.

Following the awarding of the driver licensing contract to HSRI in 1970, correspondence with the driver licensing administrators in the 50 states and the District of Columbia requested that copies of all driver license written tests be forwarded to HSRI.

Forty-six of the 51 licensing administrators responded. The replies were divided into the respective license classes (operator, chauffeur, etc.) and catalogued. The replies for the motorcycle class were catalogued

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[63]Originally published as a part of the interim report for Contract FH-11-7617, National Highway Traffic Safety Administration. Now published under the title Item Writers' Guide for Motorcycle Riding: A Preliminary Outline and subsequently referred to as the Guide.

according to the HumRRO indexing scheme (as used for cataloguing the basic class items). When duplicate questions were eliminated, a total of 904 unique questions were found to be used by the various states on their motorcycle license examinations. Subsequently, 182 items were added from other sources providing an item base of 1086 items currently in use for testing motorcycle operators (September, 1970).

Through an extensive search of the available literature including library searches, discussions with local motorcycle dealers and riders, it was determined that the bulk of the motorcycle literature was addressed to those tasks necessary for learning how to ride, but that little or nothing was said about the tasks used in day-to-day operation. Thus, it became apparent that a comprehensive source document was necessary which detailed the procedures associated with a large number of motorcycle riding tasks and which was organized in such a manner as to permit identification of riding tasks which were unique and/or critical to riding a motorcycle.

A careful examination of HumRRO revealed that it would provide a suitable framework for the development of a similar document on motorcycle operation. Hopefully, the development of a preliminary description of the tasks involved in motorcycle riding would: (1) identify those unique and critical aspects of motorcycle operation, and (2) provide an outline for the cataloguing of existing

motorcycle test items and for those yet to be written and/or revised.

Contact was made with the Cycle Conservation Club of Michigan through the Michigan Department of Education and the Greater Lansing (Michigan) Safety Council and an agreement reached whereby three members of the Club (President, Secretary-treasurer and a member) would sit as a committee to rewrite HumRRO to reflect motorcycle riding. The committee rewrote existing statements, deleted inappropriate statements and added new statements where applicable, deleted several entire sections inappropriate to motorcycle operation, and added new sections where necessary to reflect the spectrum of motorcycle riding tasks and situations. Listed in Figure 3 is the table of contents for the Guide (Item Writers' Guide for Motorcycle Riding: A Preliminary Outline).[64] A reader familiar with HumRRO will be able to see the similarities and note the differences.

Once the task of adapting the original document had been completed, it was checked for content and completeness using the available literature and the existing motorcycle license test items as references. Modifications were made where necessary, while retaining as much of the original HumRRO statement numbering and structure as possible. Those

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[64]The Guide is probably best thought of as a taxonomy of tasks necessary to ride a motorcycle on the road. It is but one of the steps necessary for a complete task analysis, and in its current form represents only a compilation of tasks.

ON-ROAD BEHAVIOR

Basic Control Tasks
- Pre-operative procedures
- Starting
- Accelerating
- Steering
- Speed control
- Stopping
- Skid control

General Driving Tasks
- Surveillance
- Compensating for physical limitations
- Navigation
- Urban driving
- Highway driving
- Freeway driving
- Carrying passengers

Tasks Related to Traffic Conditions
- Following
- Passing
- Entering and leaving traffic
- Lane changing
- Parking
- Reacting to traffic
- Driving with other motorcycles

Tasks Related to Roadway Characteristics
- Negotiating intersections
- On-ramps and off-ramps
- Negotiating hills
- Negotiating curves
- Lane usage

Tasks Related to Roadway Characteristics (cont.)
- Road surface and obstructions/hazards
- Turnabouts
- Off-street areas
- Railroad Crossings, bridges and tunnels, toll plazas

Tasks Related to the Environment
- Weather conditions
- Night driving

Tasks Related to the Motorcycle
- Carrying packages or luggage
- Responding to motorcycle emergencies
- Roadside servicing

OFF-ROAD BEHAVIOR

Pre-Trip Tasks
- Planning
- Use of alcohol and drugs
- Maintaining and accommodating physical and emotional condition

Maintenance
- Routine care and servicing
- Periodic inspection and servicing

Legal Responsibilities
- Driver and motorcycle certification
- Post-accident responsibilities

Figure 3.--Table of Contents for the Item Writers' Guide for Motorcycle Riding: A Preliminary Outline.

statements which were identical to HumRRO statements were designated by all numeric (HumRRO) code whereas those statements which were unique to motorcycles were designated by alpha-numeric codes. The Guide was then reproduced in a limited quantity and sent to experts (Motorcycle Safety Specialist, NHTSA, Professor of Safety Education, Representative of a Recreational Cycle Club) for review.

The arrangements made with the experts were to have them review the document and comment on its contents. Each expert performed the following tasks:

1. In the process of reading the Guide,

   a. Change any statement that may be unsafe or improper on a motorcycle.

   b. Delete any statement that may be totally improper or wrong by crossing out same.

   c. Add statements or indicate sections to be included which have been omitted and where these sections should be placed.

2. Circle the NUMERIC codes (i.e., 21-111, etc.) associated with statements felt to be significantly more important for motorcycles than for passenger cars from a safety and traffic flow standpoint.

Upon return of the documents by the experts, the comments were reviewed and, where indicated, changes were again made in the Guide by the author. An item designated by the experts as representing a behavior more important for motorcyclists than passenger car driving was considered a "critical" statement. The criticality ratings indicated by experts were not incorporated in the final document, but

were reported in Appendix E of the project technical report.[65] The manuscript was then prepared for publication and distribution.

The resulting document, Item Writers' Guide for Motorcycle Riding: A Preliminary Outline (the Guide) represents a compendium of tasks associated with owning and operating a motorcycle on the street.

Development of the Test Item Pool

At this point in the project, work had been completed on the Composite Topic Index (the final organizational scheme for indexing all the test items in all vehicle classes). All of the existing test items as collected from the states were then recatalogued according to this index.

To assist in identifying those areas of motorcycle operation which should be tested, data on motorcycle accidents were gleaned from the HSRI Accident Data Files and other sources. Using the data gathered, the criticality ratings, the unique statements as identified from the Guide, and the existing items from the states, statements in the Guide were identified as being either unique to the operation of a motorcycle, critical to the operation of a motorcycle (as identified by experts and verified with supporting data), or items already being used as supported by questions from the various state licensing examinations. Thus, areas of motorcycle operation were identified for which test items

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[65] W. G. Berger, et. al., National Item Bank, op. cit.

should be written. Also, all the sections of the UVC applicable to motorcycles were included.

Multiple choice test items were formulated based on the statements previously identified in the Guide. Each item was carefully constructed using accepted rules of multiple choice test item construction. Once the rough questions were completed, they were reviewed by other staff persons at HSRI and revised where necessary. Reading level spot checks and vocabulary checks were made. Also each item was examined for grammatical and structural problems and for content consistency and scope with the Guide.

Each major content area in the Guide was represented by items in the pool. In all, 463 items were prepared reflecting not only the scope of the Guide but on-the-road riding as well.

Listed in Figure 4 is the Composite Topic Index used as the master index for all the test item pools.[66] As reproduced here, it reflects those topics which were included in the motorcycle test item pool.

As a final exercise, each test item was subjected to a two phase review. This procedure consisted of (1) a review by experienced motorcycle riders acting as paid subjects to take every test item, and (2) a review by motorcycle riding experts of each item. The paid subjects (nine in all) answered each of the 463 items. After scoring the items, the subjects who received the highest scores were interviewed about why they chose the answer they did on the items they

[66] Ibid.

A.* Pre-Operative Procedures

1. Vehicle Related
   a. Pre-trip inspection and procedures
   b. After entering vehicle Upon mounting motorcycle (See also: Carrying Passengers)
   c. Starting and stopping the engine
   d. After starting engine

2. Navigation and Trip Planning
   a. Planning
      4. Prepares for long trip
   b. Navigation
      1. Location and route awareness

B. Basic Knowledge

1. Fundamental Control Information and Maneuvers
   a. Shifting gears
      1. Standard
      2. Automatic
      3. Downshifting when necessary
      4. Difficulty shifting
      5. Emergency downshift
   b. Lane usage
      1. General
      2. Multi-lane
   c. Following
      1. Following distance
      2. Speed adjustments
   d. Hauling and towing loads
      1. General
   e. Carrying passengers
      2. Seating Passengers

2. Directional Control
   a. Steering general
   b. Turning (See also: Backing up)

3. Speed control
   a. Starting on a hill
   b. Starting on snow or ice
   d. Speed control--normal (see also: Shifting gears)
   e. Speed control--slow speed

4. Braking and Stopping
   a. Technique and procedures (See also: Rapid stop)
   b. Distance
   c. Emergency (See also: Shifting gears and Emergency situations)

5. Driver Perception and Communication
   a. Surveillance
      1. General
      2. Traffic
      4. Vehicle interior and operating conditions
   b. Signals and signaling

6. Maneuvers
   a. Entering and leaving traffic (See also: Freeway driving on and off ramps)
      1. Entering traffic
      2. Leaving traffic
      3. Entering and leaving off street areas
   b. Negotiating intersections
      1. Approaching intersections
      2. Traversing intersections
   c. Negotiating curves
      1. Approaching curves
      2. Driving through curves

(continued)

*The alpha-numeric section indicators follow the scheme used in the basic test item pool for passenger cars (see footnote 8). Since not all sections are applicable to motorcycles, they have been deleted from this listing.

Figure 4.--Test Item Pool Organization, Composite Topic Index.

d. Negotiating hills
   1. Upgrades
   2. Downgrades
e. Lane changing
   1. Prepares to change
   2. Completes change
f. Passing
   1. Prepares to pass
   2. Changes lanes (See also: Lane changing)
   3. Passes vehicle
g. Turnabouts
   1. U-turns
i. Parking
   1. General
   2. Legal regulations
   3. Parallel
   4. Angle
   5. Perpendicular
   6. Securing vehicle
   7. Leaving space
   9. At edge of roadway (See also: Entering and leaving traffic, Disabled vehicle)
j. Driving in off-strees areas (parking lots, loading areas, deliver areas, etc.) (See also: Entering and leaving off-street areas)

7. Road and Weather Conditions
   a. Road surface and obstructions
      1. Surface type
      2. Surface irregularities
      3. Road cover
      4. Roadway edges
      5. Roadway obstructions
   b. Weather conditions
      1. Visibility
      2. Temperature
      3. Wind

8. Emergency Situations and Maneuvers
   a. Vehicle emergencies
      1. On-road critical
      2. On-road non-critical
      3. Preparations for possible emergencies
      4. Emergency downshift (See also: Shifting gears)
      5. Emergency stop (See also: Stopping, Skid control)
      6. Seeks emergency assistance for disabled vehicle (See also: Reacting to Traffic, Roadside Services and Parking)
   b. Skid control
      1. Preventive measures
      3. Arrests skid (See also: Skid control, Deceleration)
      4. Deceleration
   c. On-road emergencies (See also: Reacting to Traffic)

C. Driving Situations

1. Urban driving
   a. General
   b. Commercial areas
   c. Residential areas

2. Highway driving
   a. General highway driving
   b. Rural highways
   c. Mountainous terrain

3. Freeway driving
   a. On-ramps
   c. Moving with traffic
   f. Off-ramps

4. Reacting to Traffic--General On-road Emergencies
   a. Reacting to other vehicles
   b. Reacting to pedestrians

5. Night driving
   a. General
   b. Urban
   c. Rural

(continued)

Figure 4.--Continued.

6. Railroad Crossings, Bridges and Tunnels, Toll Plazas, Weigh Stations
   a. Railroad crossings
   b. Bridges and tunnels
   c. Toll Plazas

D. Vehicle and Driver

1. Physical and Emotional Conditions
   a. Temporary (fatigue, carbon monoxide, etc.)
   b. Alcohol
   d. Vision
   e. Hearing
   f. Illness
   g. Preoccupation and distraction --emotional conditions

2. Vehicle Care and Servicing
   a. Fuel Stop service
   b. Roadside service
   c. Routine service

E. Driver Responsibilities

1. Driver Responsibilities to the Laws
   a. Driver licensing
   b. Vehicle registration
   c. Insurance
   g. Required equipment

2. Post-Accident Responsibilities
   a. Stops vehicle
   b. Notifies police
   c. Offers assistance to injured
   d. Warns other traffic
   e. Exchanges information
   f. Reports accident

F. Vehicle Code--Laws and Regulations

1. Definitions

2. Vehicle Registration and Title

4. Drivers' License

8. Rules of the Road
   h. Speed restrictions
   n. Special rules for motorcycles

9. Equipment of vehicles
   e. Equipment on motorcycles and motor driven cycles

Figure 4.--Continued.

missed. Their responses were recorded to be used later in revising the items. The experts (32 in all) were given a sub-set of the items along with a copy of the Guide and a reference list of where the source could be found in the Guide and asked to evaluate each item in terms of its accuracy in reflecting the context of the Guide. Their comments were also recorded for later use.

The publication of the items in the final report constituted the completion of this phase of the contract.

As a result of these efforts, three documents were prepared and available for use: (1) An Item Writers' Guide for Motorcycle Riding: A Preliminary Outline (the Guide); (2) a test item pool containing 463 multiple choice items covering the range of critical on-the-road riding tasks; (3) a set of comments about each item as compiled from experienced motorcycle riders and motorcycle riding experts.

This set of test items ([2] above) and set of comments ([3] above) form the basis for the test item evaluation and test development efforts described in subsequent chapters.

Preparation of the Test Items

Materials Available

In September, 1972, the following documents and materials were available for use in carrying out the objective of this study:

1. The Guide[67] which served as a source document for the item content along with the UVC.

2. The item pool consisting of 463 multiple choice test items (four responses per item) indexed according to the Composite Topic Index. [68]

3. A review of each item by:
   a. nine paid subjects who answered every item,[69]
   b. at least two "experts" in the field of motorcycle riding.[70]

4. Comments on each of the items by:
   a. subjects who scored well on the test but missed specific items,
   b. experts who felt that an item did not accurately reflect the intent of the Guide, good riding practice, or both.

Item Revision

The first task in this study consisted of scanning each of the 463 items, searching for those which duplicated or otherwise provided overlapping coverage of sections in the Guide. There were thirty such items, and they were flagged for combination into one item or for the elimination of one of the duplicating items. Often times a section was covered by two or more detailed items. These were subsequently rewritten into one item of a more general nature. This was also the procedure in the cases where a section was covered by a general item and a detailed item. Some of the

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[67] T.L. McDole and W.G. Berger, Guide, op. cit.

[68] W.G. Berger, et. al., National Item Bank, op. cit.

[69] All 463 items were combined into one test which was taken by all nine subjects.

[70] Experts included educators, lawyers, policemen, industry representatives, etc.

duplicating items were simply omitted after determining that their content was covered.

The comments made by the experts and paid subjects, an indication of the source material location for the item in the Guide, and the item were assembled for review. In all, 316 items were identified for review and possible revision and 147 were left as originally written.

Each item, thus identified for review, was carefully examined in light of the comments made by the experts and the paid subjects. In addition, the source material (as shown in the Guide) for each item was also reviewed.

One of four actions resulted. The item was either: (1) retained as originally prepared; (2) revised, rewritten, edited, or illustrated as necessary; (3) combined with another item of similar or like content; (4) discarded. The goal was to correct and strengthen the item and to eliminate duplicity in the pool. As a result, 96 items were omitted, 161 items were revised, 129 items were retained in their original form, and 77 items previously marked for revision were retained as usable in their original, unrevised form. A total of 367 items emerged from the review and revision.

The ideal test size for a one hour testing period is about 50 items per test. With the item pool at 367 items, this meant approximately eight test forms. Since the desired sample size per test is 100 subjects, this meant approximately 800 students would be needed. In preliminary talks with schools it became apparent that obtaining this large

a sample would be difficult as one school system would have difficulty providing that many students. Also cost became a factor, not only in increased material expense, but personnel to administer the tests. Also, the larger the sample, the more costly the analysis. It therefore seemed imperative to reduce the item pool to a more manageable size. In the process of negotiations with school systems, it became apparent that two systems would be able to provide about 600-650 students. Thus, an attempt was made to reduce the number of items in the pool to less than 300 so that the number of subjects per test could be maintained at 100.

The items in the revised item pool (arranged by topic) were reviewed again with an eye to eliminating or combining items so as to reduce their overall numbers, but not to reduce the content coverage. This was a judgmental exercise resulting in the elimination of an additional 85 items, leaving 282 items in the pool for an average of 47 items on each of six test forms.

This final pool of 282 items was then reviewed for (1) the correct answer, (2) consistent vocabulary (language), (3) correct and consistent grammar, punctuation and format. A reading level check was not made on the items as (1) they had been spot checked during their initial preparation under the contract, and (2) the correlation of the responses to each item with an independent measure of reading achievement for each subject would provide an index of verbal difficulty for the items.

Once verified, the 282 items in the pool were grouped according to their content area and organized according to the Composite Topic Index (see Figure 4 for the Topic Index). These 282 items were consecutively numbered so that individual items, when removed from the pool, could be uniquely and readily identified. This number is subsequently referred to as the 282 number.

Figure 5 shows the grouping of the items according to the Topic Index with the Index outline numbers given, number of items in each category, and a brief identification of the content. Sub-totals give the numbers of items in each major grouping. Since the Index is an outline form, it is possible to identify major topics and their related items. These major topics are somewhat autonomous and hence can be lifted out and tested without fear of disrupting any interaction between topics.

Preparing the Items for Testing

Item Format.--Each of the six proposed tests was constructed from the major topics described above, thus preserving the ability to test for inter-item correlation between items of like subject matter. Figure 6 shows the groupings of the major topics comprising each of the six tests, and the total number of items per test. A very concerted attempt was made to maintain the integrity of the major topics. Only one (Section C6) had to be broken apart. However, it consisted of topics which were not closely

Topic Index	Major Topic	No. of Items	Sub Topics
A.	Pre-Operative Procedures	8	Pre-Trip Inspection
		4	Carrying Passengers
	25 items	3	Mounting Motorcycle
		4	Starting the Engine
		5	After Starting the Engine
		1	Preparing for a Long Trip
B.1.to B.5.	Fundamental Control	3	Shifting Gears
		2	"
	77 items	1	"
		1	"
		1	"
		4	Lane Usage
		2	Following
		4	"
		3	Carrying Passengers
		1	"
		7	"
		6	Steering
		10	"
		5	Speed and Starting and Stopping
		3	"
		2	"
		2	"
		11	Braking and Stopping
		3	Emergency Braking and Stopping
		4	Surveillance
		2	"
B.6.	Maneuvers	8	Intersections
	32 items	6	"
		1	Curves
		1	"
		2	Hills
		1	"
		1	Lane Changing

(continued)

Figure 5.--Number of Items Grouped by Content According to the Topic Index.

Topic Index	Major Topic	No. of Items	Sub Topics
B.6. (continued)		5	Passing
		1	"
		1	U-Turns
		1	Parking
		1	"
		1	"
		1	"
		1	"
B.7.	Road and Weather Conditions	6	Road Surface
		6	"
		22	"
	48 items	3	"
		4	"
		4	Weather
		1	"
		2	"
B.8.	Emergency Situations and Maneuvers	9	Emergency
		1	"
		1	"
		1	"
	22 items	5	Skidding
		4	"
		1	"
C.1 to C.3	Driving Situations	3	Urban Driving
		1	"
		1	"
	13 items	1	Highway Driving
		2	"
		4	Freeway Driving
		1	"
C.4. to C.6.	Reacting to Traffic	23	Reacting to other Vehicles
		3	Night Driving
	36 items	2	"
		4	Railroad Crossings, etc.
		3	"
		1	"

(continued)

Figure 5.--Continued.

Topic Index	Major Topic	No. of Items	Sub Topics
D. to E.	Vehicle and Driver	3	Physical--Driver
		1	"
	14 items	1	"
		2	Vehicle Care
		7	"
F.	Legal	1	Laws
		1	"
	15 items	8	"
		5	"
		n_t=282	

Figure 5.--Continued.

Test Number	Major Topics	No. of Items
1.	A (except carry pass) + D + B5 + C6b + C6c 22 14 6 3 1	46
2.	B1 + B2 + Carry Pass. 29 16 3	48
3.	B3 + B4 + B8 12 14 22	48
4.	B7 48	48
5.	C1 + C2 + C3 + C4 + C5 + C6a 5 3 5 23 5 4	45
6.	B6 + F 32 15	47

Description of Major Topics (see also Figure 5)

A: Pre-Operative

B1-B5: Basic Control Tasks

B6: Maneuvers

B7: Road and Weather Conditions

B8: Emergency Maneuvers

C1-C6: Driving Situations

D: Vehicle and Driver

F: Legal

Figure 6.--Topic Layout for Each Test.

related. In no instance were individual items from any lower level topic spread among several tests. Each test therefore contained items from one or more major topics with an average of 47 items per test.

Marker Items.--To complete the subject matter portions of the six tests, two marker items (Figure 7) were chosen from the basic test pool[71] to serve as common items between the various test forms. These two items would be the only points of commonality between the tests. These items (Figure 7) also served the same function in the evaluation of the items in the basic test item pool.[72] Thus something was known about their performance and hence one could evaluate the performance of the subjects responding to these tests in light of experience with similar groups.

Randomizing Test Items.--As a final step in the subject matter portion of the six tests, the items for a particular test were randomized so that no two adjacent items (like subject matter) in the pool were adjacent in the test.[73] Since the items were arranged by content in the pool, it was possible (and probable) that an adjacent item in the pool could contain a tip off to or the answer to a neighboring

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[71]Basic item pool and report.

[72]Ibid.

[73]The two marker items were placed as number 1 and 2 on each test.

Marker Item	Estimated P Value[a]	Item
M1	94	This sign means:  * a) Slow down to 35 mph and prepare to enter a curve. b) Exit ahead, exit speed 35 mph. c) Construction area, slow down to 35 mph and use the right lane only. d) Vehicle turning right must reduce speed to 35 mph.
M2	75	In making a left turn, you should not: * a) Pull halfway into the intersection and edge into cross traffic. b) Signal before you arrive at the intersection. c) Slow down to a stop if traffic is heavy. d) Stay in one lane while turning.

*Correct answer

[a]Average P Value obtained from testing done on high school driver education graduates in Iowa in 1972.

Figure 7.--Marker Items for Inclusion on Each Test.

item. Randomization reduces this possibility as well as makes the test more interesting by presenting alternating subject matter.

The items were then typed onto masters, proof-read, checked again for adjacent items and prepared for reproduction. The test items, as prepared for reproduction, are shown in Appendix A.

Dependent Variable

Subject Definition.--Several items were written dealing with subject definition, cycle ownership, and cycle interest and riding experience. The first category, consisting of three items, was simply a description of the subject and permitted a definition of the sample. The three subject definition items are shown in Figure 8.

1. How old are you?

   a) 15 years old or younger.
   b) 16 years old.
   c) 17 years old.
   d) 18 years old.
   e) 19 years old or older.

2. What grade are you in?

   a) 9th (Freshman).
   b) 10th (Sophomore).
   c) 11th (Junior).
   d) 12th (Senior).

3. What is your sex?

   a) Male.
   b) Female.

Figure 8.--Subject Definition Items.

Motorcycle Interest Inventory (Dependent Variable).--The items prepared for the latter two categories--cycle ownership and cycle interest--are an attempt to measure the interest and riding experience of the subject in owning and operating a motorcycle. The seven questions covering these two topics would be combined into a Dependent Variable for the purposes of answering the amount of experience the subject has had riding a cycle. This value would be used later to group the subjects and sub-set the data into experienced and non-experienced cycle rider groups. The seven questions as formulated are shown as Figure 9, along with the definitions and introductory material.

The items can be grouped into those dealing with cycle ownership--both self, family, and friends (items 4-6)--and those dealing with cycle interest and riding experience, both as a passenger and as an operator (items 7-10). To permit a study of the stability (reliability) of this

1. How old are you?
   a) 15 years old or younger.
   b) 16 years old.
   c) 17 years old.
   d) 18 years old.
   e) 19 years old or older.

2. What grade are you in?
   a) 9th (Freshman).
   b) 10th (Sophomore).
   c) 11th (Junior).
   d) 12th (Senior).

3. What is your sex?
   a) Male.
   b) Female.

The next seven questions (numbers 4-10) are about motorcycle ownership and riding experience on-the-road.

The term:

MOTORCYCLE as used here also includes the smaller machines such as motor-driven cycles, motor scooters, mini-bikes, etc.

OWNERSHIP or OWN means either it is yours legally or yours but someone else had to sign for it.

FAMILY means all people, other than yourself, who live in the same house.

4. Do you or does any member of your family - either now or sometime within the past two years - own a motorcycle?
   a) No one owns a motorcycle.
   b) Someone else in the family (other than myself) owns a motorcycle.
   c) I am the only one in the family who owns a motorcycle.
   d) I own a motorcycle and so does another member of my family (two or more motorcycles in the family).

5. Do any of your friends own a motorcycle?
   a) No.
   b) Yes.

6. Do you plan on buying or owning a motorcycle this year?
   a) No.
   b) Don't know
   c) Yes.
   d) I already own one.

7. How many times have you been the driver (operator) of a motorcycle on the road?
   a) Never operated a motorcycle.
   b) Once or twice.
   c) Several times.
   d) Many times.

8. Estimate the total number of miles you have driven (operated) a motorcycle on the road during the past year.
   a) Don't drive a motorcycle.
   b) Less than 100 miles.
   c) 100 - 1,500 miles.
   d) 1,500 - 3,000 miles.
   e) More than 3,000 miles.

9. How many times have you been a passenger on a motorcycle?
   a) Never been a passenger.
   b) Once or twice.
   c) Several times.
   d) Many times.

10. How much time do you spend working on motorcycles - yours or someone else's (mechanical repairs, cleaning, etc.)?
   a) None.
   b) Less than one hour per week.
   c) One - three hours per week.
   d) Four - eight hours per week.
   e) More than eight hours per week.

1 Continue to next page...

Figure 9.--Motorcycle Interest Inventory (Dependent Variable) Items.

measure, an alternative form of questions 7 and 9 were prepared. These are shown in Figure 10.

7. How many times have you been the driver (operator) of a motorcycle on the road?

   a) Never operated a motorcycle.
   b) One or two times.
   c) Three - ten times.
   d) More than ten times.

9. How many times have you been a passenger on a motorcycle?

   a) Never been a passenger.
   b) One or two times.
   c) Three - ten times.
   d) More than ten times.

Figure 10.--Alternate Forms of the Two Dependent Variable Items.

The complete page of items for the subject definition items and the dependent variable items is shown in Appendix A. Also the page for the alternate form of the dependent variable is in Appendix A.

Preparing the Tests

As a final step in the preparation of the items for the initial testing, a cover was prepared stating the purpose of the test, directions for taking the test, instructions for marking the answer sheet and providing for a place to record the subject's name and number. An example of this cover can be found in Appendix A. The masters for each of the six tests--one set of items, the dependent variable

page, and cover--were assembled and proof read. Once satisfied that they contained no errors, a sufficient quantity (125 copies of each of six tests) of tests were reproduced. The tests were then ordered in sequence of six tests so that when distributed, every 6th student would get an identical test. This, coupled with the arbitrary seating arrangement found in many classrooms and random starting point in distributing test booklets in the classroom (not always starting at the same place in passing out booklets) assured random assignment of the various tests within a classroom and across the entire sample.

Obtaining Permission to Test

To obtain permission to test students in a test-retest program, contact was made with several school districts in Western Wayne and Washtenaw counties in Michigan. Two school districts (one suburban, one rural) agreed to permit the testing of seniors in the American Government programs. In one of the school districts, students (mostly seniors) in some of the World Geography classes were also tested. In all, the required number plus additional students were available. A schedule was established whereby the testing would take place on consecutive days during the first and second weeks of March, 1973. Each class would be contacted twice--one during the first week and again one week later. Arrangements were also made with each school district to obtain achievement test scores for the subjects.

Written Testing Instructions

As the final task in preparing to test the students, written testing instructions to guide the test proctor and provide verbal direction (and uniformity) were drafted. These instructions included directions to the proctor for administering the test, maintaining decorum in the classroom and giving instructions to the students. Materials were prepared for both the testing and re-testing exercises. Copies of these instructions can be found in Appendix B. Also included in Appendix B is a copy of the mark sense answer sheet used to record the students' responses. Pencils were also furnished for those who came without them. As a gesture of thanks, bumper stickers (left over from another project) were passed out to the students at the end of the re-test session. The bumper sticker is also shown in Appendix B.

Data Collection

On the appointed days a test proctor and the author administered the tests to the students--high school seniors enrolled in the required American Government classes--and to selected mixed grade level classes in World Geography. The materials were distributed in accordance with the instructions (Appendix B) and at the end of a class period collected and placed in a specially marked envelope for that particular class. At the end of the first testing, all materials (booklets and answer sheets) were processed and recycled for the restesting exercise. Each test booklet and

answer sheet was given a subject number. The test booklet was then scanned for stray marks and placed in the envelope for re-testing. For those tests used in the rural district, the alternate form of the dependent variable page was inserted. The answer sheets were set aside to await further processing. On the appointed days one week later, the second administration of the test took place. Students were given the same test booklet they had had the previous week and asked to retake the test. For those who were present for the first time, they were given a fresh booklet and asked to take it as the first test. Those students who were absent for this second testing had the cover of their booklet marked absent. Again, the booklets and answer sheets were collected at the end of the testing period and placed in their proper envelope. While the test was made to appear mandatory, it was in fact voluntary and any student who objected was excused. Two classes voted not to take the re-test. At the end of the re-test session in each class, bumper stickers were distributed (see Appendix B). At the end of the re-testing, the answer sheets were given the subject number that appeared on the booklet cover. In the case of those booklets which did not have a subject number, one was assigned. The booklets were then returned to their respective envelopes and the answer sheets coupled with those from the first testing to await further processing. Six hundred twenty-five (625) participated in the first testing and 484 participated in the re-test. Of

the 484 taking the re-test, 33 actually took the test for the first time. Thus, a total of 658 students took the test for the first time, while 451 took the test both times. One hundred seventy-four (174) students were absent or elected not to take the test the second time. In all, 25 classes of students took the test for the first time with 23 of the 25 classes taking the re-test also.

With the testing completed, work began on processing the 1109 valid answer sheets.

Data Analysis and Test Item Evaluation

Preparing the Answer Sheets

The first task in preparing for the data analysis included checking over the answer sheets, adding selected data and reducing the answer sheets to punched cards.

Optically scannable answer sheets were used by the subjects. The use of these provides a quick and inexpensive means of reducing the student responses to a machine readable form--in this case, punched cards. An example of the answer sheet used is shown as Figure 11. Shown also on this form are the places where additional data was recorded. The steps taken to complete the answer sheet were as follows:

1. Write in Achievement Score - An independent reading achievement score was obtained for a sizeable portion of the sample. Both of the urban high schools

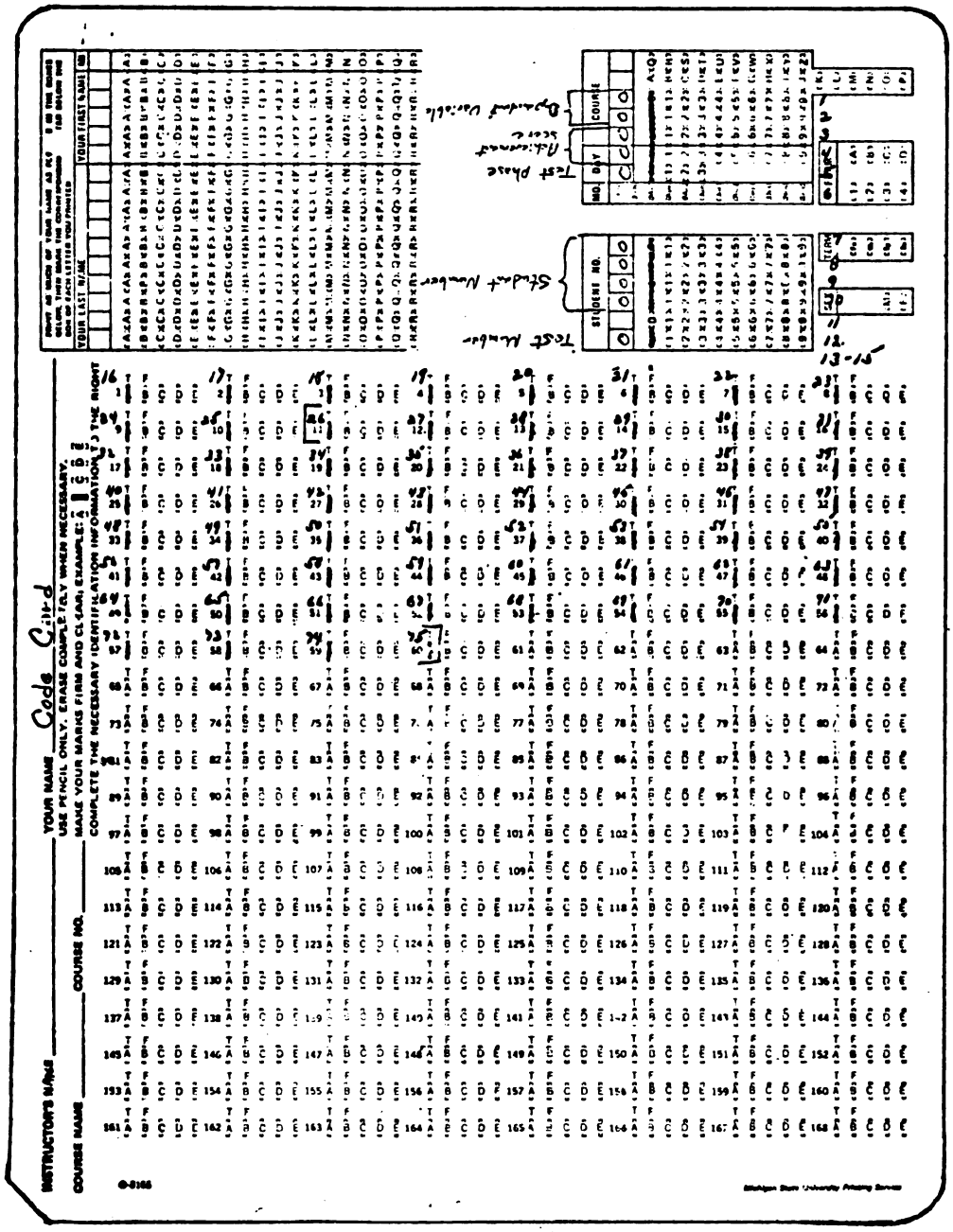

Figure 11.--Answer Sheet.

administered the Stanford Achievement Test Battery[74] to virtually all of the students in the sample during the fall semester of the 10th grade (October, 1970). The Reading Test portion of the Battery was used as an independent measure of the student's reading comprehension. The Percentile Rank score available for each subject was recorded on the first testing answer sheet.

2. Write in Test Phase - A four level variable was created and recorded on the answer sheet which gave an indication of the first and second testing and also whether an achievement score was available and which student took the alternate form of the dependent variable. This variable permitted sorting the tests into first and second (re-test) testing phases.

3. Calculate Dependent Variable - The alternative choices for the seven items which made up the dependent variable were assigned a numerical value (see Figure 15 for values). These values were summed and the total entered on the answer sheet as the dependent variable value.

4. Mark in Written Numbers - All values entered as a part of this coding phase plus the previously recorded subject number were marked in so that the scanner could read them.

5. Check over Answer Sheet - Each answer sheet was visually checked for stray marks and legibility. Improperly

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[74] E. Gardner, J. Merwin, R. Callis, R. Madden, Stanford Achievement Test High School Battery (Grades 9-12) Manual (New York: Harcourt, Brace and World, Inc., 1965).

recorded answers were re-marked, light marks darkened, and stray marks erased so as to present to the optical scanner answer sheets with as few induced errors as possible.

6. Sort by Test Number - The answer sheets were then sorted by test number as each test had a different answer key.

Figure 11 shows the location of the various data groups on the answer sheet and Figure 12 summarizes the layout. During the scoring operation, the total score (number correct) would be calculated and placed in answer sheet columns 13 - 15.

The test keys (an answer sheet with the correct answer shown) were prepared and placed on top of the corresponding answer sheets.

Answer Sheet Column	Information	Tape Output-Card Column
1-2	Dependent Variable-reversed	1-2
3-4	Achievement Score-reversed	3-4
5	Test Phase 1 Test 2 Re-test 3 Re-test - alternate form	5
6	Blank	6
7-10	Student Number-reversed	7-10
11	Blank	11
12	Test Number	12
13-15	Total Score-Number Correct	13-15
16-75	Responses to Items	16-75

Figure 12.--Answer Sheet Code Layout.

Scoring the Answer Sheets and Data Reduction

The answer sheets were scanned on the Optical Scanner at the Michigan State University Office of Evaluation Services. The machine "read" each answer sheet, scored each test item according to the key, printed the total score on the sheet and transferred all the information on the answer sheet onto magnetic tape. The tape was then taken to the MSU Computing Center where a computer card deck was prepared from the tape. Figure 13 shows the location of the information on the answer sheet and corresponding position of the data on the card.

At this point the data cards were listed and the listing scanned for obvious errors and omissions. Since the data cards were in the same order as the answer sheets, retrieving the answer sheet and noting corrections was a relatively easy task. The necessary corrections were made to the card deck.

Since the Optical Scanner reads the answer sheet from top to bottom and certain of the data information was recorded from bottom to top, the resultant data contains code values (two fields or wider) in which the digits are reversed. Thus it was necessary to go through a reversal process. At the same time as this conversion, certain of the data columns were rearranged so as to make the analysis easier. The final data card layout and example data card are shown in Figure 14.

Output Card Column	Read
1-3	3 digits of COURSE
4	2nd digit of DAY
5	1st digit of DAY
6	Blank
7-12	STUDENT NUMBER
13-15	place TOTAL SCORE (number correct) here.
16-75	responses to items 1-60. Note: only Items 11-60 are Scored.
76-80	Blank

Figure 13.--Position of Data on Card Following the Scoring of the Answer Sheets.

Card Column	Information
1	Test Number
2	Blank
3-6	Student Number
7	Blank
8	Test Phase
9	Blank
10-11	Achievement Score
12	Blank
13-14	Dependent Variable
15	Blank
16-75	Responses to Items 1-60
76	Blank
77-78	Total Score
79-80	Blank

Figure 14.--Final Data Card Layout.

As previously done, this data deck was listed and carefully scanned for errors. Frequency distributions were also made to facilitate the location of errors within the data set. The necessary corrections were made. Also, at this time incomplete cases were eliminated from the data set. These few cases resulted from subjects not completing the test during the allotted time. In all, 658 valid cases were available for analysis distributed across the six tests as shown in Table 1.

TABLE 1.--Number of Valid Cases for Each Test.

Test	Number
1	111
2	112
3	107
4	110
5	108
6	110
Total	658

Computations

In the subsequent steps, the computing facility at the University of Michigan via the MERIT Network[75] was used whenever possible, either with programs written specifically for this task, or through the use of the pre-packaged MIDAS[76] statistical program system. Further reference will not be made to the use of the computer or to specific programs. The computer and programs represent a quick, inexpensive tool for data reduction and analysis. All programs used here employed standard computational formulae and techniques.

Marker Item Summary.--Two marker items were placed on each of the six test forms such that there would be two identical items across the six tests. The P values from each of these items could be compared against a known value obtained from previous testing exercises with similar groups of subjects. The items and estimated P values are shown in Figure 7.

Table 2 shows the results of the analysis of the responses to the marker items for the subjects who responded

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[75]The MERIT Computer Network connects three separate university computers: IBM 360/67 computers under MTS at the University of Michigan and at Wayne State University, and a CDC 6500 under SCOPE at Michigan State University. The Network provides the technical means whereby a user of any of the Network's computers can access all resources available at each of the other computers.

[76]Daniel Fox and Kenneth Guire, MIDAS-Michigan Inter-Active Data Analysis System, Ann Arbor, Michigan: University of Michigan, The Statistical Research Laboratory, 1972.

TABLE 2.--P Values for the Marker Items for Each Test.

	Test	1	2	3	4	5	6	Avg.	Est. Value*
Item	11(M1)	96	95	94	94	97	93	94.8	94
Item	12(M2)	73	71	73	80	76	66	73.2	75

*Average P value obtained from testing done on high school driver education graduates in Iowa in 1972.

to them in the context of this testing. While the average P values varied from test to test, the average P values for both items were very close to the estimated value suggesting that these subjects were not greatly different than those who had previously responded to these marker items.

Response Distribution.--As a first step in the data analysis, a response distribution was calculated for each item. This consisted of counting the number of students who responded to each of the alternatives. Because of the varying numbers of students responding to each test, the components of the response distribution for each item was divided by the number of subjects taking each test. This linear transformation converted each response distribution to the base 100 or, in other words, expressed it as a percent. The response distribution (and all data) for each item are shown in Appendix C. The sum of each may not total 100 percent in each case, due to some missing data (some students omitting a question, or mismarking the answer sheet) or rounding error in calculating the percentages.

Item Difficulty.--The item difficulty (P) is the proportion of the students selecting the correct answer. It is found by dividing the number of students responding to the item (or test in the presence of minimal missing data). Since there was little missing data and a percent response distribution was calculated, the P value becomes the value of the response distribution for the correct answer divided by 100.

Dependent Variable Summary.--The focus of the data analysis then turned to the dependent variable since it would be used in subsequent analyses. The analysis proceeded along two fronts: (1) an investigation into its structure, and (2) an evaluation of its stability (reliability). The numerical value assigned to each of the dependent variable item responses are shown in Figure 15. The value for the dependent variable was found, as previously explained, by summing the values for items 4-10. A summary of the response distribution for variables 1-10 (three information items, i.e., age, grade, sex--plus the seven items forming the dependent variable) are shown in Table 3 in the column labeled "%-All." The values given are expressed in terms of percentages. The other columns--"%6-9" and "%15-30"--show the responses for two sub-groups of riders, i.e., non-experienced and experienced.

4. Do you or does any member of your family - either now or sometime within the past two years - own a motorcycle?

1 a) No one owns a motorcycle.
2 b) Someone else in the family (other than myself) owns a motorcycle.
4 c) I am the only one in the family who owns a motorcycle.
5 d) I own a motorcycle and so does another member of my family (two or more motorcycles in the family).

5. Do any of your friends own a motorcycle?

1 a) No.
3 b) Yes.

6. Do you plan on buying or owning a motorcycle this year?

1 a) No.
2 b) Don't know.
4 c) Yes.
5 d) I already own one.

7. How many times have you been the driver (operator) of a motorcycle on the road?

1 a) Never operated a motorcycle.
2 b) Once or twice.
4 c) Several times.
5 d) Many times.

8. Estimate the total number of miles you have driven (operated) a motorcycle on the road during the past year.

1 a) Don't drive a motorcycle.
2 b) Less than 100 miles.
3 c) 100 - 1,500 miles.
4 d) 1,500 - 3,000 miles.
5 e) More than 3,000 miles.

9. How many times have you been a passenger on a motorcycle?

1 a) Never been a passenger.
2 b) Once or twice.
4 c) Several times.
5 d) Many times.

10. How much time do you spend working on motorcycles - yours or someone else's (mechanical repairs, cleaning, etc.)?

1 a) None.
2 b) Less than one hour per week.
3 c) One - three hours per week.
4 d) Four - eight hours per week.
5 e) More than eight hours per week.

Figure 15.--Dependent Variable Items and Code Values.

TABLE 3.--Summary of Components of the New Dependent Variable (N Dep Var).

Variable	Value	% All	% 6-9*	% 15-30**
1. Age	15	0	0	0
	16	2.13	3.07	0.98
	17	62.10	61.69	60.49
	18	34.25	34.10	36.59
	19+	1.25	1.15	1.95
2. Grade	9	0	0	0
	10	.30	0	0
	11	3.20	3.45	3.90
	12	96.50	96.55	96.10
3. Sex	M	50.84	34.10	79.02
	F	49.16	65.90	20.98
4. Own Cycle	None	59.51	85.69	26.34
	Someone else	26.79	13.41	31.71
	Self	7.61	0	22.44
	Self and family	6.09	0	19.51
5. Friend Own	No	14.92	26.44	5.37
	Yes	85.08	73.56	94.63
6. Buy or Own this year	No	59.97	91.57	13.17
	?	19.18	8.43	26.34
	Yes	13.24	0	36.59
	Already Own	7.61	0	23.90
7. Times Operator	Never	46.12	90.80	2.44
	1-2	20.55	9.20	10.24
	Several	15.37	0	30.24
	Many	17.96	0	57.07

*No experience.

**Experienced.

TABLE 3.--Continued.

Variable	Value	% All	% 6-9	% 15-30
8. Miles Operated	Never	49.92	93.87	4.39
	100	31.81	6.13	40.00
	100-1500	9.89	0	28.78
	1500-3000	5.02	0	16.10
	3000	3.35	0	10.73
9. Times Passenger	Never	11.72	27.59	0
	1-2	28.77	53.64	8.29
	Several	32.12	13.31	34.15
	Many	27.40	0.38	57.56
10. Times Working on Cycle	None	75.65	99.23	33.17
	1 Hr.	12.18	0.77	29.76
	1-3	6.54	0	19.02
	4-8	2.89	0	9.27
	8	2.74	0	8.78
Number of Subjects=N_t=		657	261	205

Dependent Variable Stability.--To assess the value of the dependent variable as a measure of the riding experience, correlation coefficients (Pearson product moment correlation) were calculated between the total value and components (seven items). Also, inter-item correlation coefficients were calculated, as well as a histogram of the range of the dependent variable value (7-33), and descriptive measures of each of the components of the dependent variable. On examination, these values showed that all components except the item on Friend's Ownership of Cycle correlated very high with the dependent variable value (.64 and above).

The item on Friend's Ownership correlated at .3356. While this was high enough to constitute a significant correlation, it was felt that it was unduly influencing the dependent variable as the histogram of the dependent variable frequencies showed many of the students placing above the lowest levels. It was decided to recalculate the dependent variable and to establish a new dependent variable (N Dep Var) which would eliminate the Friend's Ownership question. Thus, the old dependent variable (Old Dep Var) would not be used. The N Dep Var had a range of from 6-30 and, when the correlation coefficients, histogram and descriptive measures for it were examined, they were found to indeed be satisfactory.

The correlation coefficients for all ten items, plus the old and new dependent variables are found in Table 4, with the descriptive measures shown in Table 5, and the histogram in Table 6.

All of the components for the new dependent variable correlated with it at .63 or above--well above the .1006 required for significance at the .01 level of confidence and they were clustered closely together. Thirty three and one half percent (33.5%) of the subjects were clustered in the first three levels of the dependent variable. Also, the old and new dependent variable correlated at .9921, indicating they were very closely coupled. Thus, the deletion of the item on Friend's Ownership did not hurt the new dependent variable, and may have helped it.

TABLE 4.--Correlation Coefficients for the Components of the N Dep Var.

ITEM NO°	VARIABLE												
	OLDDEPV	1.0000											
1	AGE	.0237	1.0000										
2	GRADE	-.0401	.1832	1.0000									
3	SEX	-.3971	.0171	.0576	1.0000								
4	OCYCLE	.7469	-.0187	-.0395	-.2355	1.0000							
5	FOWN	.3356	.0072	-.0328	-.0616	.1205	1.0000						
6	BUYCYC	.8008	.0272	-.0309	-.4497	.6232	.1484	1.0000					
7	OP	.8552	.0174	-.0465	-.4131	.5400	.1856	.6019	1.0000				
8	MILES	.8718	-.0096	-.0419	-.3877	.6115	.1657	.6602	.8221	1.0000			
9	PASS	.6437	.0609	.0427	-.0830	.2755	.2978	.3365	.4471	.4460	1.0000		
10	WORK	.7474	.0243	-.0018	-.3218	.5942	.1214	.6552	.5413	.6469	.2937	1.0000	
	NDEPVAR	.9921	.0242	-.0272	-.4004	.7560	.2283	.8169	.8661	.8910	.5339	.7580	1.0000
		OLDDEPV	AGE	GRADE	SEX	OCYCLE	FOWN	BUYCYC	OP	MILES	PASS	WORK	NDEPVAR

N= 555 DF= 653 R=.9500= .0766 R=.9900= .1006

°See Figure 5 for the specific items

TABLE 5.--Descriptive Measures for the Components of the N Dep Var

Variable	N	Mean	Std. Dev.	SE of Mean	Minimum	Maximum
Old DepV	655	15.315	6.1075	.23864	7.0000	33.000
Age	657	3.3516	.54909	.21422 - 1	2.0000	5.000
Grade	657	3.9619	.20678	.80672 - 2	2.0000	4.000
Sex	657	1.4916	.50031	.19519 - 1	1.0000	2.000
Ocycle	657	1.7397	1.1755	.45861 - 1	1.0000	5.000
Fown	657	2.7017	.71304	.27818 - 1	1.0000	3.000
Bucyc	657	1.8935	1.3438	.52425 - 1	1.0000	5.000
Op	657	2.3851	1.5963	.62277 - 1	1.0000	5.000
Miles	657	1.8006	1.0307	.40211 - 1	1.0000	5.000
Pass.	657	3.3470	1.4340	.55944 - 1	1.0000	5.000
Work	657	1.4490	.93911	.36638 - 1	1.0000	5.000
NDepVar	657	12.615	5.8933	.22992	6.0000	30.000

Table 6.--Histogram (Frequency Distribution) of the N Dep Var.

N Dep Var

```
 6.0000   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX59
 7.0000   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX86
 8.0000   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX51
 9.0000   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX66
10.000    +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX47
11.000    +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX45
12.000    +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX38
13.000    +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX33
14.000    +XXXXXXXXXXXXXXXXXXXXXXXXX26
15.000    +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX34
16.000    +XXXXXXXXXXXXXXXXXXXXXXXXXXXX29
17.000    +XXXXXXXXXXXXXXXX17
18.000    +XXXXXXXXXXXXXXXXXXXX21
19.000    +XXXXXXXXXXX12
20.000    +XXXXXXXXX10
21.000    +XXXXXXXXXXX12
22.000    +XXXX5
23.000    +XXXXXXXXXXXXX14
24.000    +XXXXXXXXX10
25.000    +XXXXX6
26.000    +XXXXXXXXXXXXXXXX17
27.000    +XXXXXX7
28.000    +XXXXXX7
29.000    +XXX4
30.000    +1
 657 OBSERVATIONS PLOTTED (EACH X=  1)
```

Descriptive measures were calculated for the N Dep Var for each of the tests. They were very close together and indicated a high degree of stability of the N Dep Var over each of the six tests. This summary is shown in Table 7.

To test the stability (reliability) of the dependent variable, two independent tests were undertaken. For the students in the two urban high schools, the same dependent variable items were administered to them at the second testing one week later. Table 8 shows the correlations between both the dependent variable and its components for the 329 students who participated in both the first and second testings. All values were acceptably high--.67 and above. However, when the Friend's Ownership question was omitted, the remaining correlations were .82 and above. The low reliability (stability) of this item thus lent more credence to the argument for omitting the question from the dependent variable.

A second stability exercise was undertaken with the students in the rural high school where the response format was changed for two of the items (see Figure 10). This was an attempt to see if the wording of the responses to these two items (verbal range v.s. numeric range) would make a difference in the stability of the responses to them. Table 9 gives the correlation coefficients for the dependent variable and its component items. They too were high with the previous comments applying. For questions 7 and 9

TABLE 7.--Descriptive Measures for the N Dep Var for Each of the Six Tests.

Variable	N	Mean	Std. Dev.	SE of Mean	Minimum	Maximum
DESCRIPTIVE MEASURES			Stratum* = 1			
N Dep Var	111	12.991	6.2268	.59102	6.0000	29.000
DESCRIPTIVE MEASURES			Stratum = 2			
N Dep Var	112	12.125	5.6904	.53769	6.0000	28.000
DESCRIPTIVE MEASURES			Stratum = 3			
N Dep Var	107	12.374	6.0680	.58662	6.0000	30.000
DESCRIPTIVE MEASURES			Stratum = 4			
N Dep Var	109	12.459	5.6413	.54034	6.0000	29.000
DESCRIPTIVE MEASURES			Stratum = 5			
N Dep Var	108	13.009	5.6577	.54441	6.0000	29.000
DESCRIPTIVE MEASURES			Stratum = 6			
N Dep Var	110	12.736	6.1251	.58401	6.0000	29.000

*Stratum = Test

TABLE 8.--N Dep Var Stability Correlation Coefficients.

VARIABLE											
OLDDEPV2	.9513										
AGE2	.0591	.0503									
GRADE2	-.0393	.2797	1.0000								
SEX2	-.3282	.0488	.0396	.9939							
OCYCLE2	.6865	-.0011	-.0414	-.1453	.8298						
POOR2	.3694	-.0006	.0298	-.1070	.1742	.6741					
BUYCYC2	.7506	.0195	-.0833	-.3467	.4979	.0347	.8337				
OP2	.7952	-.0292	-.1503	-.3470	.4025	.1319	.5767	.8760			
MILE2	.8345	-.0150	-.0365	-.3433	.4755	.1260	.6153	.7977	.9224		
PASS2	.6189	.0978	.0566	.0053	.2372	.2676	.3253	.4760	.4623	.5289	
WORK2	.7255	.0001	-.0788	-.3337	.4856	.0391	.0544	.5262	.6393	.3447	.8629
NEWDEPV2	.9469	.0250	-.0718	-.3151	.6028	.1850	.7511	.8150	.8365	.6557	.6968	.9480
	OLDDEPV1	AGE1	GRADE1	SEX1	OCYCLE1	POOR1	BUYCYC1	OP1	MILE1	PASS1	WORK1	NEWDEPV1

N= 329 DF= 327 R@.9500= .1082 R@.9900= .1418

TABLE 9.--N Dep Var Stability Correlation Coefficients--Alternate Form.

VARIABLE											
OLDDEPV2	.9427										
AGE2	-.0112	.9099									
GRADE2	-0.	-0.	-0.								
SEX2	-.4714	-.0195	-0.	.9042							
OCYCLE2	.8382	-.1199	-0.	-.3502	.9354						
FOWN2	.2765	-.1213	-0.	-.1285	.1365	.6104					
BUYCYC2	.7976	.0049	-0.	-.4447	.6756	.1439	.8788				
OP2	.7108	.0519	-0.	-.3759	.5662	.2127	.6290	.7709			
MILE2	.8055	-.0717	-0.	-.4243	.6219	.1465	.6316	.7510	.9712		
PASS2	.5229	.0269	-0.	-.0431	.3239	.3210	.3325	.4263	.3315	.7158	
WORK2	.7323	.0128	-0.	-.3075	.5396	.1503	.6043	.6040	.6657	.2923	.7941
NEEDEPV2	.9410	-.0116	-0.	-.4233	.7884	.2593	.8042	.8195	.8511	.5169	.7533
	OLDDEPV1	AGE1	GRADE1	SEX1	OCYCLE1	FOWN1	BUYCYC1	OP1	MILES1	PASS1	WORK1

N= 112 DF = 110 R@.9500= .1957 R@.9900= .2425

(op and Pass) the correlation coefficients were .77 and .71 respectively, indicating some instability, but not enough to be concerned with.

Partitioning the N Dep Var

The N Dep Var was partitioned into three groups--those values indicating little or no experience, those values indicating a high level of experience, and the middle ground indicating a mixed level of experience. The value ranges were 6-9, 15-30, and 10-14 respectively. They were derived by (1) determining the minimum and maximum values for each item of the N Dep Var, and (2) the resultant sample size for each level of the N Dep Var. Each item was examined in the light of how a student with little or lots of experience might respond to it and values were assigned to establish a minimum and maximum value for each item. Table 10 summarizes these values.

If the split was based on these value ranges, however, the number of subjects in each group would be disproportionate. Table 11 summarizes the number of subjects in each N Dep Var level and also gives the cumulative N both up and down. For an ideal grouping, a 1/3, 1/3, 1/3 split would be satisfactory. This would place 219 subjects in each group. However, this split (1/3) falls in the middle of a group and the total number at a level must be included. Therefore, the split occurs at 6-9 and 15-30 establishing a compromise between the two considerations. The three groups

TABLE 10.--Minimum and Maximum Expected Values for Two Experience Groups of the N Dep Var

Item No.*	No Experience		Lots of Experience	
	Min.	Max.	Min.	Max.
4	1	2	2	5
6	1	1	2	5
7	1	2	4	5
8	1	2	3	5
9	1	2	4	5
10	1	1	3	5
Total	6	10	18	30

*Refer to Figure 15 for the items.

TABLE 11.--Distribution of the N Dep Var and Subjects for Grouping the Response Distribution.

N Dep Var Value	N	Cum N↓	Cum N↑
6	59	59	657
7	86	145	598
8	51	196	512
9	66	262	461
10	47	309	395
11	45	354	348
12	38	392	303
13	33	425	265
14	26	451	232
15	34	485	206
16	29	514	172
17	17	531	143
18	21	552	126
19	12	564	105
20	10	574	93
21	12	586	83
22	5	591	71
23	14	605	66
24	10	615	52
25	6	621	42
26	17	638	36
27	7	645	19
28	7	652	12
29	4	656	5
30	1	657	1

of N Dep Var (riding experience) were established as summarized in Table 12. The response distributions for the dependent variable items subdivided into the experienced and non-experienced groups can be seen by examining Table 3.

Identification of Responses by Experience Group.--The responses for each test item were divided into three groups on the basis of the N Dep Var groupings. A Student T statistic was calculated between the responses to each item

TABLE 12.--Summary of the Grouping of the N Dep Var and Number of Subjects.

Level	N	Label	Percent
6-9	262	No Experience	39.88
10-14	189	Mixed	28.77
15-30	206	Experienced	31.35
Total	657		100.00

by those students in the No Experience Group (6-9 N Dep Var value) and the Experienced Group (15-30 N Dep Var value). The results were recorded for each item in Appendix C to be used later as an aid in selecting items.

Correlation Coefficients.--To continue the development of statistics for evaluating each item, the items were scored either right or wrong. The scored data for each item was then used to calculate a correlation coefficient between the response for the item and the following variables: age; sex; N Dep Var; Achievement Score (vocabulary); total score. A test-retest reliability coefficient was also calculated (correlation between the responses to the items for the first and second testing). These statistics in addition to the P value were used to screen each item and judge its "goodness" according to the criteria shown in Figure 16.

These definitions and value ranges were applied to the statistics for each item and became the rules of thumb for deleting bad or problem items from the pool.

(1) Age: If the item shows a significant correlation--generally ± .30 or above,* then it should be rejected as the age of the subject may be a factor in his getting the answer right or wrong.

(2) Sex: If the item shows a significant correlation, generally ± .30 or above, then it probably is influenced by the sex of the respondent.

(3) N Dep Var: If the item shows a negative (-) correlation, then those who are more knowledgeable about motorcycle operation tend to get the item wrong and vice-versa.

(4) Achievement-Reading Score: If the item has a high correlation (± .30 or above), then the ability of the subject to read may be a factor in his getting the item correct.

(5) Total Score: If the item has a negative (-) correlation with the total score on the test, then the knowledge of the subject may be a deterrent to his getting the item correct--some other choice may seem more correct.

(6) Test-Retest Reliability: If the item, when responded to twice separated only by time by the same subject, shows a non-significant correlation--generally + .29 or lower--then an unacceptable number of subjects changed their responses the second time. Hence, the item is unstable.

(7) P Value: A range of item difficulty (the proportion of students responding to the item correctly) between .50 and .95 is desirable. Below .50 means less than 1/2 of the students got the item correct and over .95 means that virtually everyone got it correct. For reporting purposes, the decimal point has been dropped. The P value given is for all students.

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*When using samples of about 100, the correlation coefficient generally became significant ($\alpha = .05$) at about .30. The specific levels for each sample size were used.

Figure 16.--Criteria for Screening Each Test Item.

Additionally, the Student's T statistic (computed for the response distributions between the experienced and non-experienced groups) was used for screening the items. If the statistic was significant, i.e., value of -1.67 or above, then the item was labeled as discriminating between the experienced and non-experienced rider groups. If the statistic was positive and significant, the item was labeled as discriminating in the wrong direction. This constituted immediate grounds for deletion from the pool.

Item Selection

The above guidelines were applied to the statistical measures computed for each of the 282 items in the pool. Forty of the items were labeled as discriminating,[77] 130 of the items passed all the above tests and 112 were dropped from the pool for one or more of the above reasons. This left 170 items in the pool as "good items." As a result of this item review, no major topic section in the pool was lost due to bad items. This fact, coupled with a sufficient number (170) of good items available, led to the decision not to rewrite the bad items and retest them.

At this point the item pool was reformatted to include only the 170 items which were "good." These items

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[77]Some of the items which discriminated had P values of less than .50 for all respondents. They were retained at this point and examined more closely later on the basis of the P value for the experienced and non-experienced riders.

and associated statistics are shown in Chapter IV as the Final Test Item Pool.

Development of the Parallel Tests

The process of the final item selection and extraction of the parallel test forms was begun using this final pool as a starting point.

Item Review and Elimination

Each item and its statistics were reviewed with particular attention being paid to the Student's T value. All items were eliminated which showed a positive T value. This meant that the P value for the subjects in the no experience group was higher than the P value for the subjects in the experienced group. While this is not a significant positive T statistic, it indicates at least for this testing that the item has reverse discrimination. (All items with a positive significant Student T value were eliminated earlier.) Also the items which had a negative significant Student T value (items which discriminate) coupled with a low P value (less than .50) for all subjects were examined to see if the low P value was also true for the experienced group. If the P value for the experienced group was markedly below .50, the item was eliminated. If the P value for the experienced group was near .50 or above, the item was retained. These two exercises (positive T statistic and low P value) reduced the number of items in the pool to 107. The items were regrouped into a third item pool called the Parallel Test

Item Pool which formed the basis for the parallel test forms. Thus, 107 items remained as candidates for inclusion on the parallel tests. The items covered 24 major topics of the Test Item Pool Topic Outline.

Parallel Test Item Pool

Of the 170 items comprising the Final Test Item Pool, 107 of them were identified as also belonging to the Parallel Test Item Pool. To save space, both item pools were combined, with those items constituting the Parallel Test Item Pool identified as such.

Inter-Item Correlations

To facilitate the selection of items for the parallel test forms, the inter-item correlations were calculated for each item in the Parallel Test Item Pool within a major topic area. Thus, a relationship could be established between items of like subject matter so that those which appeared to be measuring the same thing could be assigned to alternate forms or eliminated as duplicates. Table 13 shows the results of this correlation exercise. All pairs of items which had significant correlations at either the .01 or .05 levels of confidence are listed by giving the item numbers and correlations between them (by pairs). Also shown are the groups of items which are intercorrelated, i.e., three pairs of items intercorrelated and two pairs of intercorrelated items linked by a common item.

TABLE 13.--Inter-Item Correlations for Items by Major Topics Included in the Parallel Item Pool.

Section	282# Item	Pair	r	α	Item Groups
A	16	17	.29		16,17,24 (3 Pairs)
	24	17	.28	$\alpha = .01$	
	24	16	.24		
	1	15	.21		1 → 15 or 17 (common item)
	1	17	.21	$\alpha = .05$	
	16	18	.19		
D2	259	264	.35		
	263	265	.276	$\alpha = .01$	
	260	262	.275		
	263	259	.22		264 → 262, 263, 265
	264	263	.20	$\alpha = .05$	263 → 259, 264
	264	262	.20		
	265	264	.19		
B1a2	30	31	.26	$\alpha = .01$	
B1e2	11	49	.28	$\alpha = .01$	
	11	47	.22		47 → 11, 54
	54	47	.21	$\alpha = .05$	
B2	57	68	.20	$\alpha = .05$	
	63	65	-.19	$\alpha = .05$	(note negative correlation)
B3	80	76	.20	$\alpha = .05$	
B4	92	93	.36	$\alpha = .01$	92 → 93, 86
	92	86	.28		
B8a1	93	86	.22	$\alpha = .05$	
	186	190	.27	$\alpha = .01$	186 → 190 or 193
	186	193	.20	$\alpha = .05$	
B8b	197	198	.29	$\alpha = .01$	197 → 198, 202
	197	202	.26		
	204	198	.23	$\alpha = .05$	

(continued)

TABLE 13.--Continued

Section	282# Item	Pair	r	α	Item Groups
B7b	160	161	.38		144 → 169, 173, 159
	144	169	.35		140 → 173, 162, 155
	144	173	.32		169 → 144, 162
	165	173	.30		162 → 140, 155
	158	147	.29	$\alpha = .01$	159 → 144, 153
	140	173	.28		173 → 144, 165, 140
	140	162	.28		
	144	159	.28		
	140	155	.27		
	153	159	.27		
	155	162	.27		
	162	169	.25		
	146	164	.24		
	146	160	.24		
	140	165	.24		
	153	175	.23	$\alpha = .05$	
	161	144	.23		
	159	148	.22		
	155	165	.22		
	169	140	.22		
	Not all pairs, but enough				
B7b	176	177	.27	$\alpha = .01$	
	180	177	.23	$\alpha = .05$	
C4	219	235	.27	$\alpha = .01$	
B6b	110	112	.32	$\alpha = .01$	
	110	113	.21		107 → 112, 110
	112	107	.20	$\alpha = .05$	110 → 113, 107
	110	107	.19		113 → 109, 110
	109	113	.19		
F8	278	272	.24	$\alpha = .05$	278 → 272, 279
	278	279	.23		

Item Selection

With 107 items in the Parallel Test Item Pool and a large number of them intercorrelated, it became apparent that two parallel tests of 40 items each would be satisfactory. To achieve a balanced selection of items within the major topics, the number of items within each major topic was listed (see Table 14). The number of items per section to achieve a total of 40 items per test was calculated by dividing the total number of items (107) by the number of items desired per test (40) to get a ratio of 2.675. The number of items needed from each section was then determined by dividing the number of items in the major topic section by the ratio and rounding the result to the nearest whole number. Four of the topic areas contained only one item each which were of questionable discriminability. These four were not included in the final selection. Thus the number of items to be selected from each content area was determined. Also given in Table 14 are the actual numbers of items included on the tests.

Item Assignment to Test Form

Item assignment began by examining the items in each major section and assigning them to the two alternate test forms according to the following guidelines:

(a) All items which discriminate were considered first.

(b) All remaining items were assigned to complete the required number.

TABLE 14.--Item Count by Major Topic.

Major Section	Total Item	Items Needed for Test	Rounded	Form A Actual Number Used	Form B Actual Number Used
		40			
A	8	2.99	3	4	3
B1a	5	1.85	2	2	1
B1b	1	.37	1	1	1
B1e	6	2.24	2	2	2
B2	7	2.61	3	3	3
B3	3	1.12	1	2	2
B4	4	1.49	1	2	2
B6b	6	2.24	2	2	2
B6d	1	.37	1	1	1
B6e & f	5	1.86	2	2	2
B6i	1	.37	-	-	-
B7a	18	6.72	7	7	8
B7b	4	1.49	1	1	1
B8a	6	2.24	2	2	2
B8b	6	2.24	2	2	2
C1	1	.37	-	-	-
C2	1	.37	-	-	-
C3	1	.37	?(1)*	-	-
C4	4	1.49	1	1	1
C6a	1	.37	-	-	-
C6c	1	.37	?(1)*	-	-
D1	2	.74	1(?)*	1	1
D2	8	2.90	3	3	3
F	7	2.61	3	2	2
Total	Σ =107		40	40	40

N_t= 24

$\overline{X}$ =4.45

*?(1) = value close to zero--section probably will not be included.

*1(?) = value close to one--section probably will be included.

Within (a) and (b) above, the following selection rules were used:

(1) Pairs of items which had a significant inter-item correlation at .99 level.

(2) Pairs of items which had a significant inter-item correlation at .95 level.

(3) Pairs of items which had the highest T statistic and were content related (came from the same major content area).

(4) Major content areas represented by only one item had that item placed on both test forms (common item). If only one item was to be selected from the content area and it discriminated, it was made common to both tests provided it had no item significantly intercorrelated with it.

Table 15 shows the results of this item selection. In all, seven items out of 40 were common to both tests with 33 of the items being different on each form.

To achieve a balance between the test forms, each was assigned an equal number of items which discriminated--22 on each form. To further achieve a balance, the item difficulties for each test were averaged. Items (paired, of course) were switched between the test forms to bring the P values as nearly equal as possible. Table 16 lists the items for each test along with the P values for all students, the non-experienced group and the experienced group. The seven common items are listed at the top, with the balance following. Summary statistics in Table 17 show the average P values for the common items and unique items. The P values given are for all subjects, and also those subjects which comprised the non-experienced and experienced groups.

TABLE 15.--Item Pairs Based on Inter-Item Correlations.

Major Section	Number Needed From Section	Items		Select Code
A	1	16D*	17D	R1
	2	1	15	R2
	3	50	24D	S
B1a	1	30D	31D	R1
	2	26	28	S
B1b	1	34D	34D	C
B1e	1	11D	49	R1
	2	47	54D	R2
B2	1	55D	55D	C
	2	57	68	R2
	3	61	63	S
B3	1	76D	80	R2
B4	1	92D	86D	R1
	2	84D	93D	S
B6b	1	109D	113D	R2
	2	107	110	R2
B6d	1	119D	119D	C
B6e & f	1	122D	125	S
	2	124D	127	S
B7a	1	160D	161D	R1
	2	14 D	173	R1
	3	14eD	164	R2
	4	158D	147	R1
	5	144	160	R1
	6	153	159	R1
	7	155	162	R1
B7b	1	180D	181D	S
B8a	1	186D	190D	R1
	2	180	191D	S
B8b	1	202D	204D	S
	2	197	198	R1
C4	1	219	235	R1
D1	1	256	256	C
D2	1	263D	265D	R1
	2	257	264D	R1
	3	267D	267D	C
F	1	270D	270D	C
	2	273	274	S
		71	71	C
		18	165	C
Total		40 items		

**R1= related $\alpha = .01$
R2= related $\alpha = .05$
S = similar
C = common
D = discriminates

*282 Number (item identification)

TABLE 16.--Items Selected for Each Test with P Values.

	Test 1				Test 2			
	Item	All*	L*	H*	Item	All*	L*	H*
Common Items	256	72	67	80	256	72	67	80
	71	26	20	43	71	26	20	43
	270	87	78	95	270	87	78	95
	267	46	37	58	267	46	37	58
	119	61	49	76	119	61	49	76
	55	79	67	91	55	79	67	91
	34	28	22	42	34	28	22	42
Unique Items	16	53	39	68	17	59	35	80
	15	65	65	73	1	85	82	88
	5	49	37	60	24	43	27	55
	30	37	24	48	31	56	45	70
	26	52	45	58	28	58	53	67
	11	79	63	94	49	93	90	97
	47	86	84	88	54	73	59	85
	57	54	53	64	68	51	45	55
	61	80	78	91	63	73	69	79
	76	40	24	71	80	70	63	82
	86	36	24	54	92	41	32	57
	84	41	32	64	93	36	32	61
	109	55	44	68	113	46	36	68
	107	91	84	95	110	89	87	92
	125	49	47	58	122	42	38	58
	124	68	53	76	127	68	62	71
	160	67	44	86	161	47	31	55
	173	51	46	55	140	56	44	83
	146	48	33	72	164	78	77	90
	147	92	87	93	158	67	56	76
	144	78	77	86	169	68	64	76
	153	89	90	99	159	55	62	72
	155	49	51	62	162	84	79	90
	180	80	72	90	181	55	41	72
	186	53	44	75	190	83	76	93
	189	61	51	71	191	50	44	64
	202	68	51	82	204	42	37	61
	197	79	80	82	198	79	78	86
	219	82	79	84	235	94	92	95
	263	40	22	68	265	63	49	85
	264	79	78	90	259	75	67	83
	273	91	84	95	274	72	64	76
	18	80	78	90	165	69	56	76

*ALL = P value for all subjects.

L = P value for low experience group.

H = P value for high experience group.

TABLE 17.--Summary Statistics* for the Common and Unique Items for Each Parallel Test.

2 Parallel Test Forms -- 40 Items Each
33 Related Items -- 7 Common Items (21.2%)

7 Common Items

	All	L	H
SD	24.31	23.10	21.81
$\bar{X}$	57.00	48.57	69.28
ΣX	399	340	485
t		-1.72	

33 Related Items

	Test 1			Test 2		
	All	L	H	All	L	H
SD	17.84	21.26	13.94	16.28	18.89	12.89
$\bar{X}$	64.27	56.30	76.42	64.24	56.72	75.57
ΣX	2121	1858	25.22	2120	1872	2494
		-4.54			-4.73	
t	.007					

*Based on P values--see Table 16.

Tests for Parallelism

Student T tests were performed on the non-experienced and experienced groups' P distributions and found to be significant for both parts of both test forms indicating a power to discriminate. A Student's T was also run between the P values for all subjects on both tests and found to be non-significant (.007). Thus, the common items and the unique items have the ability to discriminate and the test forms are equal and parallel. The same tests were run on both sets of each test combined, i.e., the complete 40 item test set. Table 18 reports the results of these tests and confirms that the tests are parallel, have the power to discriminate between experienced and non-experienced riders and are of equal difficulty.

Test Form Preparation and Reproduction

To complete the construction of the parallel tests, the items for each form were randomized to avoid the problems of adjacent items giving away the answer. They were then typed onto masters in preparation for reproduction. The dependent variable questions and information items were also prepared as well as a test booklet cover. When ready, copies of each of the test forms--A and B--were reproduced. Also devised was an answer sheet for use by subjects in recording their responses. The test forms and answer sheets are shown in Chapter IV.

TABLE 18.--Summary Statistics* and Results of the Tests for Parallelism for the Two Parallel Tests.

	Test 1			Test 2		
	All	L	H	All	L	H
Mean	63	54.95	75.15	62.98	55.3	74.58
SD	18.98	21.49	15.46	17.79	19.62	14.53
SE of Mean	3.00	3.40	2.44	2.81	3.10	2.30
Minimum	26	20	42	26	20	42
Maximum	92	90	99	94	92	97

	All	L	H	All	L	H
Correlations	.96					
	.94					
	.86					
	.61					
	.61					
	.60					

	Test 1	Test 2
t Tests between	All - L = 1.77	1.83
	All - H =-3.13	-3.19
	L - H =-4.82	-4.99

Test 1	Test 2	
All	All	.006
L	L	-.19
H	H	.17

*Based on P values -- See Table 16.

Summary

In Chapter III, the procedures of developing the parallel tests were described. Beginning Chapter III was a summary of the origin of the source document--Item Writers' Guide for Motorcycle Riding: A Preliminary Outline--and the 463 multiple choice test items based upon selected statements contained in the Guide. The balance of the chapter was devoted to a description of how the 463 items were rewritten into 282 items, tested and evaluated, and condensed into a Final Test Item Pool of 170 suitable items. Additional sections of the chapter related the steps involved in selecting 107 of these items for inclusion into a Parallel Test Item Pool and the mechanics of extracting two parallel test forms of 40 items each. Final sections of the chapter described the test for parallelism applied to the parallel test forms and the results, showing that the forms were indeed parallel and discriminate between high school students who know how to ride and those who do not know how to ride.

In Chapter IV--Final Test Item Pool and Parallel Test Forms--are the following: Test Items and Data; Parallel Test Layout and Use of Forms; Parallel Test Forms and Answer Keys; Pilot Test of Parallel Test Forms; and Summary.

CHAPTER IV

FINAL TEST ITEM POOL AND PARALLEL TEST FORMS

The test item pool is arranged by content areas and organized according to a topic index. The Top Index (Figure 17) provides for organization of the items but does not attempt to prescribe a hierarchy of events nor does it show a relationship between major (1st and 2nd level outline headings) content areas.

The test items are grouped according to the Topic Index. Shown in the item pool (Table 19) in addition to each item are: the associated statistics for it, the correct answer, and whether or not it is included in the parallel test item pool. If the item is included in the parallel test pool, the parallel test (if any) in which it can be found it also given.

The layout of the parallel test forms (Table 20) with suggestions as to the structure and use of the tests is given followed by the actual test forms (Figures 19 and 21). A sample suggested answer sheet, keyed for each of the tests, is also shown in Figures 20 and 22.

The results of a pilot test of the test forms is given and summarized in Tables 20-23.

Test Items and Data

All test items comprising the TEST ITEM POOL are listed along with their associated statistical data. An indication is also made which identifies the items included in the Parallel Test Item Pool. All items are indexed according to the Test Item Pool Topic Index (Figure 17). Figure 18 gives an explanation of the Test Item Pool Column Headings. The Final Test Item Pool and Parallel Test Item Pool are shown in Table 19.

A.* Pre-Operative Procedures

1. Vehicle Related
   a. Pre-trip inspection and procedures
   b. Upon mounting motorcycle
      (See also: Carrying passengers)
   c. Starting and stopping the engine
   d. After starting engine

2. Navigation and Trip Planning
   a. Planning
      4) Preparations for long trip

B. Basic Knowledge

1. Fundamental Control Information and Maneuvers
   a. Shifting gears
      1) Standard
      2) Automatic
      3) Downshifting when necessary
      5) Emergency downshift
   b. Lane usage
      1) General
   c. Following
      1) Following distance
      2) Speed adjustments
   d. Hauling and towing loads
      1) General
   e. Carrying Passengers
      2) Seating passengers

2. Directional Control
   a. Steering general
   b. Turning (See also: Backing up)

3. Speed Control
   a. Starting on a hill
   b. Starting on snow or ice
   d. Speed control - normal (See also: Shifting gears)
   e. Speed control - slow speed

4. Braking and Stopping
   a. Technique and procedures (See also: Rapid stop)
   c. Emergency (See also: Shifting gears and
      Emergency situations)

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*The alpha-numeric section indicators follow the scheme shown in Figure 4. Thus gaps will exist here as there were no items remaining after the item evaluation to fill that particular section.

Figure 17.--Test Item Pool Topic Index.

5. Driver Perception and Communication
   a. Surveillance
      1) General
      2) Traffic

6. Maneuvers
   a. Entering and leaving traffic (See also: Freeway driving on and off ramps)
      1) Entering traffic
   b. Negotiating intersections
      1) Approaching intersections
      2) Traversing intersections
   c. Negotiating curves
      1) Approaching curves
   d. Negotiating hills
      1) Upgrades
   e. Lane changing
      1) Prepares to change
   f. Passing
      1) Prepares to pass
   i. Parking
      1) General

7. Road and Weather Conditions
   a. Road surface and obstructions
      1) Surface type
      2) Surface irregularities
      3) Road cover
      4) Roadway edges
      5) Roadway obstructions
   b. Weather conditions
      1) Visibility
      2) Temperature
      3) Wind

8. Emergency Situations and Maneuvers
   a. Vehicle emergencies
      1) On-road critical
      2) On-road non-critical
      3) Preparations for possible emergencies
      6) Seeks emergency assistance for disabled vehicle (See: Reacting to Traffic, Roadside Services and Parking)
   b. Skid Control
      1) Preventive measures
      3) Arrests skid (See also: Skid control, Deceleration)
      4) Deceleration

Figure 17.--Continued

C. Driving Situations

1. Urban Driving
   a. General
2. Highway Driving
   b. Rural highways
   c. Mountainous terrain
3. Freeway Driving
   a. On-ramps
4. Reacting to Traffic - General on Road Emergencies
   a. Reacting to other vehicles
   b. Reacting to pedestrians
5. Night Driving
   a. General
   c. Rural
6. Railroad Crossings, Bridges and Tunnels, Toll Plazas, Weigh Stations
   a. Railroad crossings
   b. Bridges and tunnels
   c. Toll plazas

D. Vehicle and Driver

1. Physical and Emotional Conditions
   a. Temporary (fatigue, carbon monoxide, etc.)
   d. Vision
2. Vehicle Care and Servicing
   a. Fuel stop service
   c. Routine service

F. Vehicle Code--Laws and Regulations

8. Rules of the Road
   n. Special rules for motorcycles
9. Equipment of Vehicles
   e. Equipment on motorcycles and motor driven cycles

Figure 17.--Continued.

RD % All - Response distribution for all subjects tested.

r Sex - correlation with sex.

r N Dep Var - correlation with New Dependent Variable (measure of riding experience).

r Ach Score - correlation with independent measure of reading - achievement score.

r Total Score - correlation with total score (number of items on test answered correctly).

r Test-retest Reliability - the reliability of the test item.

P - proportion of students getting item correct.

RD % - No experience group
- High experience group

} response distributions for subjects grouped into a no experience group and a high experience group based on the Dependent Variable value.

T Statistic - value of Student T statistic based on number of subjects correctly answering the items in each experience group.

Discriminates - An indication of when the Student T statistic is negative and significant.

Figure 18.--Definitions of the Test Item Pool Column Headings.

TABLE 19.--Final Test Item Pool; Parallel Test Item Pool

Test-Item[a]	282 Number[b]		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Low Exp. Gp. (1-10)	Resp. Distribution (%) High Exp. Gp. (15-30)	T tstatistic	Discriminates	Parallel Test Pool	Parallel Test Form
1-44	1	In order to check your stop light you must:		.08	.06	.23	.47	.51	85			-.75		X	B43
		a) Turn your operating lights on.	11							16	8				
		b) Turn the engine off.	1							0	3				
		c) Engage the clutch.	4							2	3				
		*d) Press the brake pedal or lever.	85							82	88				
1-22	2	Before mounting your motorcycle you should:		-.10	.05	-.21	.34	54	57			.11			
		a) Move the parking stand to the "park" position.	22							27	8				
		b) Push the motorcycle to a closed area and park it.	10							0	23				
		*c) Check for loose parts and tight them.	57							61	60				
		d) Reduce the air pressure if carrying a passenger.	10							10	8				
1-18	5	When carrying cargo it is always necessary to:		-.19	.15	.03	.36	.59	49			-2.22	X	X	A31
		a) Make sure it can move around slightly.	13							14	10				
		b) Adjust the brake cables and clutch.	7							10	3				
		*c) Place it as low as possible on the motorcycle.	49							37	60				
		d) Add air to the tires.	31							37	28				
		b. Upon Mounting Motorcycle													
1-24	15	Before starting the engine on a level surface, it is most important to:		-.16	.08	-.05	.29	.38	65			-.72		X	A49
		*a) Be sure that the motorcycle is in neutral.	65							65	73				
		b) Check the brake and signal lights.	6							2	10				
		c) Check the tires and shock absorbers.	3							0	3				
		d) Raise the kickstand.	25							33	13				

*Correct Answer.

[a]Refers to specific tests and items as shown in Appendicies A and C.

[b]Item identification number.

Test-Item	282 Number	A. Pre-Operative Procedures 1. Vehicle Related (contd.) c. Starting and Stopping the Engine	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Low Exp. Gp. (1-14)	Resp. Distribution (%) High Exp. Gp. (15-30)	r Statistic	Discriminites	Parallel Test Pool	Parallel Test Form
1-54	16	When you start a "kickstart" motorcycle, you should:		-.24	.26	-.18	.45	.52	53			-2.78	X	X	A10
		*a) Turn the folding pedal of the kickstarter lever "out."	53							39	68				
		b) Find the start of compression of the stroke by pulling up on the lever.	8							4	13				
		c) Kick down gently on the lever to start the engine.	22							35	13				
		d) Not touch the spark retard or compression release.	15							18	8				
1-29	17	After starting your engine you should:		-.41	.42	-.13	.40	.57	59			-4.74	X	X	B28
		*a) Return the kickstart lever and folding pedal to storage position.	59							35	80				
		b) Close the throttle to prevent stalling.	11							22	3				
		c) Activate the choke as soon as you start the engine.	22							29	15				
		d) Keep the throttle all the way open.	7							12	3				
1-56	18	If after you kick the starter, you do not hear the engine you should:		-.09	.10	.23	.30	.45	80			-1.56		X	A36
		a) Close the fuel valve.	7							10	0				
		b) Put the motorcycle in gear and engage the clutch.	9							10	5				
		*c) Check the key and choke for proper position.	80							78	90				
		d) Not try to kickstart it again.	2							0	3				
		d. After Starting Engine													
1-27	21	The condition of the headlights, taillights, and brake lights should be checked:		.01	.06	-.14	.24	.48	55			-.84		X	
		*a) Each time after you have started the engine.	55							51	60				
		b) At night before the engine is started.	28							33	22				
		c) Only before long trips when new fuses may be necessary.	5							2	8				
		d) Once a year as part of the state inspection.	13							14	10				

Test-Item	282 Number	A. Pre-Operative Procedures 1. Vehicle Related d. After Starting Engine (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
1-30	24	A motorcycle may skid or fall over when turning if:		-.15	.25	-.11	.30	.67	43			-2.82	X	X	B17
		a) You downshift before you begin to turn.	32							43	30				
		*b) The kickstand falls down and hits the ground.	43							27	55				
		c) You slow down slightly while turning.	14							12	13				
		d) The drive chain is too tight.	10							16	3				
		2. Navigation and Trip Planning a. Planning 4) Preparations for Long Trip													
1-21	25	Before going on a long trip, you need not:		.15	-.04	.12	.23	.40	60			.33			
		a) Check the condition of your tires, cables, and chain.	5							4	8				
		b) Identify the best routes to your destination.	8							4	13				
		c) Try to do most of your driving during the day.	26							31	20				
		*d) Plan to stop every hour for a rest.	60							61	58				
		B. Basic Knowledge 1. Fundamental Control Information and Maneuvers a. Shifting Gears 1) Standard													
2-51	26	When waiting to enter traffic and before shifting from neutral to first gear, you should:		-.04	.11	.16	.25	.56	52			-1.13		X	A42
		a) Keep your feet on the footpegs.	4							6	3				
		b) Lean the motorcycle to one side.	16							12	27				
		*c) Hold the motorcycle from rolling with the front brake.	52							45	58				
		d) Keep the throttle at least half-way open.	27							35	12				
2-36	28	When starting a motorcycle moving:		-.02	.16	.14	.26	.58	58			-1.20		X	B45
		a) Put your feet on the footpegs, open the throttle, and release the front brake and clutch.	13							12	15				
		b) Release the front brake and clutch, put your feet on the footpegs, and open the throttle.	21							27	9				
		c) Open the throttle and put your feet on the footpegs, then release the front brake and clutch.	8							8	9				
		*d) Open the throttle, release the front brake and clutch, and put your feet on the footpegs.	58							53	67				

Test-Item	282 Number		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (1-5)	Resp. Distribution (%) High Exp. Gp. (15-30)	r Statistic	Discriminate Parallel Test Pool		Parallel Test Form
		B. Basic Knowledge 1. Fundamental Control Information and Maneuvers a. Shifting Gears (contd.) 2) Automatic													
2-58	30	When shifting from first to second gear on a motorcycle with an automatic clutch, you should:		.15	.23	-.10	.23	.37	37			-2.38	X	X	A39
		a) Open the throttle halfway and shift into second gear.	23							27	21				
		*b) Close the throttle and toe the lever into second gear.	37							24	48				
		c) Apply the rear brake and gently toe the lever into second gear.	8							14	0				
		d) Disengage the clutch and shift into second gear.	29							33	27				
		3) Downshifting When Necessary													
2-39	31	If you are going up a hill and will be stopping, you should:		-.29	.29	.07	.40	.43	56			-2.45	X	X	B31
		a) Downshift into second gear after you have come to a stop.	13							12	12				
		*b) Downshift into first gear just before you come to a stop.	56							45	70				
		c) Shift into neutral just before you come to a stop.	8							14	0				
		d) Stay in high gear until you have stopped.	22							29	18				
		5) Emergency Downshift													
2-38	33	To make an emergency downshift:		-.18	.18	-.18	.22	.45	63			-.92		X	
		a) Hit both brakes hard until you slow down enough to shift into first gear.	13							14	12				
		b) Shift at any speed but do so very carefully and slowly.	9							8	15				
		*c) Shift through each gear as the motorcycle slows down.	63							55	64				
		d) Shift into neutral and then into any gear you wish.	15							22	9				
		b. Lane Usage 1) General													
2-35	34	When driving in the right-hand lane on a 4-lane road, you should usually ride:		-.01	.30	.08	.12	.58	28			-1.82	X	X	A14 B12
		a) In the center of the lane.	64							69	48				
		*b) In the left wheel track.	28							22	42				
		c) On the line dividing the lanes.	3							2	3				
		d) In a slight zig-zag pattern.	5							6	6				

Test-Item	282 Number		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	p Value	Resp. Distribution (%) Low Exp. Grs. (1-4)	Resp. Distribution (%) High Exp. Grs. (15-30)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
		B. Basic Knowledge 1. Fundamental Control Information and Maneuvers b. Lane Usage 1) General (contd.)													
2-34	35	Weaving in and out of traffic is:		.02	-.14	.16	.16	.18	90			.90			
		a) A good way to make time.	4							4	3				
		*b) A dangerous maneuver.	90							92	91				
		c) An advantage of driving a motorcycle.	2							0	0				
		d) Permitted if proper signals are given.	4							4	6				
2-47	36	When driving a motorcycle you should not ride in the:		.18	-.11	.33	.30	.52	96			.68			
		a) Left part of the lane when following a car or truck.	13							4	21				
		b) Same lane and alongside another motorcycle.	12							12	12				
		c) Right-hand lane unless you are going 5-10 mph slower than the speed limit.	10							14	6				
		*d) Same lane and alongside a car or truck.	66							69	61				
		c. Following 1) Following Distance													
2-50	38	Large following distances are more important for motorcycles than for cars because:		-.03	.02	.28	.31	.48	62			-.36			
		a) Motorcycles cannot stop as quickly.	19							20	21				
		*b) It is easier to overbrake and lose control.	62							61	64				
		c) Vision is more restricted.	17							18	9				
		d) Less attention is required to operate the motorcycle.	3							0	6				
2-27	39	When driving on wet or icy roads, you should:		-.21	-.03	.16	.45	.42	68			.61			
		*a) Increase your following distance.	68							71	64				
		b) Change speed often in order to ensure traction.	18							12	15				
		c) Use the clutch as much as possible.	4							4	9				
		d) Ride closer to the center of the road.	10							12	12				
		2) Speed Adjustments													
2-52	40	Generally your speed should be determined by:		-.09	-.17	.22	.36	.45	71			.91			
		a) The speed of the fastest vehicle on the road.	4							0	6				
		*b) The speed of the vehicle ahead of you.	71							76	70				
		c) The speed of the vehicle behind you.	6							6	6				
		d) The power of your engine.	18							18	15				

Test-Item	282 Number	B. Basic Knowledge 1. Fundamental Control Information and Maneuvers c. Following 2) Speed Adjustments (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Low Exp. Gp. (1-3)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
2-21	41	If the vehicle in front of you suddenly stops, the safest thing to do is:		-.01	-.00	.14	.29	.45	68			.33			
		a) Slide your motorcycle to a stop and jump off.	5							4	3				
		*b) Slow down and take evasive action.	68							71	67				
		c) Brake hard and try to stay behind the vehicle.	17							16	18				
		d) Continue at the same speed and try to drive around the vehicle.	10							8	9				
2-29	43	To be prepared for changes in the speed of the vehicle you are following, you should:		-.05	-.17	.05	.00	.43	55			1.63			
		*a) Watch the vehicles in front of him.	55							65	45				
		b) Change your speed often in order to get a better view of the lead vehicle.	31							20	18				
		c) Ride close enough to him to watch his action.	3							2	3				
		d) Ride close to the left lane line	20							3	33				
		d. Hauling and Towing Loads 1) General													
2-55	46	If you are carrying heavy packages at night and notice that oncoming vehicles are blinking their headlights, you should:		-.09	-.03	.21	.43	.68	63			.25			
		*a) Stop and check the height of your headlights.	63							69	70				
		b) Put your headlight on high beam and continue.	5							4	9				
		c) Move onto the shoulder and continue driving there until you find out what is wrong.	21							16	15				
		d) Check your speed and adjust it if necessary.	9							8	3				
		e. Carrying Passengers 2) Seating Passengers													
2-44	47	You may carry a passenger on your motorcycle only if:		.04	.11	.41	.46	.45	86			-.59		X	A34
		a) The passenger has a motorcycle license.	2							2	3				
		b) You have been driving a motorcycle for one season or more.	1							2	0				
		c) You have insurance.	11							12	9				
		*d) Your motorcycle is equipped for carrying a passenger.	86							84	88				

Test-Item	282 Number	B. Basic Knowledge 1. Fundamental Control Information and Maneuvers e. Carrying Passengers 2) Seating Passengers (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	p Value	Resp. Distribution (%) No Exp. Gp. (1-3)	Resp. Distribution (%) High Exp. Gp. (15-30)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
2-48	10	You should not carry passengers after you have just learned to ride because:		.02	-.02	.13	.43	.47	85			-.30			
		*a) The motorcycle will handle differently.	85							88	85				
		b) More fuel will be used.	1							0	0				
		c) The added weight will decrease the stopping distance.	4							2	3				
		d) You must have a year of experience before it is legal.	9							8	9				
2-28	11	When you have a passenger on your motorcycle, he should:		-.14	.31	.07	.43	.42	79			-3.47	X	X	All
		a) Use the front set of footpegs.	4							10	0				
		*b) Not interfere with the balance or the controls.	79							63	94				
		c) Lean the opposite way as you do when making a turn.	5							8	3				
		d) Know how to operate the motorcycle.	12							18	3				
2-32	12	A passenger should mount the motorcycle:		.15	-.08	.27	.23	.46	54			1.02			
		a) Before you check and adjust the brake cables.	0							0	0				
		b) Before you start the engine.	45							47	61				
		*c) After you start the engine.	54							53	39				
		d) After the motorcycle has started in motion.	1							0	0				
2-20	48	When carrying a passenger you may have to:		-.09	.07	.05	.30	.53	52			-1.29		X	
		*a) Adjust the rear shocks.	52							47	64				
		b) Let air out of the rear tire.	4							6	0				
		c) Use only the front brake to stop safely.	33							37	27				
		d) Start in second gear instead of first.	11							10	9				

B. Basic Knowledge
1. Fundamental Control Information and Maneuvers
è. Carrying Passengers
2) Seating Passengers (contd.)

Test-Item	282 Number		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
2-45	49	It is least important for your passenger to wear a:		.06	.15	.13	.25	.26	93			-1.26		X	B42
		a) Helmet.	4							8	0				
		b) Faceshield or goggles.	2							2	0				
		c) Wind-proof jacket.	1							0	3				
		*d) Heavy scarf.	93							90	97				
2-26	50	Any passenger you carry must:		.02	-.15	.22	.21	.56	48			1.48			
		a) Give handsignals when you stop or turn.	41							29	61				
		b) Use the front footpegs.	8							14	3				
		*c) Straddle the seat.	48							55	36				
		d) Hold onto your shoulders.	2							2	0				
2-16	51	You should tell your passenger to hold onto:		.06	.02	-.09	.22	.50	80			-.01		X	
		a) Your shoulders or arms.	1							0	0				
		*b) Your hips or waist.	80							78	79				
		c) The handlebars.	2							2	3				
		d) The seat behind him.	17							20	18				
2-41	52	You should tell your passenger to:		.12	-.02	.10	.32	.57	63			.10			
		a) Stay tense and be ready for danger.	6							4	15				
		b) Put his hands in his pockets if they get cold.	0							0	0				
		*c) Get comfortable and signal when ready.	63							61	61				
		d) Use his feet to help balance the motorcycle.	29							33	24				
2-46	53	You should tell your passenger to:		.21	- 03	.07	.26	.61	71			.05			
		a) Get on the motorcycle before you start the engine.	21							24	27				
		b) Hold onto your shoulders while riding.	4							2	3				
		*c) Lean with the motorcycle to help control it.	71							69	70				
		d) Change position often to keep from getting stiff.	4							4	0				

Test-Item	282 Number	B. Basic Knowledge 1. Fundamental Control Information and Maneuvers e. Carrying Passengers 2) Seating Passengers (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Non Exp. Grp. (6-9)	Resp. Distribution (%) High Exp. Grp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
2-19	54	If you have a passenger, you should instruct him to:		-.03	.25	.11	.30	.32	73			-2.68	X	X	B41
		a) Hang onto your shoulders or arms.	5							4	6				
		b) Put his feet down when you begin to slow down.	14							29	6				
		*c) Lean forward as you accelerate and backward as you slow down.	73							59	85				
		d) Drag his feet if necessary to help balance the motorcycle.	5							8	0				
		2. Directional Control a. Steering General													
2-25	55	The best way to steer a motorcycle is to have:		-.15	.23	.17	.22	.41	79			-2.46	X	X	A12 B10
		a) One hand on the throttle, the other free to operate controls.	7							12	6				
		b) One hand on the left handgrip, the other free to operate controls.	13							20	3				
		*c) One hand on the throttle, the other on the left handgrip.	79							67	91				
		d) One hand on the throttle, the other near the center of the left handlebar.	0							0	0				
2-43	56	For good steering control you should:		.05	.00	.29	.36	.49	70			-.04		X	
		*a) Grasp the handlebars firmly.	70							71	73				
		b) Lean heavily into the handlebars.	4							6	3				
		c) Steer mostly by shifting your weight up and down.	16							16	21				
		d) Hold loosely onto the ends of the handgrips.	10							6	3				
2-33	57	To steer the motorcycle you should:		-.13	.18	.29	.24	.42	54			-.93		X	A30
		a) Shift your weight to the right when making a left turn.	20							20	24				
		*b) Make small steering corrections by putting pressure on the handlebars.	54							53	64				
		c) Turn the handlebars more sharply the faster you are going.	6							4	9				
		d) Hold the handlebars loosely at all times.	20							22	3				
		b. Turning													
2-18	61	When making a turn it is most important to:		-.03	.08	.15	.27	.51	80			-1.45		X	A20
		*a) Look to see if the turn can be made safely.	80							78	91				
		b) Downshift as you start to turn.	11							8	6				
		c) Use both the front and the rear brakes.	5							8	0				
		d) Put your foot down on the inside of the turn.	4							6	3				

Test-Item	282 Number	B. Basic Knowledge 2. Directional Control b. Turning (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Non-Exp. Gp. (1)	Resp. Distribution (%) High Exp. Gp. (15-10)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
2-22	63	For the best turns the passenger should:		.19	.06	-.01	.11	.40	73			-1.04		X	B44
		a) Lean in the opposite direction of the driver.	7							14	0				
		*b) Lean in the same direction as the driver.	73							69	79				
		c) Sit up straight and try not to lean.	13							8	15				
		d) Lean slightly forward.	7							8	6				
2-37	65	When making a sharp turn, you should be ready to:		-.05	.04	.07	.37	.35	68			-.44		X	
		a) Apply the front brake firmly.	24							31	18				
		b) Put both feet out to the side.	2							2	0				
		*c) Put down the foot which is on the inside of the turn.	68							65	73				
		d) Put down the foot which is on the outside of the turn.	6							2	9				
2-24	66	When making sharp turns at high speeds:		-.15	-.05	-.11	.17	.25	21			.41			
		*a) Apply brakes before the turn.	51							55	48				
		b) Do not downshift before the turn.	5							0	9				
		c) Lean the motorcycle more if you are on a slippery surface.	5							6	3				
		d) Never speed up while in the turn.	38							39	36				
2-54	68	To straighten the motorcycle after a turn, you should:		.09	.11	.50	.33	.45	51			-.86		X	B47
		a) Take both feet off the footpegs.	4							2	6				
		b) Lean sharply into the opposite direction.	25							31	21				
		*c) Adjust pressure on the handlebars	51							45	55				
		d) Sit up straight and turn the handlebar sharply.	18							20	15				
2-42	69	If your motorcycle starts to slide when you are making a slow turn, be ready to:		-.16	.00	.02	.34	.59	55			.33			
		a) Apply sharp jabs on the front brake.	11							10	15				
		b) Shift into a lower gear.	19							22	15				
		c) Lean forward to put more weight on the front wheel.	14							14	18				
		*d) Put your foot down on the inside of the turn.	55							53	52				

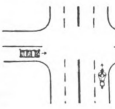
Test-Item	282 Number	B. Basic Knowledge 3. Speed Control a. Starting on a Hill	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	p Value	Resp. Distribution (%) High Exp. Gp. (15-20)	Resp. Distribution (%) High Psy. Gp. (15-20)	r Stat stic	Discriminates	Parallel Test Pool	Parallel Test Form
3-49	71	If your motorcycle stalls when going up a hill, you should:		-.45	.21	.07	.24	.55	26			-?.25	X	X	A15 B13
		*a) Hold it from rolling with the front brake.	26							20	43				
		b) Hold it from rolling with the rear brake.	9							7	4				
		c) Hold it from rolling with the front and rear brakes.	41							34	36				
		d) Hold it from rolling with your feet.	23							39	18				
		b. Starting on Snow or Ice													
3-43	76	After starting on a slippery road, you should:		-.43	.42	.12	.52	.23	40			-4.56	X	X	A47
		*a) Shift to a higher gear when the road surface permits.	40							24	71				
		b) Regulate your speed by using the clutch instead of the throttle.	36							46	11				
		c) Use the front brake to control your speed.	20							22	14				
		d) Lean the motorcycle to the right.	2							2	0				
		d. Speed Control - Normal													
3-48	78	When you are driving on the highway:		.12	.02	.09	.27	.35	76			.37			
		a) Vary your speed to break the monotony.	10							5	11				
		b) Try not to vary the amount the throttle is opened.	8							10	7				
		*c) Maintain the speed of traffic flow.	76							78	75				
		d) Keep your wrists well above the handgrips.	5							7	4				
		e. Speed Control - Slow Speed													
3-14	80	When going very slowly, you should:		-.31	.16	.18	.30	.35	70			-1.61		X	B34
		a) Shift into the highest gear and press the clutch lever.	4							2	4				
		b) Close the throttle and shift into neutral.	13							12	7				
		c) Avoid using the front brake.	11							17	7				
		*d) Be ready to put your feet down for balance.	70							63	82				

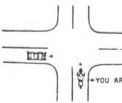
Test-Item	282 Number	B. Basic Knowledge 4. Braking and Stopping a. Technique and Procedures	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
3-21	83	When braking to a normal stop, you generally should apply:		-.13	.16	-.28	.21	.29	32			-2.58	X		
		*a) The rear brake only.	32							20	46				
		b) The front brake only.	2							0	7				
		c) Both the front and rear brakes at the same time.	44							46	43				
		d) The front brake only and shift to a lower gear.	22							34	4				
3-15	84	When slowing down for a stop, you must:		.26	.17	.13	.16	.17	41			-2.63	X	X	A32
		*a) Use extreme care when applying the front brake.	41							32	64				
		b) Rotate the throttle to the open position.	0							0	0				
		c) Shift to a lower gear before applying the brakes.	52							54	36				
		d) Depress the brake pedal firmly.	6							15	0				
3-47	86	When you are carrying a passenger:		-.29	.27	-.19	.37	.54	36			-2.38	X	X	A27
		*a) You will need more distance to slow down and stop.	36							24	54				
		b) The motorcycle will speed up faster.	4							5	4				
		c) The motorcycle will be more stable at slow speeds.	22							32	7				
		d) You should let him help you balance the motorcycle.	36							39	39				
3-44	92	If you want to stop after recovering from a rear wheel skid, you should:		-.41	.22	-.01	.48	.50	41			-1.98	X	X	B23
		a) Apply the front brake only.	8							10	4				
		*b) Apply both brakes again.	41							32	57				
		c) Coast to a stop without the use of brakes.	22							32	11				
		d) Close the throttle and press the clutch lever.	26							24	25				
		c. Emergency													
3-24	93	When making a rapid or emergency stop, you should:		-.37	.24	-.04	.42	.64	36			-2.63	X	X	B46
		a) Shift your weight forward.	28							24	25				
		b) Hold the handlebars loosely.	12							5	11				
		*c) Grasp the fuel tank with your knees.	36							32	61				
		d) Apply the front brake only.	21							37	4				

Test-Item	282 Number		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Min. Exp. Gp. (1-4)	Resp. Distribution (%) High Exp. Gp. (15-30)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
		B. Basic Knowledge 4. Basic Knowledge c. Emergency (contd.)													
3-37	95	When making an emergency stop on a slippery road or on loose gravel, you should:		-.16	.24	-.06	.32	.15	20			2.49	X		
		*a) Apply the rear brake only.	2							12	36				
		b) Use the front and rear brakes together.	24							22	14				
		c) Apply the front brake when the rear wheel begins to slide.	23							27	21				
		d) Use the throttle and clutch and avoid using the brake.	32							37	29				
		5. Driver Perception and Communication a. Surveillance 1) General													
1-42	96	One of the safety advantages you have when driving a motorcycle is:		-.12	-.04	-.04	.25	.54	75			.58			
		a) You will be thrown clear in an accident.	4							0	8				
		b) Motorcycles are easily seen by other motorists.	1							2	0				
		*c) You have fewer blindspots than in a car.	75							76	70				
		d) Motorcycles can safely drive off the road to avoid accidents.	21							22	23				
1-49	98	If you can avoid it, you should not ride:		-.12	-.04	.16	.20	.09	91			.33			
		a) Around highway curves.	3							4	3				
		*b) Over grease or oil spots.	91							90	88				
		c) During hot or humid weather.	4							4	5				
		d) In cities or towns.	3							2	5				
		2) Traffic													
1-45	101	A safe motorcycle driver will:		-.18	.04	.19	.41	.48	64			-.02			
		*a) Give the other driver the right-of-way.	64							67	68				
		b) Only use the right-hand traffic lane.	18							12	23				
		c) Not make right turns at busy intersections.	4							2	3				
		d) Change lanes rather than change speeds.	14							18	8				

Test-Item	282 Number		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
		B. Basic Knowledge 6. Maneuvers a. Entering and Leaving Traffic 1) Entering Traffic													
6-44	102	After entering a new traffic lane, you should:		-.01	.01	.20	.49	.42	67			.36			
		a) Slow down.	14							20	11				
		*b) Switch off your turn signal.	67							69	66				
		c) Stay on the far right side of the lane.	13							7	13				
		d) Put your feet out to stabilize your motorcycle.	5							4	11				
		b. Negotiating Intersections 1) Approaching Intersections													
6-54	104	When you come to a stop sign or red traffic light, you should stop:		.05	-.06	.16	.44	.57	72			.10			
		*a) Near the left tire marks in the lane.	72							71	66				
		b) After you have passed the crosswalk.	9							7	13				
		c) Only if the car in front of you stops.	5							2	13				
		d) Between lanes of traffic.	9							16	3				
6-39	105	When approaching an intersection it is most important to:		.00	-.01	.11	.34	.46	61			.31			
		a) Stay in the right lane.	16							24	11				
		b) Watch for traffic making right turns.	7							7	8				
		c) Watch for traffic going straight.	15							11	26				
		*d) Watch for traffic making left turns.	61							58	55				
6-13	106	If a vehicle is coming from your right at an intersection it may be unsafe to:		.17	-.02	.09	.40	.34	58			-.08			X
		a) Try to estimate the speed and distance of the vehicle.	15							18	13				
		b) Prepare to slow down and stop if the vehicle is close.	17							16	24				
		c) Look ahead of the vehicle to see if you will have to stop.	10							13	8				
		*d) Continue at the same speed through the intersection.	58							53	55				

B. Basic Knowledge
6. Maneuvers
b. Negotiating Intersections
1) Approaching Intersections (contd.)

Test-Item	282 Number		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Op. (0-9)	Resp. Distribution (%) High Exp. Op. (10-70)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
6-20	107	If you are on a main road and coming to an intersection, you should:		-.01	.11	.17	.42	.17	91			-1.46		X	A38
		*a) Watch for vehicles slowing down or giving other signs of making left turns.	91							84	95				
		b) Protect yourself by driving between lanes of traffic.	1							2	0				
		c) Shift to higher gear and coast through the intersection.	4							7	3				
		d) Move to the far left lane and turn on your lights.	5							7	3				
6-47	108	When on a main road at an intersection and a vehicle is approaching from the left, you should:		.03	-.09	.02	.39	.40	78			.75			
		a) Stop; he always has the right-of-way.	11							16	11				
		b) Speed up to make sure he knows you're there.	4							2	5				
		*c) Yield if he does not slow down.	78							78	71				
		d) Slow down immediately and blow your horn.	6							4	11				
															
6-50	109	Before yielding to a vehicle which is turning left in front of you:		.06	.21	.05	.28	.14	55			-1.91	X	X	A44
		a) Move into the right lane.	23							33	8				
		b) Move to the left so you can pass when he starts to turn.	8							9	5				
		*c) Check the vehicles behind you.	55							44	68				
		d) Signal the vehicle that he should turn.	15							13	18				

Test-Item	282 Number	B. Basic Knowledge 6. Maneuvers b. Negotiating Intersections 1) Approaching Intersections (contd.)	Resp. Distribution (U) (%)	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (L) (%)	Resp. Distribution (Y) High & Lo. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
6-27	110	If you are going straight through the intersection and see a vehicle to your left:		-.01	.01	-.16	.22	.34	89			-.75		X	B36
		a) Drive partially into the intersection to warn the other vehicle to slow down.	6							9	5				
		*b) Prepare to yield right-of-way.	89							87	92				
		c) Speed up to get through the intersection before the other vehicle.	4							4	3				
		d) Pull off the road until the vehicle gets through the intersection.	1							0	0				
															
		2) Traversing Intersections													
6-53	111	When coming to and driving through an intersection, you should always:		.03	.02	.07	.35	.32	67			.36			
		a) Slow down to 15-20 mph.	15							18	16				
		b) Stay close to the vehicle in front of you.	5							2	11				
		*c) Check the traffic lights and signs.	67							69	66				
		d) Move to the right lane.	12							11	8				
6-30	112	Upon approaching an intersection you need not stop when:		.09	-.06	-.14	.25	.37	84			-.13		X	
		a) A vehicle suddenly makes a left turn in front of you.	2							2	0				
		b) You are making a left turn and oncoming traffic is approaching.	4							4	5				
		c) A vehicle on your left is signaling for a right turn.	10							11	11				
		*d) Traffic allows complete passage through the intersection.	84							82	82				
6-17	113	If an oncoming vehicle is preparing to turn left at an intersection:		-.07	.26	-.06	.29	.42	46			-3.21	X	X	B21
		a) Drive to the left to get around it.	3							2	3				
		b) Speed up and continue straight before he completes his turn.	19							13	18				
		c) Stop and let him turn.	30							47	8				
		*d) Lag slightly behind other vehicles going in your direction.	46							36	68				

Test-Item	282 Number		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Low Exp. Gp. (1-5)	Resp. Distribution (%) High Exp. Gp. (15-30)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
		B. Basic Knowledge 6. Maneuvers b. Negotiating Intersections 2) Traversing Intersections (contd.)													
6-55	115	When turning right at an intersection, you should:		.07	-.04	.28	.24	.42	52			.63			
		a) Speed up until you complete the turn.	9							9	13				
		*b) Put your feet down only when needed for support.	52							53	47				
		c) Go faster than 5 mph.	27							27	29				
		d) Lean farther than the motorcycle.	10							11	11				
		c. Negotiating Curves 1) Approaching Curves													
6-51	117	Under good conditions, the rider approaching a curve to the right should:		.03	-.03	.29	.43	.36	75			.68			
		a) Lean to the left and brake on the curve.	12							18	11				
		*b) Reduce speed before the curve and speed up slightly in the curve.	75							71	71				
		c) Turn the wheels sharply to the right and sit straight up.	7							4	11				
		d) Speed up before the curve and brake when in the curve.	5							7	8				
		d. Negotiating Hills 1) Upgrades													
6-59	119	When going up a steep hill, you should:		-.22	.19	-.04	.30	.48	61			-2.32	X	X	A17 B15
		a) Stay in high gear and open the throttle all the way.	22							36	11				
		*b) Shift to a lower gear to maintain your speed.	61							49	76				
		c) Drive on the extreme right of the lane.	12							16	5				
		d) Decrease your speed to cool the engine.	5							0	8				
		e. Lane Changing 1) Prepares to Change													
6-29	122	The first thing to do before changing lanes is:		-.10	.15	-.09	.10	.39	42			-1.93	X	X	B19
		a) Signal with your lights and hand.	52							58	39				
		b) Slow down.	3							0	0				
		*c) Check your mirrors and look over your shoulder	42							38	58				
		d) Move closer to the lane you want to be in.	3							4	0				

Test-Item	282 Number	B. Basic Knowledge 6. Maneuvers (contd.) n. Passing 1) Prepares to Pass	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) Lit. Exp. Gp. (10-14)	Resp. Distribution (%) H'gh Exp. Gp. (15-30)	T Stat.stic	Discriminates	Parallel Test Pool	Parallel Test Form
6-31	123	When deciding to pass on a 2-lane road, it is most important to consider the:		-.13	.09	.13	.21	.30	64				-.31		X	
		*a) Time it will take you to speed up and pass.	64							67	68					
		b) Number of vehicles behind you.	3							2	5					
		c) Type of vehicle you are passing.	24							22	21					
		d) Air pressure from larger vehicles like trucks.	9							9	3					
6-15	124	When passing a truck rather than a car, you will have:		-.11	.15	-.02	.38	.38	68				-1.91	X	X	A2/
		a) To go faster in order to pass.	14							24	8					
		b) A better view of the road ahead.	15							20	8					
		c) To drive closer to the truck in order to pass safely.	2							0	5					
		*d) More control problems because of the air pressure.	68							53	76					
6-40	125	You may need more distance to pass on a 2-lane road because:		-.13	.07	.04	.16	.38	49				-1.11		X	A43
		a) Motorcycles cannot change lanes as quickly as other vehicles.	23							27	11					
		*b) Other vehicles in your lane may not yield when you try to re-enter the lane.	49							47	58					
		c) Motorcycles can go faster than other vehicles.	6							4	8					
		d) It will take you longer to slow down before you can move back to the right.	20							20	21					
6-22	127	When passing other vehicles it is safest to pass on the:		-.03	.03	.03	.11	.40	68				-.56		X	B35
		a) Right side.	6							9	3					
		*b) Left side.	68							62	71					
		c) Side away from the sun.	2							2	3					
		d) Side with the least traffic.	24							27	24					
		i. Parking 1) General														
6-28	130	You should not park in a space that:		.15	.10	-.03	.18	.75	54				-.71		X	
		*a) Has a coating of oil or grease.	54							49	58					
		b) Is less than 60 feet from a corner.	8							4	16					
		c) Is within 25 feet of a fire hydrant.	35							42	21					
		d) Has a parking meter.	3							2	5					

Test-Item	282 Number	B. Basic Knowledge 7. Road and Weather Conditions a. Road Surface and Obstructions 1) Surface Type	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
4-24	135	When approaching loose gravel or dirt, it is best to:		-.09	.08	-.25	.29	.31	72			.99			
		*a) Slow down.	72							74	76				
		b) Speed up slightly.	9							3	14				
		c) Shift to a higher gear.	16							23	7				
		d) Lean forward.	3							0	3				
4-55	138	When riding on gravel or other loose road material, it is most important to avoid:		.16	-.06	.03	.21	.30	87			1.13			
		a) Using hand signals.	3							0	7				
		b) Changing lanes.	3							0	7				
		c) Downshifting.	6							8	0				
		*d) Making sharp turns.	87							90	83				
4-30	140	When driving on a gravel or brick road, you should:		-.34	.30	-.25	.38	.30	56			-3.61	X	X	B18
		*a) Increase the distance between you and the other vehicles.	56							44	83				
		b) Use the clutch to control your speed.	19							26	7				
		c) Drive with the throttle all the way open in a lower gear.	9							10	3				
		d) Ride with a slight zig-zag motion.	16							21	7				
		2) Surface Irregularities													
4-13	141	When you are riding on a rough surface:		.07	.05	.07	.23	.21	93			.33			
		a) Steer in a zig-zag manner.	2							3	3				
		*b) Slow down.	93							92	90				
		c) Keep your feet off the footpegs.	5							5	3				
		d) Ride in the left lane.	1							0	3				
4-18	142	If you come to bumps in the road, you should:		-.08	.03	-.00	.25	.70	58			.19			
		*a) Be prepared for more bumps ahead.	58							59	59				
		b) Stop and walk your motorcycle.	8							10	3				
		c) Accelerate as you go over the bumps.	7							5	10				
		d) Hold the handlebars loosely.	26							26	28				
4-42	143	If you see a road sign indicating a bumpy road ahead:		.14	-.08	.12	.14	.16	88			.76			
		a) Stand up on the footpegs to get ready for the bumps.	3							3	3				
		b) Pull off the road and turn around.	2							0	0				
		c) Ride on the shoulder until you pass the bumps.	7							5	10				
		*d) Slow down in advance of the bumpy area.	88							92	86				

Test-Item	282 Number	B. Basic Knowledge 7. Road and Weather Conditions a. Road Surface and Obstructions 2) Surface Irregularities (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (1-5)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
4-38	144	If you see a pothole ahead, you should first:		-.00	.11	-.02	.45	.31	78			-1.01		X	A25
		*a) Slow down.	78							77	86				
		b) Swerve to the left or right.	13							15	0				
		c) Stop immediately.	1							3	0				
		d) Put on your turn signals.	6							3	14				
4-46	146	When you are riding on a bumpy road, you should:		-.17	.28	.17	.29	.37	48			-3.19	X	X	A28
		a) Keep the brakes on until you are over the bumps.	17							28	10				
		*b) Place more of your weight on the footpegs.	48							33	72				
		c) Keep both feet down for balance.	29							33	14				
		d) Ride on the shoulder or in the median.	6							5	3				
		3) Road Cover													
4-52	147	When driving on a road covered with water, snow, or sand, you should:		-.04	.07	.06	.41	.08	92			-.83		X	A22
		a) Drive closer to the center line of the road.	2							5	0				
		b) Follow other vehicles more closely than usual.	3							5	0				
		c) Use your front brake only.	4							3	7				
		*d) Drive slower than usual.	92							87	93				
4-32	148	When you want to slow down on water, ice, snow or sand, you should:		-.06	.12	.02	.22	.45	53			-.57		X	
		a) Pump the front brake first and then apply the rear brake.	24							26	24				
		*b) Pump the rear brake and then apply the front brake.	53							56	62				
		c) Shift to neutral and not apply the brakes.	10							5	3				
		d) Apply both brakes firmly at the same time.	13							13	10				
4-37	149	The most slippery place to ride on a wet road is:		.08	-.14	.20	.23	.53	48			1.63			
		a) The right wheel track.	4							0	3				
		*b) The center of the lane.	48							56	38				
		c) The left wheel track.	12							13	17				
		d) Near the shoulder or the curb.	37							31	41				
4-14	152	You should be most careful on wet roads:		.07	-.06	-.15	.03	.54	65			.45			
		a) Right after a rainstorm.	23							21	17				
		b) After several days of rain.	4							3	3				
		*c) When it first starts raining.	65							72	66				
		d) During a summer rain.	8							5	14				

Test-Item	282 Number	B. Basic Knowledge 7. Road and Weather Conditions a. Road Surface and Obstruction 3) Road Cover (contd.)	Resp. Distribution (3) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
4-15	153	If you must drive through an oil-soaked area of the road, you should:		.06	.12	-.00	.26	.21	89			-1.09		X	A46
		a) Move forward on your seat.	2							0	0				
		*b) Slow down and avoid leaning the motorcycle.	89							90	100				
		c) Lean the motorcycle instead of turning the wheel.	6							8	0				
		d) Speed up before coming to the area and then close the throttle.	3							3	0				
4-43	155	To recover from hydroplaning you should:		-.30	.07	-.19	.38	.44	49			-.99		X	A19
		*a) Close the throttle to slow down.	49							51	62				
		b) Apply the rear and then the front brake firmly.	16							5	21				
		c) Steer in a zig-zag motion to keep balance.	13							21	10				
		d) Maintain your speed and sit back on the motorcycle.	20							21	3				
4-19	156	After driving through deep water you should:		.06	-.12	.01	.10	.45	77			1.14			
		a) Downshift and then open the throttle.	13							8	14				
		b) Not apply the front brake for the next several miles.	7							5	7				
		*c) Put on both brakes lightly and open the throttle.	77							85	72				
		d) Ride in a zig-zag pattern to dry the tires.	3							3	7				
4-29	157	When coming to an intersection covered with ice or snow, you should:		-.09	.06	.27	.36	.54	90			-1.09		X	
		a) Press the clutch lever before the intersection and keep it pressed in.	6							5	0				
		b) Reduce your speed before getting to the intersection.	90							90	97				
		c) Turn on your bright lights and blow your horn.	3							5	3				
		d) Stop and ask your passenger to get off before getting to the intersection.	0							0	0				
4-60	158	If you cannot get your motorcycle started in motion on snow or ice:		-.32	.12	-.14	.43	.38	67			-1.76	X	X	B33
		a) Spin the rear wheel until you get traction.	6							15	3				
		b) Turn the front wheel to the right.	8							8	3				
		*c) Shift your weight to the rear wheel and push with your feet.	67							56	76				
		d) Push the motorcycle in gear and jump on when it starts moving.	11							15	10				

Test-Item	282 Number	B. Basic Knowledge 7. Road and Weather Conditions a. Road Surface and Obstructions 3) Road Cover (contd.)	Resp. Distribution (%) All	r Sex	r M Der Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
4-51	159	If your motorcycle gets stuck in deep snow, you may have to:		.05	.12	.11	.30	.45	55			-.72		X	B27
		a) Shift to a higher gear and speed up.	4							0	7				
		b) Bounce on the motorcycle to get more traction.	22							21	10				
		c) Open the throttle slightly and steer in a zig-zag motion.	19							18	10				
		*d) Get off and lift the motorcycle out of the drift.	55							62	72				
4-33	160	When driving through deep snow you should:		-.44	.38	-.06	.36	.44	67			-4.01	X	X	A35
		a) Keep the motorcycle in high gear.	9							13	7				
		*b) Keep moving at a constant speed.	67							44	86				
		c) Close the throttle and keep the clutch lever pressed in.	18							36	3				
		d) Press down on the handlebars.	5							5	3				
4-39	161	When you are trying to get through deep snow:		-.12	.14	.03	.38	.52	47			-2.20	X	X	B29
		a) Shift to a higher gear after entering the snow.	34							36	34				
		b) Stop and start often to get traction.	12							26	3				
		*c) Shift your weight to the rear wheel.	47							31	55				
		d) Don't use your feet for balance.	6							8	7				
4-21	162	When starting your motorcycle on ice, you should:		-.28	.09	.03	.35	.32	84			-1.17		X	B38
		a) Release the clutch quickly for better traction.	5							8	0				
		b) Start in first gear if your wheel spins in second gear.	6							8	7				
		*c) Keep your feet down and accelerate slowly.	84							79	90				
		d) Apply more pressure to the front wheel.	5							5	3				
4-40	164	When stopping on ice you should:		-.14	.17	.07	.32	.40	78			-1.42		X	B20
		a) Press the clutch and front brake at the same time.	6							3	3				
		*b) Pump the rear brake.	78							77	90				
		c) Firmly apply the front brake.	4							8	0				
		d) Shift to neutral.	11							10	7				

Test-Item	282 Number		Resp. Distribution (%) All	r Bis	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	% Value	Resp. Distribution (%) High Ach. Grs. (13-16)	Resp. Distribution (%) High Exp. Grs. (13-16)	% Statistic	Discriminates	Parallel Tests Pool	Parallel Test Form
		B. Basic Knowledge 7. Road and Weather Conditions a. Road Surface and Obstructions 3) Road Cover (Contd.)													
4-16	165	If you come to an area where sand is covering the road, you should:		-.20	.12	-.28	.48	.39	69			-1.46		X	D24
		*a) Slow down before getting to the area.	69							56	76				
		b) Rest your foot on top of the chain guard.	3							3	3				
		c) Stop and push the motorcycle through the sand.	14							26	7				
		d) Lower your body close to the motorcycle.	13							15	10				
		4) Roadway Edges													
4-44	169	When driving your motorcycle on a road where there is only a narrow, soft shoulder:		-.10	.12	-.17	.29	.37	68			-.80		X	L4
		a) Keep in the left lane.	22							28	17				
		*b) Pay more attention to the traffic and road ahead.	68							64	76				
		c) Speed up to get off the road more quickly.	3							3	3				
		d) Brake hard when stopping to avoid a loss of traction.	6							5	3				
		5) Roadway Obstructions													
4-23	173	After heavy rains you should:		-.17	.17	-.09	.40	.46	51			-1.41		X	A45
		a) Avoid downshifting if possible.	23							36	17				
		b) Not use the brakes to slow down.	16							10	10				
		*c) Watch for large puddles on the road	51							46	66				
		d) Lean your body instead of turning the front wheel.	10							8	7				
4-20	174	If you think there may be stones or other objects in the road, you should:		.05	-.00	.21	.16	.21	87			.06			
		a) Move onto the shoulder and slow down.	0							0	0				
		b) Drive close behind a larger vehicle for protection.	1							0	0				
		c) Move close to the shoulder in case you have to stop.	12							13	14				
		*d) Slow down and prepare to stop or steer around them.	87							87	86				

Test-Item	282 Number	B. Basic Knowledge 7. Road and Weather Conditions a. Road Surface and Obstructions 5) Roadway Obstructions (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Low Dep. Grp. (1-3)	Resp. Distribution (%) High Dep. Grp. (4-5)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
4-50	175	If you see an object in the middle of your lane, it is best to:		.10	.09	.22	.14	.63	72			-.88		X	
		a) Move into the lane used by oncoming traffic.	1							0	0				
		b) Drive onto the shoulder.	6							8	3				
		*c) Slow down and avoid running over it.	72							74	83				
		d) Stop and remove it from the road.	21							18	14				
		b. Weather Conditions 1) Visibility													
4-22	176	When you have trouble seeing because of rain, snow, fog, sun, etc., you should:		-.01	-.04	.23	.33	.64	69			-.68		X	
		a) Follow a larger vehicle more closely.	5							5	0				
		*b) Be very careful because other vehicles may not see you	69							69	69				
		c) Put on your bright lights and move from side to side.	5							3	7				
		d) Go 10-15 mph slower than the other vehicles.	21							23	21				
4-54	177	If you have trouble seeing because of foo, rain, or sun, you should drive:		-.01	.01	-.16	.36	.46	63			-.43		X	
		*a) In the lane that keeps you away from other traffic.	63							62	66				
		b) On the line separating the two lanes so that you can go into either.	2							5	0				
		c) In a zig-zag pattern in order to be seen.	11							10	10				
		d) At the posted speed limit.	21							21	21				
4-49	178	In order to see better when it is raining, you can:		.12	-.19	.19	.08	.66	53			1.41			
		a) Put on a pair of sunglasses.	23							18	38				
		b) Drive at a faster speed.	5							5	7				
		c) Follow close to a larger vehicle.	17							21	14				
		*d) Look over the top of your windshield.	53							54	38				
4-27	179	When your vision is reduced by fog or rain, it may help to:		-.14	-.16	.10	.21	.60	55			1.34			
		a) Turn on your high beam headlight.	43							38	59				
		b) Speed up to gain better traction.	1							3	0				
		c) Not worry about the pavement warnings.	0							0	0				
		*d) Stop and clean your eye protection.	55							56	41				

Test-Item	282 Number		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	p Value	Resp. Distribution (%) Low Exp. Grp. (1--5)	Resp. Distribution (%) High Exp. Grp. (15--20)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form	
		B. Basic Knowledge 7. Road and Weather Conditions b. Weather Conditions (contd.) 2) Temperature														
4-34	180	When driving in extremely cold weather, you should:		-.00	.14	-.00	.17	.56	80			-1.88	X	X	X	A 23
		a) Drive faster than usual.	1							0	0					
		b) Wear dark-colored clothing.	16							26	10					
		*c) Use a pivoted faceshield.	80							72	90					
		d) Follow close behind other vehicles.	3							3	0					
		3) Wind														
4-36	181	When it is very windy you should:		-.14	.29	-.20	.23	.34	55			-2.78	X	X	X	B40
		a) Hold the handlegrips lightly.	4							8	0					
		*b) Drive at a slower speed.	55							41	72					
		c) Shift to a higher gear and use less throttle.	15							15	7					
		d) Stay near the inside of the curves.	27							36	21					
		8. Emergency Situations and Maneuvers a. Vehicle Emergencies 1) On-Road Critical														
3-38	186	If your brakes fail, you should:		-.17	.19	-.14	.26	.38	53			-2.88	X	X	X	A37
		a) Open the throttle.	4							2	0					
		b) Shift your motorcycle into neutral.	34							44	18					
		c) Drag your feet to slow you down.	8							10	7					
		*d) Turn off the engine.	53							44	75					
3-54	188	If your motorcycle appears to be on fire while you are riding, you should:		-.01	-.03	.30	.38	.30	86			.20				
		a) Drive quickly to the nearest fire station.	5							5	7					
		b) Stop where you are on the road and run for cover.	6							7	4					
		c) Leave the engine on and drop the motorcycle on its side.	2							2	0					
		*d) Leave the road, stop the engine, and get off.	86							85	86					
3-26	189	If a tire blows out while driving, you should:		-.21	.09	-.15	.26	.52	61			-1.57		X	X	A41
		*a) Balance the motorcycle by shifting your weight.	61							51	71					
		b) Apply the brakes to stop quickly.	20							32	14					
		c) Use hand signals to warn other drivers.	16							17	14					
		d) Attempt to maintain the same speed.	3							0	0					

Test-Item	282 Number	B. Basic Knowledge 8. Emergency Situations and Maneuvers a. Vehicle Emergencies 1) On-Road Critical (Contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (0-3)	Resp. Distribution (%) High Exp. Gp. (15-20)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
3-33	190	If your motorcycle is not operating smoothly, you should:		-.15	.14	-.19	.37	.40	83			-1.81	X	X	B37
		a) Avoid using the front brake.	4							2	4				
		b) Loosen your grip on the handlebars.	0							0	0				
		c) Shift to a lower gear.	12							20	4				
		*d) Drive off the road as soon as you find a safe place.	83							76	93				
3-41	191	If the drive chain begins slipping or clanking:		-.29	.19	.28	.34	.24	50			-1.85	X	X	B25
		a) Hold the handlebars loosely.	1							0	4				
		*b) Disengage the clutch as soon as possible.	50							44	64				
		c) Slow down and jump off the motorcycle.	3							5	0				
		d) Close the throttle and shift to a lower gear.	45							51	29				
		2) On-Road Non-Critical													
3-58	192	If you are running low on fuel:		-.05	.06	.21	.22	.37	69			-.29		X	
		a) Increase your speed.	3							5	0				
		*b) Turn the fuel valve to reserve.	69							71	75				
		c) Shift into neutral and coast.	21							20	18				
		d) Stop often in order to save gas.	6							5	4				
		3) Preparations for Possible Emergencies													
3-19	193	The least important thing to carry with you on your motorcycle is:		-.21	.09	-.13	.19	.39	53			-.75		X	
		a) A small tool kit.	3							2	4				
		b) A first aid kit.	11							5	14				
		c) A master link.	33							39	21				
		*d) An extra chain.	53							54	61				
		6) Seeks Emergency Assistance for Disabled Vehicle													
3-30	194	When your motorcycle is disabled on the shoulder of a freeway, do not:		-.02	-.11	.17	.30	.49	55			1.43			
		a) Get it completely off the road.	7							7	11				
		*b) Push it along the shoulder to an exit.	55							59	43				
		c) Tie a white cloth to the handlebars.	10							12	14				
		d) Get off the motorcycle and stand back from the road.	27							22	32				

Test-Item	282 Number	B. Basic Knowledge 8. Emergency Situations and Maneuvers a. Vehicle Emergencies 6) Seeks Emergency Assistance for Disabled Vehicle (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Op. (4-9)	Resp. Distribution (%) High Exp. Op. (15-20)	r Statistic	Discriminates	Parallel Test Pool	(Parallel Test Form
3-17	196	The distance it takes to safely stop a motorcycle depends most on the:		.11	.00	.08	.23	.16	80			-.24		X	
		a) Weight of the driver.	9							2	11				
		b) Age of the motorcycle.	1							0	4				
		c) Size of the tires.	7							12	0				
		*d) Condition of the road.	80							83	86				
		b. Skid Control 1) Prevention Measures													
3-36	197	In order to avoid skids you should:		-.08	-.05	-.10	.40	.35	79			-.10		X	
		a) Not drive in high gear.	10							15	4				
		*b) Enter turns at slow speeds.	79							80	82				
		c) Ride near the center of the lane.	3							0	7				
		d) Put oversized tires on the motorcycle.	7							5	7				
3-22	198	In order to avoid skids on wet or slippery roads, you should:		-.17	.09	.19	.37	.40	79			-.72		X	B32
		a) Reduce the air pressure in the tires.	14							17	11				
		b) Put more pressure on the front wheel.	3							0	4				
		c) Start in third gear rather than first.	5							5	0				
		*d) Change your speed and direction slowly.	79							78	86				
		3) Arrests Skid													
3-35	200	If your rear wheel is skidding, you should:		.05	.07	.03	.32	.45	68			-.18		X	
		*a) Steer in the direction of the skid.	68							68	71				
		b) Sit very still and not shift your weight.	6							2	0				
		c) Lean your body more than the motorcycle.	6							5	7				
		d) Apply the front brake lightly.	20							22	21				
3-40	202	If your front wheel begins to skid, you should:		-.31	.23	.12	.51	.32	68			-2.62	X	X	A26
		a) Not apply the rear brake.	4							7	4				
		*b) Release the front brake.	68							51	82				
		c) Shift to a lower gear.	22							32	11				
		d) Press the clutch lever.	5							10	0				

Test-Item	282 Number		Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	p Value	Resp. Distribution (%) No Exp. Co. (6-9)	Resp. Distribution (%) High Exp. Co. (15-20)	t Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
		B. Basic Knowledge 8. Emergency Situations and Maneuvers b. Skid Control (contd.) 4) Deceleration													
3-52	204	When in a skid you should use your brakes:		-.24	.19	.04	.37	.45	42			-1.85	X	X	B26
		*a) After feeling you have control of the motorcycle.	42							37	61				
		b) Just as the motorcycle starts to skid.	9							15	4				
		c) In a series of quick, hard jabs on a wet road.	16							15	14				
		d) In order to help you regain steering control.	32							34	18				
		C. Driving Situations 1. Urban Driving a. General													
5-15	206	When driving on city streets you should:		-.02	.04	.14	.14	.24	90			-.35		X	
		a) Ride between two lanes of traffic.	0							0	0				
		*b) Maintain an even pace with other traffic.	90							87	89				
		c) Change lanes if a space opens up.	3							0	3				
		d) Stay close to the right curb.	7							13	8				
5-16	207	When riding a motorcycle in the city, you should:		.10	-.10	.16	.30	.41	90			1.05			
		a) Not pace your speed to the traffic lights.	5							3	5				
		b) Change your speed every few minutes so as not to stall.	2							3	3				
		*c) Stay in the lane which offers the best movement and vision.	90							92	84				
		d) Take advantage of your motorcycle and weave in and out of traffic.	4							3	8				
		2. Highway Driving b. Rural Highways													
5-22	210	When driving on country roads you should be prepared for:		.03	-.11	-.04	.31	.40	82			-.58			
		*a) Many unmarked intersections.	82							84	79				
		b) Few curves or sharp turns.	10							8	13				
		c) Fast moving farm vehicles.	6							5	5				
		d) Good road surfaces.	2							3	3				

Test-Item	282 Number	C. Driving Situations 2. Highway Driving c. Rural Highways (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Low Exp. Grp. (6-49)	Resp. Distribution (%) High Exp. Grp. (150-30)	t Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
5-25	211	On a mountain road, you should:		-.00	.00	.03	.33	.44	56			-.45		X	
		*a) Stay just to the right of the center of the lane except when meeting traffic.	56							53	58				
		b) Keep your brakes on when going downhill.	19							21	16				
		c) Ride on the right shoulder, if possible.	13							18	11				
		d) Move from one side of the lane to the other.	12							8	16				
		3. Freeway Driving a. On-Ramps													
5-39	213	If the freeway entrance ramp to a freeway feeds into the left lane, you should:		-.33	.34	.22	.41	.42	53			-1.37		X	
		a) Wait until you can cross over to the right lane before entering the main road.	14							18	8				
		b) Slow to a stop before entering and then proceed with extra care.	19							21	16				
		c) Drive along the shoulder until you can safely enter the main road.	14							16	16				
		*d) Make sure that you can travel at the freeway speed limit before entering.	53							45	61				
5-52	215	If you are carrying a passenger, you:		.05	-.06	.22	.39	.56	63			.47			
		*a) Will need to open your throttle more or allow more distance when entering a high speed road.	63							66	61				
		b) Should let your passenger watch out for approaching cars.	12							16	8				
		c) Will need less distance in order to stop because of the extra weight.	15							11	18				
		d) Should drive only in the left-hand lane.	6							5	5				
5-55	216	When on a right-hand entrance to a freeway you should:		.07	-.11	.25	.47	.68	69			.74			
		*a) Look back over your left shoulder and into the left rearview mirror.	69							74	66				
		b) Only look straight ahead at the road.	6							3	11				
		c) Not speed up until you are on the main road.	6							8	11				
		d) Assume the right-of-way when merging with freeway traffic.	13							13	8				

Test-Item	282 Number	C. Driving Situations 4. Reacting to Traffic - General On-Road Emergencies a. Reacting to Other Vehicles	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	p Value	Resp. Distribution (%) Low Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
5-45	218	When you ride by parked cars, you should:		.08	-.23	.24	.44	.34	82			1.52			
		a) Move to the right side of the lane.	3							5	0				
		*b) Slow down and stay 1/2 to 3/4 of a lane away.	82							89	76				
		c) Blow your horn or flash your lights.	6							0	11				
		d) Speed up and drive in the lane farthest away from the park cars.	8							5	11				
5-27	219	You should not ride close to parked cars because:		-.16	.04	-.09	.24	.63	82			-.58	X	A33	
		a) The right edge of the traffic lane is the "oil slick" area.	5							0	8				
		*b) People may be getting out of the parked vehicle.	82							79	84				
		c) The vehicle may have been improperly parked.	2							5	0				
		d) It is illegal to ride less than 5 feet away from a parked car.	10							16	5				
5-31	220	When you drive past a line of parked vehicles:		.01	.03	.04	.31	.41	85			.35			
		a) Speed up slightly if there are no people on the road.	1							0	0				
		b) Drive close to the right side of the lane.	5							3	5				
		c) Blow your horn.	8							8	5				
		*d) Look for vehicles that may be leaving their spaces.	85							89	87				
5-21	224	If someone is following very close behind you, you should:		-.04	-.07	-.02	.21	.52	45			.68			
		a) Speed up in order to lose them.	2							0	2				
		*b) Slow down gradually and let them pass.	45							50	42				
		c) Hit the brakes to warn them that they are too close.	15							16	13				
		d) Continue to drive at the legal speed limit.	38							34	42				
5-30	225	If a runaway vehicle is coming toward you, you should:		-.17	-.07	-.08	.31	.51	50			.91			
		*a) Pull of onto the right shoulder and drive behind any available protection.	50							55	45				
		b) Speed up until you come to an exit or side road.	5							5	5				
		c) Slow down and then jump off your motorcycle.	7							3	13				
		d) Move into another lane and stop and wait until the other vehicle passes you.	38							37	37				

C. Driving Situations
4. Reacting to Traffic - General
On-Road Emergency
a. Reacting to Other Vehicles
(contd.)

Test-Item	282 Number		Resp. Distribution (%) (All)	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	p Value	Resp. Distribution (%) Low Exp. Gp. (1-4)	Resp. Distribution (%) High Exp. Gp. (15-20)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
5-29	226	When you approach a long line of oncoming vehicles, you should:		.18	-.11	-.01	.00	.41	74			1.03			
		*a) Move to the right side of your lane.	74							79	68				
		b) Stay in the left part of the lane.	14							11	21				
		c) Flash your lights and slow down.	9							11	8				
		d) Drive in a zig-zag manner to attract attention.	3							0	3				
5-34	227	If you are about to have a crash on the road:		.03	-.06	-.04	.32	.45	79			.86			
		a) Steer toward large, rigid objects near the roadway.	1							0	3				
		*b) Leave the road at any point rather than risk a head-on collision.	79							84	76				
		c) Jump off your motorcycle to get clear of the other vehicle.	12							8	11				
		d) Steer so that you will be hit broadside rather than head-on.	8							8	11				
5-23	229	When driving with other motorcycles you should not:		.03	.02	-.20	.32	.45	71			.00			
		a) Drive more cautiously.	1							0	3				
		b) Drive at a steady, constant pace.	5							0	0				
		*c) Talk to other riders or passengers.	71							76	76				
		d) Drive in the same lane or abreast of another motorcycle.	22							24	21				
5-49	230	When driving with other motorcycles it is best to drive:		-.01	-.04	.24	.41	.67	64			.23			
		a) In second or third gear.	14							16	16				
		*b) In single file in a staggered position.	64							61	58				
		c) 10-15 mph below the posted speed limit.	19							24	21				
		d) In the passing lane.	2							0	3				
5-21	231	When riding with other motorcycles, there should never be:		.01	.05	-.05	.36	.39	74			-.27			X
		a) Two motorcycles side by side.	21							21	16				
		*b) More than two motorcycles side by side.	74							76	79				
		c) More than three motorcycles side by side.	4							3	5				
		d) More than four motorcycles side by side.	1							0	0				

Test-Item	282 Number	C. Driving Situations 4. Reacting to Traffic - General On-Road Emergencies a. Reacting to Other Vehicles (contd.)	Resp. Distribution (%) All	r S x	r N Leg. Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-10)	Resp. Distribution (%) High Exp. Gp. (15-30)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
5-53	233	When driving with other motorcycles you should:		-.14	-.05	.25	.20	.45	59			.46			
		a) Drive close to the other motorcycles or vehicles.	2							5	0				
		b) Stay close to the left side of the right-hand lane.	28							29	26				
		*c) Set a pace slow enough for the slowest motorcycle.	59							63	58				
		d) Keep your headlight on high beam.	6							0	8				
		b. Reacting to Pedestrians													
5-33	235	If you are coming to an animal crossing, you should:		.04	04	.11	.38	.40	94			-.45	X		B30
		a) Keep going at the same speed.	2							5	0				
		b) Speed up and move to the left.	2							0	3				
		*c) Slow down and be prepared to stop.	94							92	95				
		d) Stop and push your motorcycle.	3							3	3				
5-46	236	If a dog is chasing you, you should:		-.23	.09	.14	.29	.75	58			-.70			
		*a) Speed up.	58							58	66		X		
		b) Slow down.	19							26	11				
		c) Attempt to run over the animal.	3							0	3				
		d) Stop as soon as possible.	19							16	18				
5-28	237	If you have to change speed or direction because of an animal, you should first:		.17	-.10	.21	.26	.51	59			.70			
		a) Press in the clutch lever.	11							8	11				
		*b) Check for vehicles behind and around you.	59							66	58				
		c) Apply both brakes lightly and signal.	24							21	26				
		d) Take both feet off the footpegs for balance.	5							5	3				
		5. Night Driving a. General													
5-18	243	At night you should:		-.01	-.00	-.00	.17	.42	81			.90			
		a) Pass vehicles more quickly than during the day.	3							5	0				
		b) Follow vehicles more closely than during the day.	2							0	0				
		*c) Allow more time to stop than during the day.	81							87	79				
		d) Drive closer to the center of the road than during the day.	15							8	21				

Test-Item	282 Number	C. Driving Situations 5. Night Driving (contd.) c. Rural	Resp. Distribution (%) All	r Fox	r Resp Var	r Achievement Score	r Total Score	r Test-Retest Reliability	p Value	Resp. Distribution (%) Low Exp. Grp. (1-15)	Resp. Distribution (%) High Exp. Grp. (15-30)	r Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
5-57	245	When coming to an animal crossing or refuge area at night, you should:		-.06	-.03	.10	.33	.47	82			.30			
		a) Speed up and flash your lights several times.	2							0	5				
		b) Stop and continue with care.	7							8	8				
		*c) Slow down and watch for animals near the roadway.	82							84	82				
		d) Sound your horn and then continue at normal speed.	4							5	0				
		6. Railroad Crossings, Bridges and Tunnels, Toll Plazas, Weigh Stations a. Railroad Crossings													
5-43	247	The best way to cross railroad tracks is to:		.02	-.03	.00	.18	.48	59			.46			
		a) Go slow and cross at an angle to the right.	20							24	24				
		b) Reduce speed and cross at an angle to the left.	11							5	8				
		c) Speed up slightly and lean forward for balance.	9							8	11				
		*d) Reduce speed and cross at a right angle, if possible.	59							63	58				
5-50	249	If you drop something off your motorcycle while crossing railroad tracks, you should:		-.06	-.01	.18	.43	.43	81			-.30		X	
		a) Stop on the tracks and pick it up right away.	0							0	0				
		b) Circle back if it looks like no train is coming.	12							13	5				
		*c) Keep going until you can pull off the road and walk back to the tracks.	81							82	84				
		d) Leave the object where it is, since it's illegal to pick things up from the tracks.	6							5	8				
		b. Bridges and Tunnels													
1-16	250	As you enter a tunnel you should:		-.20	.01	-.03	.28	.54	65			.03			
		a) Move closer to the center of the road.	27							29	25				
		b) Increase your speed a bit.	5							4	5				
		*c) Remove your sunglasses.	65							65	65				
		d) Turn off your headlight.	1							0	3				

Test-Item	282 Number		Resp. Distribution (%) All	r Pos	r Neg Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) Low Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-20)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
		C. Driving Situations 6. Railroad Crossings, Bridges and Tunnels, Toll Plazas, Weigh Stations (contd.) c. Toll Plazas													
1-37	253	When coming to a toll booth, you should:		-.10	.07	.27	.36	.64	92			-1.15		X	
		a) Get the change out of your pocket well in advance.	3							2	0				
		b) Get the change out of your pocket only while moving slowly.	3							2	3				
		*c) Get the change out of your pocket only after you have stopped.	92							92	98				
		d) Only use those booths that are used by trucks.	2							4	0				
		D. Vehicle and Driver 1 Physical and Emotional Conditions a. Temporary													
1-19	254	To help prevent eye strain while driving, you should:		.00	-.01	.06	.16	.22	93			-.26			
		a) Drink coffee before you drive.	0							0	0				
		*b) Wear a good faceshield or goggles.	93							94	93				
		c) Wear sunglasses to protect against glare at night.	4							2	15				
		d) Keep your eyes focused at the middle of the road.	4							4	0				
1-46	256	If you are tired and cannot stop to sleep, you should:		-.14	.09	.21	.22	.50	72			-1.33		X	A16 B14
		a) Drive at a constant speed.	6							4	3				
		b) Drive as fast as permitted.	5							4	8				
		*c) Stop and rest at least every hour.	72							67	80				
		d) Drive as slowly as possible.	16							24	10				
		d. Vision													
1-38	258	If you normally wear glasses:		-.11	.08	.10	.18	.44	87			-.61		X	
		a) Do not use a tinted faceshield.	2							2	3				
		b) You should not wear them when you drive a motorcycle.	1							0	0				
		c) You do not need to wear goggles or a faceshield.	9							12	8				
		*d) Make sure they fit properly with your goggles or faceshield on.	87							86	90				
		2. Vehicle Care and Servicing a. Fuel Stop Service													
1-47	259	When you put gas in your tank, you should always:		-.29	.18	.07	.38	.63	75			-1.63		X	B48
		a) Leave the motorcycle in gear.	4							6	0				
		*b) Avoid overfilling the tank.	75							67	83				
		c) Leave the engine on.	7							8	8				
		d) Use the same brand of gasoline.	14							18	10				

Test-Item	282 Number	D. Vehicle and Driver 2. Vehicle Care and Servicing a. Fuel Stop Service (contd.)	Resp. Distribution (%) All	r Sex	r H De? Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
1-57	260	Every time you stop for gas, you should:		-.12	09	-.13	.36	.44	52			-.84		X	
		*a) Check the oil level or add oil to the gas tank.	52							51	65				
		b) Ask a mechanic to check the brake and light system.	12							6	5				
		c) Shift through all the gears to see if repairs are needed.	20							24	22				
		d) Oil and tighten the brake and clutch cables.	13							16	3				
		c. Routine Service													
1-31	261	You should inspect your wheel rims to see if they need to be straightened:		-.06	.05	.09	.25	.49	51			-.98		X	
		a) Every time you ride.	27							35	15				
		*b) Every 3,000 miles.	51							47	58				
		c) Once a year.	11							10	15				
		d) Only after riding on gravel roads.	11							8	13				
1-55	262	If you are having problems with your suspension system, you may need to:		-.08	.08	.24	.44	.35	75			-.65		X	
		a) Add air to your front tire.	11							12	13				
		b) Use oversize tires.	6							4	5				
		*c) Adjust your rear shocks.	75							71	78				
		d) Stay in first or second gear.	6							8	5				
1-34	263	When checking steering and suspension systems, you should check:		-.45	.42	.09	.31	.74	40			-4.74	X	X	A40
		a) The tension of the brake and clutch cables.	33							45	28				
		b) Rear and front footpegs.	5							6	0				
		*c) For bent fork tubes.	40							22	68				
		d) The drive chain and sprockets.	20							24	5				
1-35	264	If your stoplight comes on before your brakes begin to grab, you should:		-.04	.22	.14	.42	.43	78			-1.99	X	X	A48
		*a) Adjust the brake linkage and switch.	78							73	90				
		b) Tighten the clutch cable.	11							18	3				
		c) Move the rear wheel slightly back.	5							4	3				
		d) Apply the brakes quickly when stopping.	5							4	5				
1-51	265	If the front brake lever pulls back against the handgrip without applying the brake, you should:		-.42	.33	-.01	.31	.46	63			-3.78	X	X	B39
		a) Tighten the screws in the lever.	17							20	10				
		*b) Adjust the brake cable.	63							49	85				
		c) Loosen the rear brake.	9							10	3				
		d) Oil the cable and the brake lever on the handgrip.	9							16	3				

Test-Item	282 Number	D. Vehicle and Driver 2. Vehicle Care and Servicing c. Routine Service (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
1-25	266	When you check for lubrication on the chain, do not:		.03	-.20	-.01	.20	.43	83			1.28			
		a) Remove, clean, and oil the chain.	8							4	10				
		b) Apply oil with spout, spray, or brush oiler.	5							4	8				
		*c) Leave the motorcycle's engine running.	83							88	78				
		d) Adjust automatic chain oiler if present.	5							4	5				
1-53	267	After you have moved the rear wheel to adjust the chain, you should:		-.24	19	-.03	.33	.29	46			-1.97	X	X	A18 B16
		*a) Tighten the axle and adjust the rear brake.	46							37	58				
		b) Tighten the axle and adjust the clutch.	11							14	8				
		c) Adjust the sprockets and connect the brake light.	14							8	13				
		d) Adjust the rear shocks and tighten the chain adjusters.	28							37	23				
		F. Vehicle Code - Laws and Regulations 8. Rules of the Road n. Special Rules for Motorcycles													
6-42	270	A person who operates a motorcycle:		.05	.11	.16	.32	.30	87			-1.95	X	X	A13 B11
		a) Must wear light or white clothes.	4							9	0				
		b) Cannot drive on high speed highways.	6							11	5				
		*c) Has all the rights and duties of other drivers.	87							78	95				
		d) Must not stop his motorcycle on the shoulder of the road.	3							2	0				
6-25	272	Motorcycle drivers:		-.03	.00	.09	.23	.53	86			-.75		X	
		*a) Are allowed the use of the full width of a lane.	86							87	92				
		b) Must share a lane with bicycle riders.	3							2	0				
		c) Must not share a lane with another motorcycle driver.	11							11	8				
		d) Should share the lane with passenger cars and trucks.	0							0	0				
6-33	273	When overtaking and passing a vehicle in your lane, pass:		-.01	.10	-.09	.20	.16	91			-1.46		X	A24
		a) On the right.	5							9	0				
		b) On the left in the same lane.	3							2	5				
		*c) By changing to the left or passing lane.	91							84	95				
		d) On either side in the same lane.	2							4	0				

Test-Item	282 Number	F. Vehicle Code - Laws and Regulations 8. Rules of the Road n. Special Rules for Motorcycles (contd.)	Resp. Distribution (%) All	r Sex	r N Dep Var	r Achievement Score	r Total Score	r Test-Retest Reliability	P Value	Resp. Distribution (%) No Exp. Gp. (6-9)	Resp. Distribution (%) High Exp. Gp. (15-30)	T Statistic	Discriminates	Parallel Test Pool	Parallel Test Form
6-41	274	It is illegal for a group of motorcycles to drive:		-.03	.19	.03	.19	.42	72			-1.30		X	B22
		a) Through a residential area.	14							18	8				
		b) In more than one lane of a highway.	9							9	11				
		*c) More than two abreast in one lane.	72							64	76				
		d) In single file when there are more than ten motorcycles in the group.	5							9	5				
6-26	275	It is illegal for a motorcycle driver to:		.03	-.08	.02	.32	.46	65			.86			
		a) Ride two abreast on an undivided highway.	27							24	12				
		b) Drive faster than 35 mph at night.	5							7	5				
		*c) Cling to other vehicles.	65							67	61				
		d) Drive in the left part of the lane.	2							2	3				
6-16	276	In order to carry a passenger on your motorcycle, it must be equipped with:		.17	-.00	-.17	.14	.45	60			-.56		X	
		a) Chain and exhaust pipe guards.	27							31	32				
		b) Mechanical directional signals.	3							4	3				
		*c) Footrests for the passenger.	60							56	61				
		d) An engine of more than 15-brake horsepower.	10							9	5				
		9. Equipment of Vehicles e. Equipment on Motorcycles and Motor Driven Cycles													
6-35	279	Motorcycles must be equipped with:		-.01	.00	.04	.40	.58	71			-.09		X	
		a) Parking lights.	9							4	16				
		b) At least two headlights.	6							7	8				
		*c) A red reflector on the rear.	71							67	68				
		d) Emergency flashing lights.	14							22	8				

Parallel Test Layout and Use of Forms

The two parallel test forms presented here are suitable for use with 9-12th grade students. Each form consisted of 40 items concerning on-road motorcycle riding plus nine items of information about each respondent for a total of 49 items. Six of the nine information items are used to determine the amount of riding a student has done, with the other three used to determine age, sex, and grade level.

The parallel test layout (Table 20) gives the pool item number and answer associated with each item and permits retracing each item to the basic pool. Also given is the topic index code.

The six informational items can be combined into a "dependent variable" for use in determining the riding experience level of the respondent. This value is found by adding together the numbers of the responses for questions 4-9. When summed, a value of from 6-30 will result. The following range of values can be used to determine riding experience:

6-9 No experience

10-14 Some experience

15-30 Considerable experience

Space on the answer sheet is provided for recording both this dependent variable information as well as the total score. A subject code can also be placed on the upper right hand corner of the answer sheet.

The parallel test forms are bound into booklets with a suggested cover page and instruction. Answer sheets are also provided. Those shown in Figures 20 and 22 also indicate the correct answer.

Since these tests have the statistical power to differentiate between groups of students who know how to ride and those who do not know how to ride, one would expect that those with a low dependent variable value (6-9) would do poorly on the test and those with a high dependent variable value (15-30) would perform well on the test.

Parallel Test Forms and Answer Keys

Following are the parallel test form booklets A and B with suggested manually scored answer sheets which, in this case, also serve as answer keys. These test booklets and answer sheets are suitable for use in an initial evaluation of the test forms.

Figure 19 shows test booklet A; Figure 20 shows answer sheet A; Figure 21 shows test booklet B; Figure 22 shows answer sheet B.

TABLE 20.--Parallel Test Layout--Form A and B (Item Locator).

	Test A			Test B		
Test Item	282* Number	Answer	Topic Outline Section	282* Number	Answer	Topic Outline Section
10	16	A	A1c	55	C	B2a
11	11	B	B1e2	270	C	F8n
12	55	C	B2a	34	B	B16l
13	270	C	F8n	71	A	B3a
14	34	B	B1b1	256	C	D1a
15	71	A	B3a	119	B	B6d1
16	256	C	D1a	267	A	D2c
17	119	B	B6d1	24	B	A1d
18	267	A	D2c	140	A	B7a1
19	155	A	B7a3	122	C	B6e1
20	61	A	B2b	164	B	B7a3
21	124	D	B6f1	113	D	B6b2
22	147	D	B7a3	274	C	F8n
23	180	C	B7b2	92	B	B4a
24	273	C	F8n	165	A	B7a3
25	144	A	B7a2	191	B	B8a1
26	202	B	B8b3	204	A	B8b4
27	86	A	B4a	159	D	B7a3
28	146	B	B7a2	17	A	A1c
29	197	B	B8b1	161	C	B7a3
30	57	B	B2a	235	C	C4b
31	5	C	A1a	31	B	B1a3
32	84	A	B4a	198	D	B8b1
33	219	B	C4a	158	C	B7a3
34	47	D	B1e2	80	D	B3e
35	160	B	B7a3	127	B	B6f1
36	18	C	A1c	110	B	B6b1
37	186	D	B8a1	190	D	B8a1
38	107	A	B6b1	162	C	B7a3

*Item Identification Number

Table 20.--Continued.

Test Item	Test A 282 Number	Test A Answer	Test A Topic Outline Section	Test B 282 Number	Test B Answer	Test B Topic Outline Section
39	30	B	B1a2	265	B	D2c
40	263	C	D2c	181	B	B7b3
41	189	A	B8a1	54	C	B1e2
42	26	C	B1a1	49	D	B1e2
43	125	B	B6f1	1	D	A1a
44	109	C	B6b1	63	B	B2b
45	173	C	B7a5	28	D	B1a1
46	153	B	B7a3	93	C	B4c
47	76	A	B3b	68	C	B2b
48	264	A	D2c	259	B	D2a
49	15	A	A1b	169	B	B7e4

MOTORCYCLE RIDING KNOWLEDGE TEST

TEST BOOKLET

FORM A

READ: This test is designed to find out how much you know about certain aspects of motorcycle riding.

Whether you have a lot of experience on a motorcycle, a little experience, or have never been on a motorcycle, please try and answer each question as well as you can.

There is one BEST answer for each question. Mark your response on the answer sheet by crossing out the letter or number which corresponds to your choice. See the answer sheet for an example of how to mark your response. Erase completely any answer you wish to change.

NOTE: The question numbers go down the answer sheet.

Use only a number 2 or soft pencil.

Consider each question by itself and assume, unless otherwise stated, that the road and weather conditions are ideal and that all riding is done on the road.

WRITE: Write your name on the line marked "YOUR NAME" at the top of the answer sheet. Also fill in today's "DATE," the letter of the "TEST FORM" and the name of your "INSTRUCTOR."

DO NOT make any marks in this booklet.

NOW: Turn the page and begin answering the questions . . .

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Figure 20.--Paralell Test Form--Booklet A.

1. **How old are you?**

   a) 15 years old or younger.
   b) 16 years old.
   c) 17 years old.
   d) 18 years old.
   e) 19 years old or older.

2. **What grade are you in?**

   a) 9th (Freshman).
   b) 10th (Sophomore).
   c) 11th (Junior).
   d) 12th (Senior).

3. **What is your sex?**

   a) Male.
   b) Female.

The next six questions (numbers 4-9) are about motorcycle ownership and riding experience on-the-road.

The term:

MOTORCYCLE as used here also includes the smaller machines such as motor-driven cycles, motor scooters, mini-bikes, etc.

OWNERSHIP or OWN means either it is yours legally or yours but someone else had to sign for it.

FAMILY means all people, other than yourself, who live in the same house.

4. **Do you or does any member of your family - either now or sometime within the past two years - own a motorcycle?**

   1) No one owns a motorcycle.
   2) Someone else in the family (other than myself) owns a motorcycle.
   4) I am the only one in the family who owns a motorcycle.
   5) I own a motorcycle and so does another member of my family (two or more motorcycles in the family).

5 **Do you plan on buying or owning a motorcycle this year?**

   1) No.
   2) Don't know.
   4) Yes.
   5) I already own one.

6. **How many times have you been the driver (operator) of a motorcycle on the road?**

   1) Never operated a motorcycle.
   2) Once or twice.
   4) Several times.
   5) Many times.

7. **Estimate the total number of miles you have driven (operated) a motorcycle on the road during the past year.**

   1) Haven't driven a motorcycle.
   2) Less than 100 miles.
   3) 100 - 1,500 miles.
   4) 1,500 - 3,000 miles.
   5) More than 3,000 miles.

8. **How many times have you been a passenger on a motorcycle?**

   1) Never been a passenger.
   2) Once or twice.
   4) Several times.
   5) Many times.

9. **How much time do you spend working on motorcycles - yours or someone else's (mechanical repairs, cleaning, etc.)?**

   1) None.
   2) Less than one hour per week.
   3) One - three hours per week.
   4) Four - eight hours per week.
   5) More than eight hours per week.

Continue to next page...

10. When you start a "kickstart" motorcycle, you should:
    a) Turn the folding pedal of the kick-starter lever "out."
    b) Find the start of compression of the stroke by pulling up on the lever.
    c) Kick down gently on the lever to start the engine.
    d) Not touch the spark retard or compression release.

11. When you have a passenger on your motorcycle, he should:
    a) Use the front set of footpegs.
    b) Not interfere with the balance or the controls.
    c) Lean the opposite way as you do when making a turn.
    d) Know how to operate the motorcycle.

12. The best way to steer a motorcycle is to have:
    a) One hand on the throttle, the other free to operate controls.
    b) One hand on the left handgrip, the other free to operate controls.
    c) One hand on the throttle, the other on the left handgrip.
    d) One hand on the throttle, the other near the center of the left handlebar.

13. A person who operates a motorcycle:
    a) Must wear light or white clothes.
    b) Cannot drive on high speed highways.
    c) Has all the rights and duties of other drivers.
    d) Must not stop his motorcycle on the shoulder of the road.

14. When driving in the right-hand lane on a 4-lane road, you should usually ride:
    a) In the center of the lane.
    b) In the left wheel track.
    c) On the line dividing the lanes.
    d) In a slight zig-zag pattern.

15. If your motorcycle stalls when going up a hill, you should:
    a) Hold it from rolling with the front brake.
    b) Hold it from rolling with the rear brake.
    c) Hold it from rolling with the front and rear brakes.
    d) Hold it from rolling with your feet.

16. If you are tired and cannot stop to sleep, you should:
    a) Drive at a constant speed.
    b) Drive as fast as permitted.
    c) Stop and rest at least every hour.
    d) Drive as slowly as possible.

17. When going up a steep hill, you should:
    a) Stay in high gear and open the throttle all the way.
    b) Shift to a lower gear to maintain your speed.
    c) Drive on the extreme right of the lane.
    d) Decrease your speed to cool the engine.

18. After you have moved the rear wheel to adjust the chain, you should:
    a) Tighten the axle and adjust the rear brake.
    b) Tighten the axle and adjust the clutch.
    c) Adjust the sprockets and connect the brake light.
    d) Adjust the rear shocks and tighten the chain adjusters.

19. To recover from hydroplaning you should:
    a) Close the throttle to slow down.
    b) Apply the rear and then the front brake firmly.
    c) Steer in a zig-zag motion to keep balance.
    d) Maintain your speed and sit back on the motorcycle.

20. When making a turn it is most important to:
    a) Look to see if the turn can be made safely.
    b) Downshift as you start to turn.
    c) Use both the front and the rear brakes.
    d) Put your foot down on the inside of the turn.

21. When passing a truck rather than a car, you will have:
    a) To go faster in order to pass.
    b) A better view of the road ahead.
    c) To drive closer to the truck in order to pass safely.
    d) More control problems because of the air pressure.

 Continue to next page ...

22. When driving on a road covered with water, snow, or sand, you should:
    a) Drive closer to the center line of the road.
    b) Follow other vehicles more closely than usual.
    c) Use your front brake only..
    d) Drive slower than usual.

23. When driving in extremely cold weather, you should:
    a) Drive faster than usual.
    b) Wear dark-colored clothing.
    c) Use a pivoted faceshield.
    d) Follow close behind other vehicles.

24. When overtaking and passing a vehicle in your lane, pass:
    a) On the right.
    b) On the left in the same lane.
    c) By changing to the left or passing lane.
    d) On either side in the same lane.

25. If you see a pothole ahead, you should first:
    a) Slow down.
    b) Swerve to the left or right.
    c) Stop immediately.
    d) Put on your turn signals.

26. If your front wheel begins to skid, you should:
    a) Not apply the rear brake.
    b) Release the front brake.
    c) Shift to a lower gear.
    d) Press the clutch lever.

27. When you are carrying a passenger:
    a) You will need more distance to slow down and stop.
    b) The motorcycle will speed up faster.
    c) The motorcycle will be more stable at slow speeds.
    d) You should let him help you balance the motorcycle.

28. When you are riding on a bumpy road, you should:
    a) Keep the brakes on until you are over the bumps.
    b) Place more of your weight on the footpegs.
    c) Keep both feet down for balance.
    d) Ride on the shoulder or in the median.

29. In order to avoid skids you should:
    a) Not drive in high gear.
    b) Enter turns at slow speeds.
    c) Ride near the center of the lane.
    d) Put oversized tires on the motorcycle.

30. To steer the motorcycle, you should:
    a) Shift your weight to the right when making a left turn.
    b) Make small steering corrections by putting pressure on the handlebars.
    c) Turn the handlebars more sharply the faster you are going.
    d) Hold the handlebars loosely at all times.

31. When carrying cargo it is always necessary to:
    a) Make sure it can move around slightly.
    b) Adjust the brake cables and clutch.
    c) Place it as low as possible on the motorcycle.
    d) Add air to the tires.

32. When slowing down for a stop, you must:
    a) Use extreme care when applying the front brake.
    b) Rotate the throttle to the open position.
    c) Shift to a lower gear before applying the brakes.
    d) Depress the brake pedal firmly.

33. You should not ride close to parked cars because:
    a) The right edge of the traffic lane is the "oil slick" area.
    b) People may be getting out of the parked vehicle.
    c) The vehicle may have been improperly parked.
    d) It is illegal to ride less than 5 feet away from a parked car.

 Continue to next page ...

34. You may carry a passenger on your motorcycle only if:
   a) The passenger has a motorcycle license.
   b) You have been driving a motorcycle for one season or more.
   c) You have insurance.
   d) Your motorcycle is equipped for carrying a passenger.

35. When driving through deep snow you should:
   a) Keep the motorcycle in high gear.
   b) Keep moving at a constant speed.
   c) Close the throttle and keep the clutch lever pressed in.
   d) Press down on the handlebars.

36. If after you kick the starter, you do not hear the engine you should:
   a) Close the fuel valve.
   b) Put the motorcycle in gear and engage the clutch.
   c) Check the key and choke for proper position.
   d) Not try to kickstart it again.

37. If your brakes fail, you should:
   a) Open the throttle.
   b) Shift your motorcycle into neutral.
   c) Drag your feet to slow you down.
   d) Turn off the engine.

38. If you are on a main road and coming to an intersection, you should:
   a) Watch for vehicles slowing down or giving other signs of making left turns.
   b) Protect yourself by driving between lanes of traffic.
   c) Shift to higher gear and coast through the intersection.
   d) Move to the far left lane and turn on your lights.

39. When shifting from first to second gear on a motorcycle with an automatic clutch, you should:
   a) Open the throttle halfway and shift into second gear.
   b) Close the throttle and toe the lever into second gear.
   c) Apply the rear brake and gently toe the lever into second gear.
   d) Disengage the clutch and shift into second gear.

40. When checking steering and suspension systems, you should check:
   a) The tension of the brake and clutch cables.
   b) Rear and front footpegs.
   c) For bent fork tubes.
   d) The drive chain and sprockets.

41. If a tire blows out while driving, you should:
   a) Balance the motorcycle by shifting your weight.
   b) Apply the brakes to stop quickly.
   c) Use hand signals to warn other drivers.
   d) Attempt to maintain the same speed.

42. When waiting to enter traffic and before shifting from neutral to first gear, you should:
   a) Keep your feet on the footpegs.
   b) Lean the motorcycle to one side.
   c) Hold the motorcycle from rolling with the front brake.
   d) Keep the throttle at least halfway open.

43. You may need more distance to pass on a 2-lane road because:
   a) Motorcycles cannot change lanes as quickly as other vehicles.
   b) Other vehicles in your lane may not yield when you try to re-enter the lane.
   c) Motorcycles can go faster than other vehicles.
   d) It will take you longer to slow down before you can move back to the right.

44. Before yielding to a vehicle which is turning left in front of you:
   a) Move into the right lane.
   b) Move to the left so you can pass when he starts to turn.
   c) Check the vehicles behind you.
   d) Signal the vehicle that he should turn.

45. After heavy rains you should:
   a) Avoid downshifting if possible.
   b) Not use the brakes to slow down.
   c) Watch for large puddles on the road.
   d) Lean your body instead of turning the front wheel.

Continue to next page ...

46. If you must drive through an oil-soaked area of the road, you should:

a) Move forward on your seat.
b) Slow down and avoid leaning the motorcycle.
c) Lean the motorcycle instead of turning the wheel.
d) Speed up before coming to the area and then close the throttle.

47. After starting on a slippery road, you should:

a) Shift to a higher gear when the road surface permits.
b) Regulate your speed by using the clutch instead of the throttle.
c) Use the front brake to control your speed.
d) Lean the motorcycle to the right.

48. If your stoplight comes on before your brakes begin to grab, you should:

a) Adjust the brake linkage and switch.
b) Tighten the clutch cable.
c) Move the rear wheel slightly back.
d) Apply the brakes quickly when stopping.

49. Before starting the engine on a level surface, it is most important to:

a) Be sure that the motorcycle is in neutral.
b) Check the brake and signal lights.
c) Check the tires and shock absorbers.
d) Raise the kickstand.

End of the Test

Go back and answer any questions you may have missed.

MOTORCYCLE RIDING KNOWLEDGE TEST

ANSWER SHEET

DO NOT WRITE HERE

NAME ANSWER KEY DATE

TEST FORM A INSTRUCTOR

INSTRUCTIONS: Cross out the letter or number which corresponds to the answer you have chosen. Erase completely any answer you wish to change.

Example: 00. A B **X** D

1. A B C D E	18. **X** B C D	35. A **X** C D
2. A B C D	19. **X** B C D	36. A B **X** D
3. A B	20. **X** B C D	37. A B C **X**
4. 1 2 4 5	21. A B C **X**	38. **X** B C D
5. 1 2 4 5	22. A B C **X**	39. A **X** C D
6. 1 2 4 5	23. A B **X** D	40. A B **X** D
7. 1 2 3 4 5	24. A B **X** D	41. **X** B C D
8. 1 2 4 5	25. **X** B C D	42. A B **X** D
9. 1 2 3 4 5	26. A **X** C D	43. A **X** C D
10. **X** B C D	27. **X** B C D	44. A B **X** D
11. A **X** C D	28. A **X** C D	45. A B **X** D
12. A B **X** D	29. A **X** C D	46. A **X** C D
13. A B **X** D	30. A **X** C D	47. **X** B C D
14. A **X** C D	31. A B **X** D	48. **X** B C D
15. **X** B C D	32. **X** B C D	49. **X** B C D
16. A B **X** D	33. A **X** C D	
17. A **X** C D	34. A B C **X**	

DO NOT WRITE HERE
Dep Var:
Total:

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Figure 20.--Answer Key for Test Booklet A.

MOTORCYCLE RIDING KNOWLEDGE TEST

TEST BOOKLET

FORM B

READ: This test is designed to find out how much you know about certain aspects of motorcycle riding.

Whether you have had a great deal of experience on a motorcycle, a little experience, or have never been on a motorcycle, please try and answer each question as well as you can.

There is one BEST answer for each question. Mark your response on the answer sheet by crossing out the letter or number which corresponds to your choice. See the answer sheet for an example of how to mark your response. Erase completely any answer you wish to change.

NOTE: The question numbers go down the answer sheet.

Use only a number 2 or soft pencil.

Consider each question by itself and assume, unless otherwise stated, that the road and weather conditions are ideal and that all riding is done on the road.

WRITE: Write your name on the line marked "YOUR NAME" at the top of the answer sheet. Also fill in today's "DATE," the letter of the "TEST FORM" and the name of your "INSTRUCTOR."

DO NOT make any marks in this booklet.

NOW: Turn the page and begin answering the questions . . .

7/73B

Figure 21.--Parallel Test Form--Booklet B.

1. How old are you?

   a) 15 years old or younger.
   b) 16 years old.
   c) 17 years old.
   d) 18 years old.
   e) 19 years old or older.

2. What grade are you in?

   a) 9th (Freshman).
   b) 10th (Sophomore).
   c) 11th (Junior).
   d) 12th (Senior).

3. What is your sex?

   a) Male.
   b) Female.

The next six questions (numbers 4-9) are about motorcycle ownership and riding experience on-the-road.

The term:

MOTORCYCLE as used here also includes the smaller machines such as motor-driven cycles, motor scooters, mini-bikes, etc.

OWNERSHIP or OWN means either it is yours legally or yours but someone else had to sign for it.

FAMILY means all people, other than yourself, who live in the same house.

4. Do you or does any member of your family - either now or sometime within the past two years - own a motorcycle?

   1) No one owns a motorcycle.
   2) Someone else in the family (other than myself) owns a motorcycle.
   4) I am the only one in the family who owns a motorcycle.
   5) I own a motorcycle and so does another member of my family (two or more motorcycles in the family).

5. Do you plan on buying or owning a motorcycle this year?

   1) No.
   2) Don't know.
   4) Yes.
   5) I already own one.

6. How many times have you been the driver (operator) of a motorcycle on the road?

   1) Never operated a motorcycle.
   2) Once or twice.
   4) Several times.
   5) Many times.

7. Estimate the total number of miles you have driven (operated) a motorcycle on the road during the past year.

   1) Haven't driven a motorcycle.
   2) Less than 100 miles.
   3) 100 - 1,500 miles.
   4) 1,500 - 3,000 miles.
   5) More than 3,000 miles.

8. How many times have you been a passenger on a motorcycle?

   1) Never been a passenger.
   2) Once or twice.
   4) Several times.
   5) Many times.

9. How much time do you spend working on motorcycles - yours or someone else's (mechanical repairs, cleaning, etc.)?

   1) None.
   2) Less than one hour per week.
   3) One - three hours per week.
   4) Four - eight hours per week.
   5) More than eight hours per week.

Continue to next page...

10. The best way to steer a motorcycle is to have:
    a) One hand on the throttle, the other free to operate controls.
    b) One hand on the left handgrip, the other free to operate controls.
    c) One hand on the throttle, the other on the left handgrip.
    d) One hand on the throttle, the other near the center of the left handlebar.

11. A person who operates a motorcycle:
    a) Must wear light or white clothes.
    b) Cannot drive on high speed highways.
    c) Has all the rights and duties of other drivers.
    d) Must not stop his motorcycle on the shoulder of the road.

12. When driving in the right-hand lane on a 4-lane road, you should usually ride:
    a) In the center of the lane.
    b) In the left wheel track.
    c) On the line dividing the lanes.
    d) In a slight zig-zag pattern.

13. If your motorcycle stalls when going up a hill, you should:
    a) Hold it from rolling with the front brake.
    b) Hold it from rolling with the rear brake.
    c) Hold it from rolling with the front and rear brakes.
    d) Hold it from rolling with your feet.

14. If you are tired and cannot stop to sleep, you should:
    a) Drive at a constant speed.
    b) Drive as fast as permitted.
    c) Stop and rest at least every hour.
    d) Drive as slowly as possible.

15. When going up a steep hill, you should:
    a) Stay in high gear and open the throttle all the way.
    b) Shift to a lower gear to maintain your speed.
    c) Drive on the extreme right of the lane.
    d) Decrease your speed to cool the engine.

16. After you have moved the rear wheel to adjust the chain, you should:
    a) Tighten the axle and adjust the rear brake.
    b) Tighten the axle and adjust the clutch.
    c) Adjust the sprockets and connect the brake light.
    d) Adjust the rear shocks and tighten the chain adjusters.

17. A motorcycle may skid or fall over when turning if:
    a) You downshift before you begin to turn.
    b) The kickstand falls down and hits the ground.
    c) You slow down slightly while turning.
    d) The drive chain is too tight.

18. When driving on a gravel or brick road, you should:
    a) Increase the distance between you and the other vehicles.
    b) Use the clutch to control your speed.
    c) Drive with the throttle all the way open in a lower gear.
    d) Ride with a slight zig-zag motion.

19. The first thing to do before changing lanes is:
    a) Signal with your lights and hand.
    b) Slow down.
    c) Check your mirrors and look over your shoulder.
    d) Move closer to the lane you want to be in.

20. When stopping on ice you should:
    a) Press the clutch and front brake at the same time.
    b) Pump the rear brake.
    c) Firmly apply the front brake.
    d) Shift to neutral.

21. If an oncoming vehicle is preparing to turn left at an intersection:
    a) Drive to the left to get around it.
    b) Speed up and continue straight before he completes his turn.
    c) Stop and let him turn.
    d) Lag slightly behind other vehicles going in your direction.

 Continue to next page . . .

10. **The best way to steer a motorcycle is to have:**
    a) One hand on the throttle, the other free to operate controls.
    b) One hand on the left handgrip, the other free to operate controls.
    c) One hand on the throttle, the other on the left handgrip.
    d) One hand on the throttle, the other near the center of the left handlebar.

11. **A person who operates a motorcycle:**
    a) Must wear light or white clothes.
    b) Cannot drive on high speed highways.
    c) Has all the rights and duties of other drivers.
    d) Must not stop his motorcycle on the shoulder of the road.

12. **When driving in the right-hand lane on a 4-lane road, you should usually ride:**
    a) In the center of the lane.
    b) In the left wheel track.
    c) On the line dividing the lanes
    d) In a slight zig-zag pattern.

13. **If your motorcycle stalls when going up a hill, you should:**
    a) Hold it from rolling with the front brake.
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    c) Hold it from rolling with the front and rear brakes.
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    a) Stay in high gear and open the throttle all the way.
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    c) Drive on the extreme right of the lane.
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    a) Tighten the axle and adjust the rear brake.
    b) Tighten the axle and adjust the clutch.
    c) Adjust the sprockets and connect the brake light.
    d) Adjust the rear shocks and tighten the chain adjusters.

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    b) The kickstand falls down and hits the ground.
    c) You slow down slightly while turning.
    d) The drive chain is too tight.

18. **When driving on a gravel or brick road, you should:**
    a) Increase the distance between you and the other vehicles.
    b) Use the clutch to control your speed.
    c) Drive with the throttle all the way open in a lower gear.
    d) Ride with a slight zig-zag motion.

19. **The first thing to do before changing lanes is:**
    a) Signal with your lights and hand.
    b) Slow down.
    c) Check your mirrors and look over your shoulder.
    d) Move closer to the lane you want to be in.

20. **When stopping on ice you should:**
    a) Press the clutch and front brake at the same time.
    b) Pump the rear brake.
    c) Firmly apply the front brake.
    d) Shift to neutral.

21. **If an oncoming vehicle is preparing to turn left at an intersection:**
    a) Drive to the left to get around it.
    b) Speed up and continue straight before he completes his turn.
    c) Stop and let him turn.
    d) Lag slightly behind other vehicles going in your direction.

Continue to next page . . .

22. It is illegal for a group of motorcycles to drive:

a) Through a residential area.
b) In more than one lane of a highway.
c) More than two abreast in one lane.
d) In single file when there are more than ten motorcycles in the group.

23. If you want to stop after recovering from a rear wheel skid, you should:

a) Apply the front brake only.
b) Apply both brakes again.
c) Coast to a stop without the use of brakes.
d) Close the throttle and press the clutch lever.

24. If you come to an area where sand is covering the road, you should:

a) Slow down before getting to the area.
b) Rest your foot on top of the chain guard.
c) Stop and push the motorcycle through the sand.
d) Lower your body close to the motorcycle.

25. If the drive chain begins slipping or clanking:

a) Hold the handlebars loosely.
b) Disengage the clutch as soon as possible.
c) Slow down and jump off the motorcycle.
d) Close the throttle and shift to a lower gear.

26. When in a skid you should use your brakes:

a) After feeling you have control of the motorcycle.
b) Just as the motorcycle starts to skid.
c) In a series of quick, hard jabs on a wet road.
d) In order to help you regain steering control.

27. If your motorcycle gets stuck in deep snow, you may have to:

a) Shift to a higher gear and speed up.
b) Bounce on the motorcycle to get more traction.
c) Open the throttle slightly and steer in a zig-zag motion.
d) Get off and lift the motorcycle out of the drift.

28. After starting your engine you should:

a) Return the kickstart lever and folding pedal to storage position.
b) Close the throttle to prevent stalling.
c) Activate the choke as soon as you start the engine.
d) Keep the throttle all the way open.

29. When you are trying to get through deep snow:

a) Shift to a higher gear after entering the snow.
b) Stop and start often to get traction.
c) Shift your weight to the rear wheel.
d) Don't use your feet for balance.

30. If you are coming to an animal crossing, you should:

a) Keep going at the same speed.
b) Speed up and move to the left.
c) Slow down and be prepared to stop.
d) Stop and push your motorcycle.

31. If you are going up a hill and will be stopping, you should:

a) Downshift into second gear after you have come to a stop.
b) Downshift into first gear just before you come to a stop.
c) Shift into neutral just before you come to a stop.
d) Stay in high gear until you have stopped.

32. In order to avoid skids on wet or slippery roads, you should:

a) Reduce the air pressure in the tires.
b) Put more pressure on the front wheel.
c) Start in third gear rather than first.
d) Change your speed and direction slowly.

33. If you cannot get your motorcycle started in motion on snow or ice:

a) Spin the rear wheel until you get traction.
b) Turn the front wheel to the right.
c) Shift your weight to the rear wheel and push with your feet.
d) Push the motorcycle in gear and jump on when it starts moving.

Continue to next page . . .

34. When going very slowly, you should:

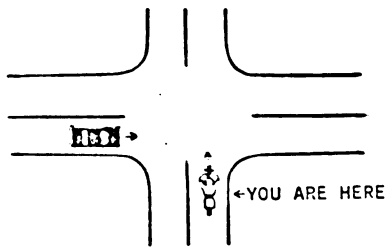
a) Shift into the highest gear and press the clutch lever.
b) Close the throttle and shift into neutral.
c) Avoid using the front brake.
d) Be ready to put your feet down for balance.

35. When passing other vehicles it is safest to pass on the:

a) Right side.
b) Left side.
c) Side away from the sun.
d) Side with the least traffic.

36. If you are going straight through the intersection and see a vehicle to your left:

a) Drive partially into the intersection to warn the other vehicle to slow down.
b) Prepare to yield right-of-way.
c) Speed up to get through the intersection before the other vehicle.
d) Pull off the road until the vehicle gets through the intersection.



37. If your motorcycle is not operating smoothly, you should:

a) Avoid using the front brake.
b) Loosen your grip on the handlebars.
c) Shift to a lower gear.
d) Drive off the road as soon as you find a safe place.

38. When starting your motorcycle on ice, you should:

a) Release the clutch quickly for better traction.
b) Start in first gear if your wheel spins in second gear.
c) Keep your feet down and accelerate slowly.
d) Apply more pressure to the front wheel.

39. If the front brake lever pulls back against the handgrip without applying the brake, you should:

a) Tighten the screws in the lever.
b) Adjust the brake cable.
c) Loosen the rear brake.
d) Oil the cable and the brake lever on the handgrip.

40. When it is very windy you should:

a) Hold the handlegrips lightly.
b) Drive at a slower speed.
c) Shift to a higher gear and use less throttle.
d) Stay near the inside of the curves.

41. If you have a passenger, you should instruct him to:

a) Hang onto your shoulders or arms.
b) Put his feet down when you begin to slow down.
c) Lean forward as you accelerate and backward as you slow down.
d) Drag his feet if necessary to help balance the motorcycle.

42. It is <u>least</u> important for your passenger to wear a:

a) Helmet.
b) Faceshield or goggles.
c) Wind-proof jacket.
d) Heavy scarf.

43. In order to check your stop light you must:

a) Turn your operating lights on.
b) Turn the engine off.
c) Engage the clutch.
d) Press the brake pedal or lever.

44. For the best turns the passenger should:

a) Lean in the opposite direction of the driver.
b) Lean in the same direction as the driver.
c) Sit up straight and try not to lean.
d) Lean slightly forward.

45. When starting a motorcycle moving:

a) Put your feet on the footpegs, open the throttle, and release the front brake and clutch.
b) Release the front brake and clutch, put your feet on the footpegs, and open the throttle.
c) Open the throttle and put your feet on the footpegs, then release the front brake and clutch.
d) Open the throttle, release the front brake and clutch, and put your feet on the footpegs.

46. When making a rapid or emergency stop, you should:

a) Shift your weight forward.
b) Hold the handlebars loosely.
c) Grasp the fuel tank with your knees.
d) Apply the front brake only.

47. To straighten the motorcycle after a turn, you should:

a) Take both feet off the footpegs.
b) Lean sharply into the opposite direction.
c) Adjust pressure on the handlebar.
d) Sit up straight and turn the handlebar sharply.

48. When you put gas in your tank, you should always:

a) Leave the motorcycle in gear.
b) Avoid overfilling the tank.
c) Leave the engine on.
d) Use the same brand of gasoline.

49. When driving your motorcycle on a road where there is only a narrow, soft shoulder:

a) Keep in the left lane.
b) Pay more attention to the traffic and road ahead.
c) Speed up to get off the road more quickly.
d) Brake hard when stopping to avoid a loss of traction.

End of the Test.

Go back and answer any questions you may have missed.

MOTORCYCLE RIDING KNOWLEDGE TEST

ANSWER SHEET

DO NOT WRITE HERE

NAME ANSWER KEY DATE

TEST FORM B INSTRUCTOR

INSTRUCTIONS: Cross out the letter or number which corresponds to the answer you have chosen. Erase completely any answer you wish to change.

Example: 00. A B X D

1. A B C D E	18. X B C D	35. A X C D
2. A B C D	19. A B X D	36. A X C D
3. A B	20. A X C D	37. A B C X
4. 1 2 4 5	21. A B C X	38. A B X D
5. 1 2 4 5	22. A B X D	39. A X C D
6. 1 2 4 5	23. A X C D	40. A X C D
7. 1 2 3 4 5	24. X B C D	41. A B X D
8. 1 2 4 5	25. A X C D	42. A B C X
9. 1 2 3 4 5	26. X B C D	43. A B C X
10. A B X D	27. A B C X	44. A X C D
11. A B X D	28. X B C D	45. A B C X
12. A X C D	29. A B X D	46. A B X D
13. X B C D	30. A B X D	47. A B X D
14. A B X D	31. A X C D	48. A X C D
15. A X C D	32. A B C X	49. A X C D
16. X B C D	33. A B X D	
17. A X C D	34. A B C X	

DO NOT WRITE HERE
Dep Var:
Total:

7/73

Figure 22.--Answer Key for Test Booklet B.

Pilot Test of Parallel Test Forms

As a final step, the two parallel tests were administered to a small group of driver education students who were just beginning the course. Fifty-five (55) subjects responded to Test Form A and 57 to Test Form B, for a total of 112 subjects. They were predominately 10th grade students (80%) with 17 percent being Juniors and three percent being seniors. Fifty-two percent (52%) were male and 48 percent (48%) were female. While this sample cannot be construed to be representative of the motorcycling population of high school students, nevertheless, the results will yield some indication of the performance of the tests. These subjects, as would be expected, had a mixed background in riding experience with most (50%) indicating little experience (dependent variable values 6-9) while a few (27%) indicated considerable experience on a motorcycle. (The dependent variable values ranged from 6-27 with 30 being the highest obtainable value.)

Table 21 shows the response distributions for each item as tested and the P value. Also listed for comparison purposes are the response distributions and P values as shown in the final item pool. Student T tests were performed on the P values for Test A and B with a resulting T statistic of 0.03. This is non-significant and means that the tests are indeed parallel. Other comparisons and statistical values are given at the end of Table 21.

TABLE 21.--P Values and Response Distributions for Each Item by Test Form Resulting from the Pilot Test.

Test Form A							Test Form B					
Test Item	Pool No.		RD All	RD* Pool	P All	P* Pool	Pool No.		RD All	RD* Pool	P All	P* Pool
10	16	*a	33	53	33	53	a	55	2	7	84	79
		b	4	8			b		14	13		
		c	62	22			*c		84	79		
		d	2	15			d		0	0		
11	11	a	9	4	71	79	a	270	4	4	91	87
		*b	71	79			b		4	6		
		c	6	5			*c		91	87		
		d	13	11			d		2	3		
12	55	a	9	7	76	79	a	34	81	64	12	28
		b	13	13			*b		12	28		
		*c	76	79			c		5	3		
		d	2	0			d		2	5		
13	270	a	4	4	93	87	*a	71	33	26	33	26
		b	2	6			b		19	9		
		*c	93	86			c		42	41		
		d	2	3			d		5	23		
14	34	a	80	64	16	28	a	256	9	6	74	72
		*b	16	28			b		0	5		
		c	2	3			*c		74	72		
		d	2	5			d		18	16		
15	71	*a	26	26	26	26	a	119	12	22	77	61
		b	11	9			*b		77	61		
		c	58	41			c		5	12		
		d	6	23			d		5	5		
16	256	a	7	6	84	72	*a	267	40	46	40	46
		b	0	5			b		7	11		
		*c	84	72			c		7	14		
		d	9	10			d		44	28		
17	119	a	2	22	20	61	a	24	39	32	16	43
		*b	20	61			*b		16	43		
		c	75	12			c		19	14		
		d	4	5			d		26	10		

*The response distribution and P values as shown in the test item pool are listed here for reference.

(continued)

Table 21.--Continued.

Test Form A							Test Form B				
Test Item	Pool No.		RD ALL	RD Pool	P All	P Pool	Pool No.	RD ALL	RD Pool	P All	P Pool
18	267	*a	46	46	46	46	*a 140	56	56	56	56
		b	2	11			b	26	19		
		c	7	14			c	12	9		
		d	46	28			d	5	16		
19	155	*a	66	49	66	49	a 122	44	52	47	42
		b	9	16			b	2	3		
		c	6	13			*c	47	42		
		d	15	20			d	5	3		
20	61	*a	73	80	73	80	a 164	12	6	68	78
		b	11	11			*b	68	78		
		c	0	5			c	11	4		
		d	16	4			d	9	11		
21	124	a	9	14	71	68	a 113	5	3	25	46
		b	13	15			b	16	19		
		c	6	2			c	53	30		
		*d	71	68			*d	25	46		
22	147	a	2	2	95	92	a 274	7	14	60	72
		b	0	3			b	26	9		
		c	4	4			*c	60	72		
		*d	95	92			d	7	5		
23	180	a	4	1	71	80	a 92	14	8	42	41
		b	16	16			*b	42	41		
		*c	71	80			c	21	22		
		d	7	3			d	23	26		
24	273	a	6	5	87	91	*a 165	88	69	88	69
		b	4	3			b	4	3		
		*c	87	91			c	5	14		
		d	4	2			d	4	13		
25	144	*a	66	78	66	78	a 191	2	1	44	50
		b	15	13			*b	44	50		
		c	0	1			c	4	3		
		d	20	6			d	47	45		
26	202	a	11	4	58	68	*a 204	51	42	51	42
		*b	58	68			b	2	9		
		c	13	22			c	12	16		
		d	18	5			d	35	32		

(continued)

Table 21.--Continued.

Test Item	Test Form A Pool No.		RD All	RD Pool	P All	P Pool	Test Form B Pool No.		RD All	RD Pool	P All	P Pool
27	86	*a	33	36	33	36	a 159		5	4	49	55
		b	0	4			b		26	22		
		c	22	22			c		19	19		
		d	46	36			*d		49	55		
28	146	a	20	17	60	48	*a 17		63	59	63	59
		*b	60	48			b		18	11		
		c	11	29			c		12	22		
		d	9	6			d		7	7		
29	197	a	7	10	84	79	a 161		18	34	65	47
		*b	84	79			b		9	12		
		c	7	3			*c		65	47		
		d	2	7			d		7	6		
30	57	a	18	20	66	54	a 235		5	2	95	94
		*b	66	54			b		0	2		
		c	6	6			*c		95	94		
		d	11	20			d		0	3		
31	5	a	9	13	60	49	a 31		7	13	68	56
		b	7	7			*b		68	56		
		*c	60	49			c		16	8		
		d	20	31			d		11	22		
32	84	*a	31	41	31	41	a 198		11	14	83	79
		b	4	0			b		4	3		
		c	53	52			c		4	5		
		d	13	6			*d		83	79		
33	219	a	4	5	73	82	a 158		9	6	54	67
		*b	73	82			b		9	8		
		c	0	2			*c		54	67		
		d	22	10			d		26	11		
34	47	a	0	2	86	86	a 80		9	4	72	70
		b	6	1			b		11	13		
		c	9	11			c		9	11		
		*d	86	86			*d		72	70		
35	160	a	7	9	69	67	a 127		12	6	68	68
		*b	69	67			*b		68	68		
		c	20	18			c		4	2		
		d	4	5			d		18	24		

(continued)

Table 21.--Continued.

Test Form A							Test Form B				
Test Item	Pool No.		RD All	RD Pool	P All	P Pool	Pool No.		RD All	RD Pool	P All	P Pool
36	18	a	2	7	91	80	a 110		21	6	65	89
		b	6	9			*b		65	89		
		*c	91	80			c		5	4		
		d	2	2			d		7	1		
37	186	a	4	4	49	53	a 190		2	4	84	83
		b	40	34			b		4	0		
		c	7	8			c		11	12		
		*d	49	53			*d		84	83		
38	107	*a	93	91	93	91	a 162		12	5	77	84
		b	2	1			b		7	6		
		c	2	4			*c		77	84		
		d	4	5			d		4	5		
39	30	a	22	23	44	37	a 265		11	17	75	63
		*b	44	37			*b		75	63		
		c	7	8			c		0	9		
		d	27	29			d		14	9		
40	263	a	38	33	40	40	a 181		7	4	53	55
		b	4	5			*b		53	55		
		*c	40	40			c		21	15		
		d	18	20			d		19	27		
41	189	*a	44	61	44	61	a 54		23	5	56	73
		b	22	20			b		16	14		
		c	31	16			*c		56	73		
		d	4	3			d		5	5		
42	26	a	4	4	62	52	a 49		9	4	86	93
		b	13	16			b		5	2		
		*c	62	52			c		0	1		
		d	22	27			*d		86	93		
43	125	a	11	23	51	49	a 1		16	11	84	85
		*b	51	49			b		0	1		
		c	4	6			c		0	4		
		d	35	20			*d		84	85		
44	109	a	29	23	51	55	a 63		7	7	47	73
		b	11	8			*b		47	73		
		*c	51	55			c		26	13		
		d	7	15			d		19	7		

(continued)

Table 21.--Continued.

Test Form A							Test Form B					
Test Item	Pool No.		RD All	RD Pool	P All	P Pool	Pool No.		RD All	RD Pool	P All	P Pool
45	173	a	29	23	51	51	a 28		12	13	60	58
		b	15	16			b		19	21		
		*c	51	51			c		9	8		
		d	6	10			*d		60	58		
46	153	a	2	2	91	89	a 93		30	28	40	36
		*b	91	89			b		7	12		
		c	4	6			*c		40	36		
		d	4	3			d		21	21		
47	76	*a	38	40	38	40	a 68		2	4	51	51
		b	44	36			b		33	25		
		c	16	20			*c		51	51		
		d	0	2			d		14	18		
48	264	*a	64	78	64	78	a 259		5	4	74	75
		b	11	11			*b		74	75		
		c	7	5			c		2	0		
		d	18	5			d		19	14		
49	15	*a	67	65	67	65	a 169		19	22	67	68
		b	7	6			*b		67	68		
		c	2	3			c		2	3		
		d	22	25			d		12	6		
Mean			61.25	63.00			Mean		61.10	62.97		
SD			21.47	18.97			SD		20.13	17.78		
t between A and B = .03							t between A and B = .03					
t between A and Pool = -.38							t between B and Pool = -.44					

While the tests were parallel, a difference in the range of total scores existed between Test A and B. Test A had a total score range of 9-38, while Test B had a total score range of 10-31. However, the average scores for both Test A and Test B were very close--$\overline{X}$ = 25.1 for Test A, and $\overline{X}$ = 24.1 for Test B. Table 22 shows the distributions of total score for Test Forms A and B, while Figure 23 displays the same information as a graph of the distribution of total scores.

TABLE 22.--Distributions of Total Score by Test Form from the Pilot Test of the Parallel Test Forms.

Number Correct	Form A %	Form A Cum %↓	Form B %	Form B Cum %↓
9	1.8	1.8		
10	1.8	3.6	1.8	1.8
11	---	3.6	---	1.8
12	---	3.6	---	1.8
13	---	3.6	---	1.8
14	1.8	5.4	---	1.8
15	3.6	9.0	---	1.8
16	---	9.0	5.3	7.1
17	3.6	12.6	1.8	8.9
18	3.6	16.2	1.8	10.7
19	---	16.2	3.5	14.2
20	1.8	18.0	8.8	23.0
21	5.5	23.5	5.3	28.3
22	9.1	32.6	3.5	31.8
23	7.3	39.9	14.0	45.8
24	3.6	43.5	3.5	49.3
25	7.3	50.8	7.0	56.3
26	3.6	54.4	8.8	65.1
27	9.1	63.5	8.8	73.9
28	5.5	69.0	7.0	80.9
29	7.3	76.3	8.8	89.7
30	7.3	83.6	7.0	96.7
31	1.8	85.4	3.5	100.2
32	---	85.4	---	
33	5.5	90.0	---	
34	1.8	92.7	---	
35	1.8	94.5	---	
36	3.6	98.1	---	
37	---	98.1	---	
38	1.8	99.9	---	
39	---	---	---	
40	---	---	---	
	$\bar{X}$ = 25.1		$\bar{X}$ = 24.1	
	SD = 6.37		SD = 4.52	
	N = 55		N = 57	

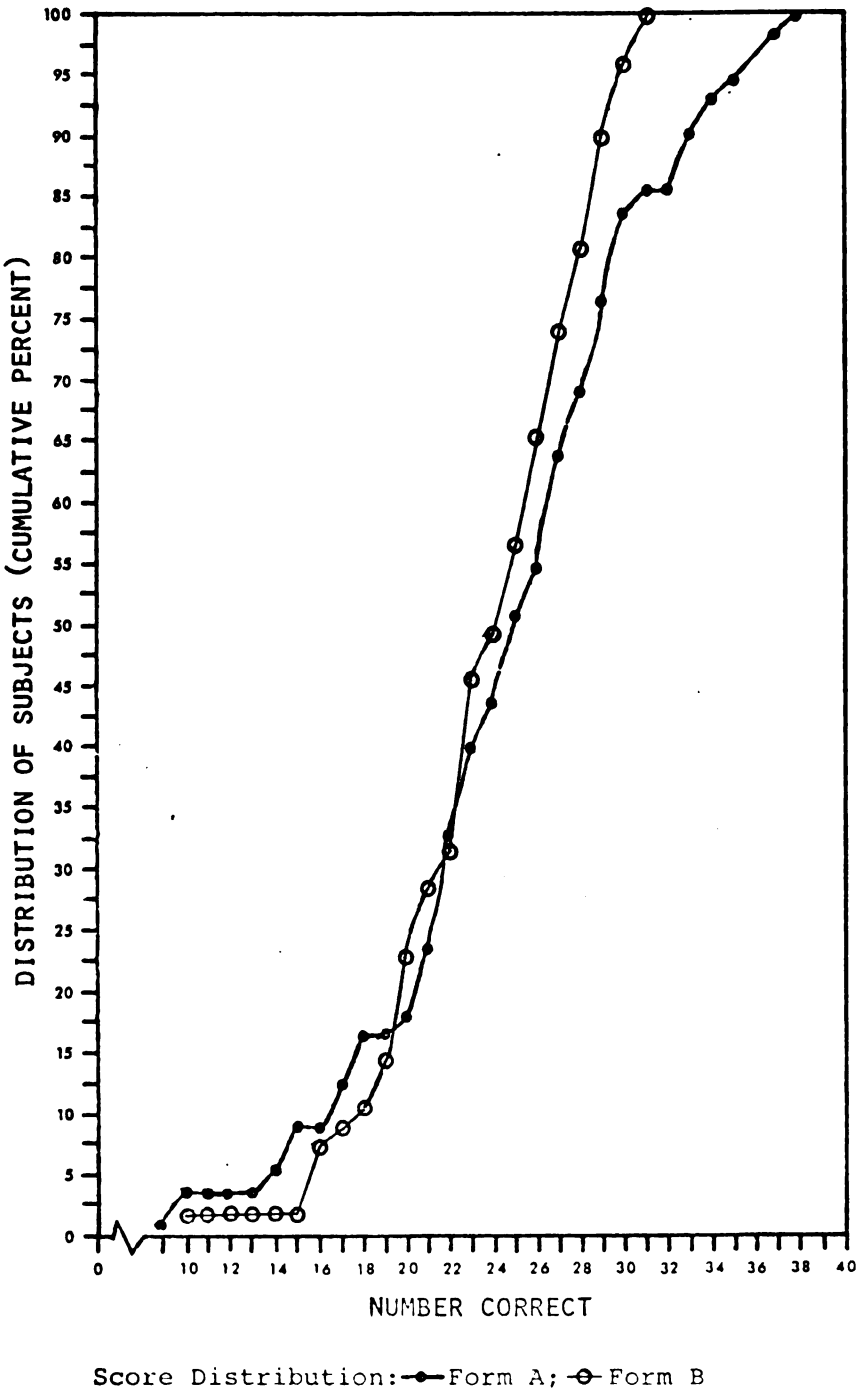


Figure 23.--Graph of the Distribution of Total Score by Test Form from the Pilot Test of the Parallel Test Forms.

Summary

Chapter IV contains both the Parallel Test Item Pool and the Final Test Item Pool along with the Topic Index for each pool. In the pools are the test items and associated data for each item. Also contained in Chapter IV are the parallel test forms and answer keys. Concluding the chapter are the results of a pilot test of the forms.

Contained in Chapter V are the following: Summary; Conclusions; Recommendations for Use of the Tests; Recommendations for Further Research; and Discussion.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND DISCUSSION

Summary

This test item evaluation and test development exercise has produced two parallel test forms which are suitable for use in measuring the on-the-road knowledge of high school age motorcycle operators. The tests, in theory, have the statistical power to differentiate between two groups of riders--those who know how to operate a motorcycle on-the-road and those who do not know how to operate a motorcycle on-the-road.

Beginning with a set of 463 items, prepared according to a set of criteria from a comprehensive source document, a full scale evaluation and test development project was undertaken. Comments about the items from experts and subjects were used to evaluate and re-write the items. As a result of this re-write, the resulting 282 items were formatted into six tests to be administered to approximately 650 subjects--high school seniors of varying riding experience--in a test-retest data collection program. Information was also collected on their riding experience (dependent variable), age, sex, and a reading achievement score. An item analysis was performed on each item by:

(1) examining the response distribution; (2) correlating the response to the item with the dependent variable, age, sex, total score, and reaching achievement score; (3) calculating the item idfficulty; (4) calculating the test-retest reliability; (5) computing an index of discrimination based on the dependent variable. Each item was reviewed according to guidelines for each of the above criterion and rejected if it failed. One hundred seventy items were retained as good items and included in the final item pool. Of these 170 items, 107 positively discriminated between riders and non-riders and were formed into the parallel test item pool. Forty of the 107 items discriminated statistically.

Inter-item correlations were calculated for the items as grouped by the 24 major content areas.

Two 40 item tests were extracted from the parallel test item pool in such a manner as to maintain a balance of content between the test item pool and the tests. An effort was also made to assign equal numbers of statistically discriminating items to each form and to fill in the balance of the test with those items which demonstrated a high probability of discriminating between operator experience groups. The items for each test were randomized within each test and the forms reproduced.

Tests for parallelism and discrimination were run on each test form. The tests were found to be absolutely parallel (T statistic = .006) and to statistically discriminate between the experienced operator and novice rider--T statistic = 4.82 for Form A, and 4.99 for Form B. This indicates

significance beyond the .001 level of confidence. This parallelism has been confirmed through a pilot test of the forms on 112 subjects enrolled in a high school driver education course.

Conclusion

Two parallel test forms have been developed from a pool of candidate test items. These tests as developed "have the statistical power to differentiate between two groups of motorcycle operators--those operators who possess and can demonstrate the knowledge necessary to operate a motorcycle on the road and those operators who cannot demonstrate such knowledge."[78] The tests are general in content and contain items which are representative of the many tasks, detailed by the source document and supported by other evidence, necessary to operate a motorcycle on the road.

Since the tests are able to discriminate between rider groups and are general in their content coverage, they are "able to serve as a comprehensive general knowledge test suitable for use as a final examination in a motorcycle rider education class or as an examination for use in driver licensing programs."[79]

A word of caution, however. No normative or other performance data, except for a pilot exercise confirming the conclusion, exists and hence further work is necessary before quantitative boundaries can be placed on the tests.

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[78] As stated in Chapter 1, section titled "Purpose of the Study."

[79] Ibid.

Recommendations for Use of the Tests

The tests in their present form are suitable for immediate use as either an instrument for assigning students to alternate treatment groups, as a final examination in a motorcycle rider education class,[80] or as a motorcycle operator license examination.

It is suggested that:

1. The tests be first administered to a group of students entering a motorcycle rider education program for the purpose of establishing the performance of the items on a novice rider group. Such a testing will establish a base-line against which to measure either subsequent groups of novice riders or to aid in determining the magnitude of the knowledge gained at the end of the course.

2. Item statistics be kept on the performance of the items to:

    a) Aid in improving the tests,

    b) Detect shifts in the knowledge level of students entering the course and hence permit altering the course material to suit the group.

3. The tests be administered to a group of motorcycle operator license applicants for the purpose of establishing a pass-fail point prior to their use as a licensing examination.

---

[80] If the tests are used as a final examination, a combination of the two forms will yield a comprehensive test of 73 items (there are seven items common to both test forms--one set of them should be removed to eliminate duplicity of these common items) which is more suitable for use as a final examination in terms of test length.

Recommendations for Further Research

A logical next step in the development of these tests would be to begin establishing norms by further administrations of the tests to samples of experienced and inexperienced operators of high school age. Such norms would permit the establishment of guidelines for the assignment of students to alternative treatment groups or as in the case of the use for a final examination or license examination, permit the establishment of a pass-fail point.

However, it is strongly recommended that the Final Item Pool, consisting of 170 items, be administered in total to a group of subjects as the beginning point in a multivariate data analysis program of the item responses. This will permit the selection of items and construction of tests with greater precision than was possible under the current project.

Discussion

The two parallel test forms and the Final Test Item Pool represent what the author considers to be perhaps the most comprehensive motorcycle test development project ever undertaken. The subject matter for each item was taken from a comprehensive source document describing on-the-road motorcycle operation. The individual items were constructed and evaluated according to the psychometric principles of test development. The result is a test item pool containing items of known performance from which parallel tests have been constructed.

It should not be construed from the above that the tests are perfect. They are not. Several factors--which are symptomatic of the entire motor vehicle testing field--should be understood.

1. While the source document is comprehensive, it has not been thoroughly tested and evaluated. It was given only a limited review and the criticality rating used are those of only a limited number of reviewers.

2. The source document is NOT a task analysis and hence lacks concurrent validity. The tasks have been detailed but there is no integration, hierarchy, or time factor applied to or associated with each task.

3. The items were evaluated on only a small sample of the potential motorcycle riding population and thus the sample may not be representative of the motorcycle riding population.

One is tempted to try to correlate the test scores of various subjects with their accident and violation records. The author feels that such an exercise would yield no useful information and be a complete waste of time. All accident and violation data--as presently collected--is badly biased. Accidents are subject to the reporting requirements of the state (in Michigan they do not have to be reported unless property damage exceeds $200 and/or someone is injured) and to the workload pressures of the police. Thus minor crashes often go unreported providing for an over-representation of serious crashes on

an individual's record. Violations--for the purposes of statistical analysis--must be divided into two categories, namely technical violations of the law and safety violations. It is this latter category which must be used as the correlate in an attempt to correlate violations with test performance. However, violations are not so indicated as to type--technical or safety. Also, violations as recorded on the record are only those for which a conviction has been obtained, omitting all which are judicially or otherwise dismissed. Violations are also subject to all the influences of selective enforcement, officer bias, judicial administrative overload, etc.

The keeping of a driving record is an attempt to monitor the driving performance of the motoring public. Entries are made only when a driver has an accident or a violation. No entry is made for safe operation. Therefore, administratively the absence of entries on the record is construed to mean that the driver is a safe motor vehicle operator. However, safe driving has not been defined. Many so called safe drivers have indeed been involved in crashes and have received violations which have not been noted on their record.

Until safe driving has been operationally defined and a bias-free driver error reporting system developed, any attempt to correlate test performance with a driver's record is at best a futile exercise.

APPENDICES

APPENDIX A

TEST BOOKLETS AS PREPARED FOR INITIAL TESTING

Appendix A-1. Booklet Cover.

MOTORCYCLE RIDING KNOWLEDGE TEST

TEST BOOKLET

READ: This test is designed to find out how much you know about certain areas of motorcycle riding.

Whether you have a lot of experience on a motorcycle, a little experience, or have never been on a motorcycle, please try and answer each question as well as you can.

There is one BEST answer for each question. Mark the space on the answer sheet which corresponds to the letter of the answer you have chosen. See the answer sheet for an example of how to mark the answer. Erase completely any answer you wish to change.
NOTE: The question numbers go across the answer sheet.

Use only a number 2 or soft pencil.

Consider each question by itself and assume, unless otherwise stated, that the road and weather conditions are ideal and that all riding is done on the road.

WRITE: Write your name on the line marked "YOUR NAME" at the top of the answer sheet. Also write in the name of your instructor. Do not write anything in the boxes on the right hand side of the sheet.

ALSO: Write your name on the line below.

NAME:_____

DO NOT make any other marks in this booklet.

NOW: Turn the page and begin answering the questions . . . . . .

Appendix A-2. Dependent Variable Item.

1. How old are you?
   a) 15 years old or younger.
   b) 16 years old.
   c) 17 years old.
   d) 18 years old.
   e) 19 years old or older.

2. What grade are you in?
   a) 9th (Freshman).
   b) 10th (Sophomore).
   c) 11th (Junior).
   d) 12th (Senior).

3. What is your sex?
   a) Male.
   b) Female.

The next seven questions (numbers 4-10) are about motorcycle ownership and riding experience on-the-road.

The term:

MOTORCYCLE as used here also includes the smaller machines such as motor-driven cycles, motor scooters, mini-bikes, etc.

OWNERSHIP or OWN means either it is yours legally or yours but someone else had to sign for it.

FAMILY means all people, other than yourself, who live in the same house.

4. Do you or does any member of your family - either now or sometime within the past two years - own a motorcycle?
   a) No one owns a motorcycle.
   b) Someone else in the family (other than myself) owns a motorcycle.
   c) I am the only one in the family who owns a motorcycle.
   d) I own a motorcycle and so does another member of my family (two or more motorcycles in the family).

5. Do any of your friends own a motorcycle?
   a) No.
   b) Yes.

6. Do you plan on buying or owning a motorcycle this year?
   a) No.
   b) Don't know.
   c) Yes.
   d) I already own one.

7. How many times have you been the driver (operator) of a motorcycle on the road?
   a) Never operated a motorcycle.
   b) Once or twice.
   c) Several times.
   d) Many times.

8. Estimate the total number of miles you have driven (operated) a motorcycle on the road during the past year.
   a) Don't drive a motorcycle.
   b) Less than 100 miles.
   c) 100 - 1,500 miles.
   d) 1,500 - 3,000 miles.
   e) More than 3,000 miles.

9. How many times have you been a passenger on a motorcycle?
   a) Never been a passenger.
   b) Once or twice.
   c) Several times.
   d) Many times.

10. How much time do you spend working on motorcycles - yours or someone else's (mechanical repairs, cleaning, etc.)?
    a) None.
    b) Less than one hour per week.
    c) One - three hours per week.
    d) Four - eight hours per week.
    e) More than eight hours per week.

Continue to next page...

Appendix A-3. Dependent Variable Items--Alternate Form.

1. **How old are you?**
   a) 15 years old or younger.
   b) 16 years old.
   c) 17 years old.
   d) 18 years old.
   e) 19 years old or older.

2. **What grade are you in?**
   a) 9th (Freshman).
   b) 10th (Sophomore).
   c) 11th (Junior).
   d) 12th (Senior).

3. **What is your sex?**
   a) Male.
   b) Female.

The next seven questions (numbers 4-10) are about motorcycle ownership and riding experience on-the-road.

The term:

MOTORCYCLE as used here also includes the smaller machines such as motor-driven cycles, motor scooters, mini-bikes, etc.

OWNERSHIP or OWN means either it is yours legally or yours but someone else had to sign for it.

FAMILY means all people, other than yourself, who live in the same house.

4. **Do you or does any member of your family - either now or sometime within the past two years - own a motorcycle?**
   a) No one owns a motorcycle.
   b) Someone else in the family (other than myself) owns a motorcycle.
   c) I am the only one in the family who owns a motorcycle.
   d) I own a motorcycle and so does another member of my family (two or more motorcycles in the family).

5. **Do any of your friends own a motorcycle?**
   a) No.
   b) Yes.

6. **Do you plan on buying or owning a motorcycle this year?**
   a) No.
   b) Don't know.
   c) Yes.
   d) I already own one.

7. **How many times have you been the driver (operator) of a motorcycle on the road?**
   a) Never operated a motorcycle.
   b) One or two times.
   c) Three - ten times.
   d) More than ten times.

8. **Estimate the total number of miles you have driven (operated) a motorcycle on the road during the past year.**
   a) Don't drive a motorcycle.
   b) Less than 100 miles.
   c) 100 - 1,500 miles.
   d) 1,500 - 3,000 miles.
   e) More than 3,000 miles.

9. **How many times have you been a passenger on a motorcycle?**
   a) Never been a passenger.
   b) One or two times.
   c) Three - ten times.
   d) More than ten times.

10. **How much time do you spend working on motorcycles - yours or someone else's (mechanical repairs, cleaning, etc.)?**
    a) None.
    b) Less than one hour per week.
    c) One - three hours per week.
    d) Four - eight hours per week.
    e) More than eight hours per week.

Continue to next page...

Appendix A-4. Items--Test 1.

11. This sign means:

a) Slow down to 35 mph and prepare to enter a curve.
b) Exit ahead, exit speed 35 mph.
c) Construction area, slow down to 35 mph and use the right lane only.
d) Vehicles turning right must reduce speed to 35 mph.

12. In making a left turn you should not:

a) Pull halfway into the intersection and edge into cross traffic.
b) Signal before you arrive at the intersection.
c) Slow down to a stop if traffic is heavy.
d) Stay in one lane while turning.

13. To help others see you at night, you should:

a) Wear bright or light-colored clothing.
b) Keep your headlights on high beam.
c) Ride in the center of the roadway.
d) Move back and forth in your lane.

14. After mounting the motorcycle you should:

a) Move the parking stand to the "park" position.
b) Push the motorcycle out into an open area before starting it.
c) Adjust the mirror(s) for a clear view of the road.
d) Check the chain and cables for proper tension and lubrication.

15. The tension on the front brake cable should:

a) Only be checked by a mechanic.
b) Be checked before mounting the motorcycle.
c) Not be adjusted by hand.
d) Not be as great as on the clutch cable.

16. As you enter a tunnel you should:

a) Move closer to the center of the road.
b) Increase your speed a bit.
c) Remove your sunglasses.
d) Turn off your headlight.

17. When you ride a motorcycle during the day:

a) Turn your headlight on.
b) Use only hand signals instead of signal lights.
c) You need not wear goggles.
d) Increase your following distance over that used at night.

18. When carrying cargo it is always necessary to:

a) Make sure it can move around slightly.
b) Adjust the brake cables and clutch.
c) Place it as low as possible on the motorcycle.
d) Add air to the tires.

19. To help prevent eye strain while driving, you should:

a) Drink coffee before you drive.
b) Wear a good faceshield or goggles.
c) Wear sunglasses to protect against glare at night.
d) Keep your eyes focused at the middle of the road.

20. When riding you should continually:

a) Apply the front and rear brake to check them.
b) Check the road conditions far ahead.
c) Shift back and forth in your seat.
d) Sound your horn when near other vehicles.

21. Before going on a long trip, you need not:

a) Check the condition of your tires, cables, and chain.
b) Identify the best routes to your destination.
c) Try to do most of your driving during the day.
d) Plan to stop every hour for a rest.

22. Before mounting your motorcycle you should:

a) Move the parking stand to the "park" position.
b) Push the motorcycle to a closed area and park it.
c) Check for loose parts and tighten them.
d) Reduce the air pressure if carrying a passenger.

23. If you are not familiar with a motorcycle you should:

a) Check the operation of the front and rear brakes.
b) Drive 10-15 mph below the speed limit.
c) Stay to the right side of the right-hand lane.
d) Not use the front brake when stopping.

Continue to next page . . .

24. Before starting the engine on a level surface, it is most important to:

a) Be sure that the motorcycle is in neutral.
b) Check the brake and signal lights.
c) Check the tires and shock absorbers.
d) Raise the kickstand.

25. When you check for lubrication on the chain, do not:

a) Remove, clean, and oil the chain.
b) Apply oil with spout, spray, or brush oiler.
c) Leave the motorcycle's engine running.
d) Adjust automatic chain oiler if present.

26. To help prevent fatigue you should:

a) Maintain a safe constant speed.
b) Have a passenger with you on long trips.
c) Wear good windproof clothing.
d) Grasp the handlebars firmly.

27. The condition of the headlights, taillights, and brake lights should be checked:

a) Each time after you have started the engine.
b) At night before the engine is started.
c) Only before long trips when new fuses may be necessary.
d) Once a year as part of the state inspection.

28. The best way to be prepared for emergencies is to:

a) Assume that others will do the unexpected.
b) Avoid heavy traffic and stay on side streets.
c) Drive slower than other traffic.
d) Keep your hand on the front brake.

29. After starting your engine you should:

a) Return the kickstart lever and folding pedal to storage position.
b) Close the throttle to prevent stalling.
c) Activate the choke as soon as you start the engine.
d) Keep the throttle all the way open.

30. A motorcycle may skid or fall over when turning if:

a) You downshift before you begin to turn.
b) The kickstand falls down and hits the ground.
c) You slow down slightly while turning.
d) The drive chain is too tight.

31. You should inspect your wheel rims to see if they need to be straightened:

a) Every time you ride.
b) Every 3,000 miles.
c) Once a year.
d) Only after riding on gravel roads.

32. When riding a motorcycle you should:

a) Ask the passenger to give hand signals.
b) Ignore vehicles moving in the same direction as you.
c) Drive in the center of your lane.
d) Assume that other drivers do not see you.

33. You should check the condition of the front brake cable:

a) Before starting the engine.
b) After every 500 miles of riding.
c) Once a month.
d) When the brakes are warm.

34. When checking steering and suspension systems, you should check:

a) The tension of the brake and clutch cables.
b) Rear and front footpegs.
c) For bent fork tubes.
d) The drive chain and sprockets.

35. If your stoplight comes on before your brakes begin to grab, you should:

a) Adjust the brake linkage and switch.
b) Tighten the clutch cable.
c) Move the rear wheel slightly back.
d) Apply the brakes quickly when stopping.

36. When driving a motorcycle you must always:

a) Dress in dark-colored clothes.
b) Wear a helmet and eye protection.
c) Wear regulation motorcycle boots.
d) Dress in light-weight clothing.

37. When coming to a toll booth, you should:

a) Get the change out of your pocket well in advance.
b) Get the change out of your pocket only while moving slowly.
c) Get the change out of your pocket only after you have stopped.
d) Only use those booths that are used by trucks.

Continue to next page . . .

38. If you normally wear glasses:
    a) Do not use a tinted faceshield.
    b) You should not wear them when you drive a motorcycle.
    c) You do not need to wear goggles or a faceshield.
    d) Make sure they fit properly with your goggles or faceshield on.

39. When planning to ride on trails rather than on highways:
    a) Turn your headlight on high beam.
    b) Check to see if you should change tires.
    c) Ask your passenger to sit far back on the seat.
    d) Use high gear rather than low gear most of the time.

40. You should never ride:
    a) In a staggered formation.
    b) Without a windshield.
    c) Barefoot.
    d) As fast as other vehicles.

41. Before mounting your motorcycle you should:
    a) Adjust the mirror.
    b) Set the gearshift lever.
    c) Return the kickstart lever to storage position.
    d) Visually check the tires.

42. One of the safety advantages you have when driving a motorcycle is:
    a) You will be thrown clear in an accident.
    b) Motorcycles are easily seen by other motorists.
    c) You have fewer blindspots than in a car.
    d) Motorcycles can safely drive off the road to avoid accidents.

43. When driving on a bridge with a rectangular metal grating, it is best to:
    a) Pull up on the handlebars.
    b) Drive in a gentle zig-zag pattern.
    c) Keep your rear brake on while crossing.
    d) Begin to slow down when you are on the grating.

44. In order to check your stop light you must:
    a) Turn your operating lights on.
    b) Turn the engine off.
    c) Engage the clutch.
    d) Press the brake pedal or lever.

45. A safe motorcycle driver will:
    a) Give the other driver the right-of-way.
    b) Only use the right-hand traffic lane.
    c) Not make right turns at busy intersections.
    d) Change lanes rather than change speeds.

46. If you are tired and cannot stop to sleep, you should:
    a) Drive at a constant speed.
    b) Drive as fast as permitted.
    c) Stop and rest at least every hour.
    d) Drive as slow as possible.

47. When you put gas in your tank, you should always:
    a) Leave the motorcycle in gear.
    b) Avoid overfilling the tank.
    c) Leave the engine on.
    d) Use the same brand of gasoline.

48. Because of the skill and coordination required to operate a motorcycle, you should not drive:
    a) In cold weather.
    b) In stop and go traffic.
    c) On gravel roads.
    d) After drinking.

49. If you can avoid it, you should not ride:
    a) Around highway curves.
    b) Over grease or oil spots.
    c) During hot or humid weather.
    d) In cities or towns.

50. If the carburetor is flooded when starting the engine, it will not help to:
    a) Open the throttle and hold it open.
    b) Kick the starter more slowly.
    c) Push the motorcycle while in gear.
    d) Close the fuel valve.

51. If the front brake lever pulls back against the handgrip without applying the brake, you should:
    a) Tighten the screws in the lever.
    b) Adjust the brake cable.
    c) Loosen the rear brake.
    d) Oil the cable and the brake lever on the handgrip.

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Continue to next page . . .

52. In a narrow two-way tunnel (or bridge), you should:

a) Speed up for better control.
b) Keep to the right of the center.
c) Wear sunglasses.
d) Ride at the speed limit.

53. After you have moved the rear wheel to adjust the chain, you should:

a) Tighten the axle and adjust the rear brake.
b) Tighten the axle and adjust the clutch.
c) Adjust the sprockets and connect the brake light.
d) Adjust the rear shocks and tighten the chain adjusters.

54. When you start a "kickstart" motorcycle, you should:

a) Turn the folding pedal of the kick-starter lever "out."
b) Find the start of compression of the stroke by pulling up on the lever.
c) Kick down gently on the lever to start the engine.
d) Not touch the spark retard or compression release.

55. If you are having problems with your suspension system, you may need to:

a) Add air to your front tire.
b) Use oversize tires.
c) Adjust your rear shocks.
d) Stay in first or second gear.

56. If after you kick the starter, you do not hear the engine you should:

a) Close the fuel valve.
b) Put the motorcycle in gear and engage the clutch.
c) Check the key and choke for proper position.
d) Not try to kickstart it again.

57. Every time you stop for gas, you should:

a) Check the oil level or add oil to the gas tank.
b) Ask a mechanic to check the brake and light system.
c) Shift through all the gears to see if repairs are needed.
d) Oil and tighten the brake and clutch cables.

58. After starting the engine, you should <u>not</u>.

a) Check the tension of the clutch cable.
b) Check the angle of the headlights.
c) Let it idle for a long time.
d) Put the kickstarter back up.

<u>End of the Test.</u>

Go back and answer any questions you may have missed.

Appendix A-5. Items--Test 2.

11. This sign means:

a) Slow down to 35 mph and prepare to enter a curve.
b) Exit ahead, exit speed 35 mph.
c) Construction area, slow down to 35 mph and use the right lane only.
d) Vehicles turning right must reduce speed to 35 mph.

12. In making a left turn, you should not:

a) Pull halfway into the intersection and edge into cross traffic.
b) Signal before you arrive at the intersection.
c) Slow down to a stop if traffic is heavy.
d) Stay in one lane while turning.

13. When carrying packages on a motorcycle, you should:

a) Use a carrier or saddlebag.
b) Try to strap the package to you.
c) Increase air pressure in the tires.
d) Place the package as high up as possible.

14. When there are obstructions on either side of your lane (cars, trees, etc.), you should:

a) Ride closer to the left side of your lane.
b) Ride closer to the right side of your lane.
c) Ride closer to the center of your lane.
d) Ride from one side of your lane to the other.

15. When you drive into the left lane of a 4-lane highway to pass another vehicle, you should usually:

a) Drive in the right wheel track.
b) Stay in the center of the lane.
c) Drive near the left wheel track.
d) Drive in a zig-zag manner.

16. You should tell your passenger to hold onto:

a) Your shoulders or arms.
b) Your hips or waist.
c) The handlebars.
d) The seat behind him.

17. When making a turn at slow speeds, you should not:

a) Downshift during the turn.
b) Accelerate slightly to maintain traction.
c) Decrease amount of lean before desired heading is attained.
d) Put your foot down on the inside of the turn.

18. When making a turn it is most important to:

a) Look to see if the turn can be made safely.
b) Downshift as you start to turn.
c) Use both the front and the rear brakes.
d) Put your foot down on the inside of the turn.

19. If you have a passenger, you should instruct him to:

a) Hang onto your shoulders or arms.
b) Put his feet down when you begin to slow down.
c) Lean forward as you accelerate and backward as you slow down.
d) Drag his feet if necessary to help balance the motorcycle.

20. When carrying a passenger you may have to:

a) Adjust the rear shocks.
b) Let air out of the rear tire.
c) Use only the front brake to stop safely.
d) Start in second gear instead of first.

21. If the vehicle in front of you suddenly stops, the safest thing to do is:

a) Slide your motorcycle to a stop and jump off.
b) Slow down and take evasive action.
c) Brake hard and try to stay behind the vehicle.
d) Continue at the same speed and try to drive around the vehicle.

Continue to next page . . .

22. For the best turns the passenger should:
   a) Lean in the opposite direction of the driver.
   b) Lean in the same direction as the driver.
   c) Sit up straight and try not to lean.
   d) Lean slightly forward.

23. When the vehicle ahead of you indicates he is going to turn, you should first:
   a) Slow down and steer around him.
   b) Stop until he is completely finished.
   c) Look to see if his turn can be made safely.
   d) Speed up to pass him as soon as possible.

24. When making sharp turns at high speeds:
   a) Apply brakes before the turn.
   b) Do not downshift before the turn.
   c) Lean the motorcycle more if you are on a slippery surface.
   d) Never speed up while in the turn.

25. The best way to steer a motorcycle is to have:
   a) One hand on the throttle, the other free to operate controls.
   b) One hand on the left handgrip, the other free to operate controls.
   c) One hand on the throttle, the other on the left handgrip.
   d) One hand on the throttle, the other near the center of the left handlebar.

26. Any passenger you carry must:
   a) Give handsignals when you stop or turn.
   b) Use the front footpegs.
   c) Straddle the seat.
   d) Hold onto your shoulders.

27. When driving on wet or icy roads, you should:
   a) Increase your following distance.
   b) Change speed often in order to ensure traction.
   c) Use the clutch as much as possible.
   d) Ride closer to the center of the road.

28. When you have a passenger on your motorcycle, he should:
   a) Use the front set of footpegs.
   b) Not interfere with the balance or the controls.
   c) Lean the opposite way as you do when making a turn.
   d) Know how to operate the motorcycle.

29. To be prepared for changes in the speed of the vehicle you are following, you should:
   a) Watch the vehicles in front of him.
   b) Change your speed often in order to get a better view of the lead vehicle.
   c) Ride close enough to him to watch his action.
   d) Ride close to the left lane line.

30. Packages or luggage:
   a) Should not be carried on a motorcycle.
   b) Do not affect the balance of the motorcycle.
   c) Should be checked from time to time to make sure they are secure.
   d) Should be attached to the handlebars or fuel tank so you can watch them.

31. If the gearshift lever is stuck in gear, it usually will not help if you.
   a) Rock the motorcycle back and forth.
   b) Shut off the engine.
   c) Try to spin the gears.
   d) "Punch" the lever firmly.

32. A passenger should mount the motorcycle:
   a) Before you check and adjust the brake cables.
   b) Before you start the engine.
   c) After you start the engine.
   d) After the motorcycle has started in motion.

33. To steer the motorcycle you should:
   a) Shift your weight to the right when making a left turn.
   b) Make small steering corrections by putting pressure on the handlebars.
   c) Turn the handlebars more sharply the faster you are going.
   d) Hold the handlebars loosely at all times.

34. Weaving in and out of traffic is:
   a) A good way to make time.
   b) A dangerous maneuver.
   c) An advantage of driving a motorcycle.
   d) Permitted if proper signals are given.

35. When driving in the right-hand lane on a 4-lane road, you should usually ride:
   a) In the center of the lane.
   b) In the left wheel track.
   c) On the line dividing the lanes.
   d) In a slight zig-zag pattern.

Continue to next page . . .

36. When starting a motorcycle moving:
   a) Put your feet on the footpegs, open the throttle, and release the front brake and clutch.
   b) Release the front brake and clutch, put your feet on the footpegs, and open the throttle.
   c) Open the throttle and put your feet on the footpegs, then release the front brake and clutch.
   d) Open the throttle, release the front brake and clutch, and put your feet on the footpegs.

37. When making a sharp turn, you should be ready to:
   a) Apply the front brake firmly.
   b) Put both feet out to the side.
   c) Put down the foot which is on the inside of the turn.
   d) Put down the foot which is on the outside of the turn.

38. To make an emergency downshift:
   a) Hit both brakes hard until you slow down enough to shift into first gear.
   b) Shift at any speed but do so very carefully and slowly.
   c) Shift through each gear as the motorcycle slows down.
   d) Shift into neutral and then into any gear you wish.

39. If you are going up a hill and will be stopping, you should:
   a) Downshift into second gear after you have come to a stop.
   b) Downshift into first gear just before you come to a stop.
   c) Shift into neutral just before you come to a stop.
   d) Stay in high gear until you have stopped.

40. To maintain the correct position in the right-hand lane, you should generally:
   a) Look ahead to the left wheel track of the lane.
   b) Move to the left when there is oncoming traffic.
   c) Drive to the far right when going around a curve.
   d) Keep your eyes on the side of the road.

41. You should tell your passenger to:
   a) Stay tense and be ready for danger.
   b) Put his hands in his pockets if they get cold.
   c) Get comfortable and signal when ready.
   d) Use his feet to help balance the motorcycle.

42. If your motorcycle starts to slide when you are making a slow turn, be ready to:
   a) Apply sharp jabs on the front brake.
   b) Shift into a lower gear.
   c) Lean forward to put more weight on the front wheel.
   d) Put your foot down on the inside of the turn.

43. For good steering control you should:
   a) Grasp the handlebars firmly.
   b) Lean heavily into the handlebars.
   c) Steer mostly by shifting your weight up and down.
   d) Hold loosely onto the ends of the handgrips.

44. You may carry a passenger on your motorcycle only if:
   a) The passenger has a motorcycle license.
   b) You have been driving a motorcycle for one season or more.
   c) You have insurance.
   d) Your motorcycle is equipped for carrying a passenger.

45. It is <u>least</u> important for your passenger to wear a:
   a) Helmet.
   b) Faceshield or goggles.
   c) Wind-proof jacket.
   d) Heavy scarf.

46. You should tell your passenger to:
   a) Get on the motorcycle before you start the engine.
   b) Hold onto your shoulders while riding.
   c) Lean with the motorcycle to help control it.
   d) Change position often to keep from getting stiff.

47. When driving a motorcycle you should <u>not</u> ride in the:
   a) Left part of the lane when following a car or truck.
   b) Same lane and alongside another motorcycle.
   c) Right-hand lane unless you are going 5-10 mph slower than the speed limit.
   d) Same lane and alongside a car or truck.

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48. You should not carry passengers after you have just learned to ride because:
   a) The motorcycle will handle differently.
   b) More fuel will be used.
   c) The added weight will decrease the stopping distance.
   d) You must have a year of experience before it is legal.

49. When you pass oncoming traffic on a 2-lane road, you should:
   a) Keep your eyes focused straight ahead.
   b) Turn on the lights and blow the horn.
   c) Prepare to move to the right side of your lane.
   d) Steer in a zig-zag fashion.

50. Large following distances are more important for motorcycles than for cars because:
   a) Motorcycles cannot stop as quickly.
   b) It is easier to overbrake and lose control.
   c) Vision is more restricted.
   d) Less attention is required to operate the motorcycle.

51. When waiting to enter traffic and before shifting from neutral to first gear, you should:
   a) Keep your feet on the footpegs.
   b) Lean the motorcycle to one side.
   c) Hold the motorcycle from rolling with the front brake.
   d) Keep the throttle at least halfway open.

52. Generally your speed should be determined by:
   a) The speed of the fastest vehicle on the road.
   b) The speed of the vehicle ahead of you.
   c) The speed of the vehicle behind you.
   d) The power of your engine.

53. When starting a motorcycle in motion, you should:
   a) Keep both feet off the footpegs.
   b) Hold your motorcycle straight up with your foot.
   c) Lean slightly to the right.
   d) Lean left and right until you gain momentum.

54. To straighten the motorcycle after a turn, you should:
   a) Take both feet off the footpegs.
   b) Lean sharply into the opposite direction.
   c) Adjust pressure on the handlebar.
   d) Sit up straight and turn the handlebar sharply.

55. If you are carrying heavy packages at night and notice that oncoming vehicles are blinking their headlights, you should:
   a) Stop and check the height of your headlights.
   b) Put your headlight on high beam and continue.
   c) Move onto the shoulder and continue driving there until you find out what is wrong.
   d) Check your speed and adjust it if necessary.

56. To turn your motorcycle to the right:
   a) Lean your body but not the motorcycle to the right.
   b) Lean more sharply than needed to turn.
   c) Lean your body to the right with the motorcycle.
   d) Raise your left foot from the footpeg.

57. When you make a turn with your motorcycle:
   a) Extend the leg on the side from which the turn is made.
   b) Adjust pressure on the handlebars as necessary.
   c) Try to keep the motorcycle as vertical as possible.
   d) Lean forward between the handlebars.

58. When shifting from first to second gear on a motorcycle with an automatic clutch, you should:
   a) Open the throttle halfway and shift into second gear.
   b) Close the throttle and toe the lever into second gear.
   c) Apply the rear brake and gently toe the lever into second gear.
   d) Disengage the clutch and shift into second gear.

59. If you are starting into motion with an automatic clutch:
   a) Open the throttle almost all the way.
   b) Hold the motorcycle vertical with your braking foot.
   c) Start in second gear.
   d) Let up on the brake lever quickly.

End of the Test.

Go back and answer any questions you may have missed.

Appendix A-6. Items--Test 3.

11. This sign means:

a) Slow down to 35 mph and prepare to enter a curve.
b) Exit ahead, exit speed 35 mph.
c) Construction area, slow down to 35 mph and use the right lane only.
d) Vehicle turning right must reduce speed to 35 mph.

12. In making a left turn, you should not:

a) Pull halfway into the intersection and edge into cross traffic.
b) Signal before you arrive at the intersection.
c) Slow down to a stop if traffic is heavy.
d) Stay in one lane while turning.

13. If your rear wheel begins to skid when coming to a stop, you should first:

a) Signal to the vehicle behind.
b) Increase pressure on the rear brake.
c) Release the front brake.
d) Shift to lower gear.

14. When going very slow, you should:

a) Shift into the highest gear and press the clutch lever.
b) Close the throttle and shift into neutral.
c) Avoid using the front brake.
d) Be ready to put your feet down for balance.

15. When slowing down for a stop, you must:

a) Use extreme care when applying the front brake.
b) Rotate the throttle to the open position.
c) Shift to a lower gear before applying the brakes.
d) Depress the brake pedal firmly.

16. If your rear wheel begins to skid:

a) Maintain or reduce the power to the rear wheel.
b) Put your feet on the footpegs.
c) Pump the front brake.
d) Hold the front wheel as straight as possible.

17. The distance it takes to safely stop a motorcycle depends most on the:

a) Weight of the driver.
b) Age of the motorcycle.
c) Size of the tires.
d) Condition of the road.

18. When slowing down you should:

a) Shift to neutral as soon as possible.
b) Not lean more than the motorcycle.
c) Take both feet off the footpegs and hold them near the ground.
d) Pump the rear and then the front brake until you stop.

19. The least important thing to carry with you on your motorcycle is:

a) A small tool kit.
b) A first aid kit.
c) A master link.
d) An extra chain.

20. You are most likely to skid when riding:

a) Up a hill on a sand or gravel road.
b) On a gravel road with a passenger.
c) Around curves and turns at low speeds.
d) Down a hill if you downshift.

21. When braking to a normal stop, you generally should apply:

a) The rear brake only.
b) The front brake only.
c) Both the front and rear brakes at the same time.
d) The front brake only and shift to a lower gear.

22. In order to avoid skids on wet or slippery roads, you should:

a) Reduce the air pressure in the tires.
b) Put more pressure on the front wheel.
c) Start in third gear rather than first.
d) Change your speed and direction slowly.

23. If your brakes fail and you must make a panic stop you should:

a) Throw the motorcycle into a slide by turning sharply away from the road.
b) Place the motorcycle in lower gear and lift up on the handlebars.
c) Shift into higher gear and use the clutch as a brake.
d) Stand on the footpegs to put weight on the front wheel and then shift to the next lowest gear.

Continue to next page . . .

24. When making a rapid or emergency stop, you should:

a) Shift your weight forward.
b) Hold the handlebars loosely.
c) Grasp the fuel tank with your knees.
d) Apply the front brake only.

25. If the throttle is stuck open and there is no traffic on the road ahead:

a) Quickly flop the motorcycle on its side.
b) Control your speed with the brakes and clutch.
c) Shift quickly to the lowest gear.
d) Drive immediately off the roadway.

26. If a tire blows out while driving, you should:

a) Balance the motorcycle by shifting your weight.
b) Apply the brakes to stop quickly.
c) Use hand signals to warn other drivers.
d) Attempt to maintain the same speed.

27. To jump-start the engine on a downgrade, you should:

a) Shift from neutral to first when you pick up speed.
b) Shift into neutral and let the motorcycle begin to roll.
c) Shift into first gear and let the motorcycle begin to roll.
d) Shift into second gear and let the motorcycle begin to roll.

28. When downshifting before coming to a stop, you should:

a) Release the clutch between gearshifts.
b) Hold the clutch disengaged after reaching first gear.
c) Move the shift lever before squeezing the clutch.
d) Shift to neutral before coming to a complete stop.

29. If the throttle is stuck open and the road is clear you should <u>first</u>:

a) Apply both brakes and turn off the engine.
b) Run the motorcycle off the road.
c) Shift into neutral.
d) Try to snap the throttle open and shut.

30. When your motorcycle is disabled on the shoulder of a freeway, do <u>not</u>:

a) Get it completely off the road.
b) Push it along the shoulder to an exit.
c) Tie a white cloth to the handlebars.
d) Get off the motorcycle and stand back from the road.

31. When making an emergency stop on a dry road, you should apply the:

a) Front brake only.
b) Rear brake only.
c) Front and rear brakes together.
d) Front and then rear brake.

32. If your rear wheel begins to skid when making a <u>rapid</u> stop, you should:

a) Apply more pressure on the front brake and less on the rear brake.
b) Release both brakes and press the clutch lever.
c) Open the throttle, release both brakes and lean left or right.
d) Balance the motorcycle by steering with the front wheel.

33. If your motorcycle is not operating smoothly, you should:

a) Avoid using the front brake.
b) Loosen your grip on the handlebars.
c) Shift to a lower gear.
d) Drive off the road as soon as you find a safe place.

34. When starting a motorcycle in motion on snow or ice, you should:

a) Place the transmission in second gear.
b) Balance the motorcycle with your feet.
c) Release the clutch quickly.
d) Place all your weight towards the front.

35. If your rear wheel is skidding, you should:

a) Steer in the direction of the skid.
b) Sit very still and not shift your weight.
c) Lean your body more than the motorcycle.
d) Apply the front brake lightly.

Continue to next page . . .

36. In order to avoid skids you should:
   a) Not drive in high gear.
   b) Enter turns at slow speeds.
   c) Ride near the center of the lane.
   d) Put oversized tires on the motorcycle.

37. When making an emergency stop on a slippery road or on loose gravel, you should:
   a) Apply the rear brake only.
   b) Use the front and rear brakes together.
   c) Apply the front brake when the rear wheel begins to slide.
   d) Use the throttle and clutch and avoid using the brake.

38. If your brakes fail, you should:
   a) Open the throttle.
   b) Shift your motorcycle into neutral.
   c) Drag your feet to slow you down.
   d) Turn off the engine.

39. The first thing you should do if the throttle sticks in heavy traffic is to:
   a) Turn off the engine.
   b) Apply both brakes firmly.
   c) Pull the clutch lever.
   d) Slide the motorcycle to the ground.

40. If your front wheel begins to skid, you should:
   a) Not apply the rear brake.
   b) Release the front brake.
   c) Shift to a lower gear.
   d) Press the clutch lever.

41. If the drive chain begins slipping or clanking:
   a) Hold the handlebars loosely.
   b) Disengage the clutch as soon as possible.
   c) Slow down and jump off the motorcycle.
   d) Close the throttle and shift to a lower gear.

42. When your motorcycle is almost stopped:
   a) Put your gearshift foot down to balance the motorcycle.
   b) Press the clutch and open the throttle.
   c) Shift into second gear.
   d) Use your brake foot to balance the motorcycle.

43. After starting on a slippery road, you should:
   a) Shift to a higher gear when the road surface permits.
   b) Regulate your speed by using the clutch instead of the throttle.
   c) Use the front brake to control your speed.
   d) Lean the motorcycle to the right.

44. If you want to stop after recovering from a rear wheel skid, you should:
   a) Apply the front brake only.
   b) Apply both brakes again.
   c) Coast to a stop without the use of brakes.
   d) Close the throttle and press the clutch lever.

45. When driving on a slippery road:
   a) Lean the motorcycle more than usual when starting in motion.
   b) Keep your feet off the footpegs.
   c) Use the rear brake to get a feel for the road.
   d) Use both the front and rear brakes for slowing or stopping.

46. If your front wheel begins to skid, you should:
   a) Shift to neutral and pump the rear brake.
   b) Sit very still and not shift your weight.
   c) Turn into the skid.
   d) Apply the front brake lightly.

47. When you are carrying a passenger:
   a) You will need more distance to slow down and stop.
   b) The motorcycle will speed up faster.
   c) The motorcycle will be more stable at slow speeds.
   d) You should let him help you balance the motorcycle.

48. When you are driving on the highway:
   a) Vary your speed to break the monotony.
   b) Try not to vary the amount the throttle is opened.
   c) Maintain the speed of traffic flow.
   d) Keep your wrists well above the handgrips.

49. If your motorcycle stalls when going up a hill, you should:
   a) Hold it from rolling with the front brake.
   b) Hold it from rolling with the rear brake.
   c) Hold if from rolling with the front and rear brakes.
   d) Hold if from rolling with your feet.

Continue to next page . . .

50. When making a rapid stop you should apply the:
   a) Rear brake firmly and then the front brake just short of sliding the front wheel.
   b) Rear brake and then the front brake firmly and increase pressure on both.
   c) Rear brake firmly then downshift and avoid using the front brake.
   d) Rear brake gently then press the clutch lever and apply the front brake.

51. If you are slowing down a little too fast, you should:
   a) Release both brakes at the same time.
   b) Release pressure on the front brake and ease up on the rear brake.
   c) Release the front brake, keeping the same pressure on the rear brake and open the throttle slightly.
   d) Release the rear brake and pump the front brake.

52. When in a skid you should use your brakes:
   a) After feeling you have control of the motorcycle.
   b) Just as the motorcycle starts to skid.
   c) In a series of quick, hard jabs on a wet road.
   d) In order to help you regain steering control.

53. You will most likely skid if you:
   a) Speed up slightly when going around a curve.
   b) Downshift before applying your brakes.
   c) Make short stops or brake hard.
   d) Slow down before riding on a metal grating.

54. If your motorcycle appears to be on fire while you are riding, you should:
   a) Drive quickly to the nearest fire station.
   b) Stop where you are on the road and run for cover.
   c) Leave the engine on and drop the motorcycle on its side.
   d) Leave the road, stop the engine, and get off.

55. After placing your motorcycle in gear when starting on a hill, you should:
   a) Keep the motorcycle from rolling with the front brake.
   b) Release the rear brake, then the front brake.
   c) Open the throttle and release the clutch slowly.
   d) Balance the motorcycle with the rear brake foot.

56. When moving at a very slow speed on a motorcycle with an automatic clutch, you should:
   a) Place your right hand on the brake lever.
   b) Keep the throttle closed.
   c) Control your speed with the throttle or rear brake.
   d) Keep both feet on the footpegs.

57. If your motorcycle stalls when going up a hill, you should:
   a) Shift into high gear, then press the clutch lever and then kickstart the engine.
   b) Close the fuel valve, then start the engine and then use the throttle to increase the engine speed.
   c) Kickstart the engine, then shift into first gear and then use the throttle to increase the engine speed.
   d) Kickstart the engine, then use the throttle to increase the engine speed and then shift into second gear.

58. If you are running low on fuel:
   a) Increase your speed.
   b) Turn the fuel valve to reserve.
   c) Shift into neutral and coast.
   d) Stop often in order to save gas.

59. When jump-starting your motorcycle, you should:
   a) Keep the motorcycle in high gear.
   b) Open and regulate the throttle until the engine develops power.
   c) Close your fuel valve until the engine turns over.
   d) Turn your lights on.

60. You should not ride with your wrists above the handgrips because:
   a) You will not be able to steer as well.
   b) A jolt could cause you to open the throttle.
   c) It may cause you to exceed the speed limit.
   d) It will be difficult to reach the clutch and brake levers.

End of the Test.

Go back and answer any questions you may have missed.

Appendix A-7. Items--Test 4.

11. This sign means:

a) Slow down to 35 mph and prepare to enter a curve.
b) Exit ahead, exit speed 35 mph.
c) Construction area, slow down to 35 mph and use the right lane only.
d) Vehicles turning right must reduce speed to 35 mph.

12. In making a left turn, you should not:

a) Pull halfway into the intersection and edge into cross traffic.
b) Signal before you arrive at the intersection.
c) Slow down to a stop if traffic is heavy.
d) Stay in one lane while turning.

13. When you are riding on a rough surface:

a) Steer in a zig-zag manner.
b) Slow down.
c) Keep your feet off the footpegs.
d) Ride in the left lane.

14. You should be most careful on wet roads:

a) Right after a rainstorm.
b) After several days of rain.
c) When it first starts raining.
d) During a summer rain.

15. If you must drive through an oil-soaked area of the road, you should:

a) Move forward on your seat.
b) Slow down and avoid leaning the motorcycle.
c) Lean the motorcycle instead of turning the wheel.
d) Speed up before coming to the area and then close the throttle.

16. If you come to an area where sand is covering the road, you should:

a) Slow down before getting to the area.
b) Rest your foot on top of the chain guard.
c) Stop and push the motorcycle through the sand.
d) Lower your body close to the motorcycle.

17. To return to the road after accidentally dropping off of the pavement onto the shoulder, you should:

a) Speed up and turn sharply when getting back onto the road.
b) Slow down and turn sharply when getting back onto the road.
c) Speed up and gradually cross from the shoulder to the road.
d) Slow down and gradually cross from the shoulder to the road.

18. If you come to bumps in the road, you should:

a) Be prepared for more bumps ahead.
b) Stop and walk your motorcycle.
c) Accelerate as you go over the bumps.
d) Hold the handlebars loosely.

19. After driving through deep water you should:

a) Downshift and then open the throttle.
b) Not apply the front brake for the next several miles.
c) Put on both brakes lightly and open the throttle.
d) Ride in a zig-zag pattern to dry the tires.

20. If you think there may be stones or other objects in the road, you should:

a) Move onto the shoulder and slow down.
b) Drive close behind a larger vehicle for protection.
c) Move close to the shoulder in case you have to stop.
d) Slow down and prepare to stop or steer around them.

21. When starting your motorcycle on ice, you should:

a) Release the clutch quickly for better traction.
b) Start in first gear if your wheel spins in second gear.
c) Keep your feet down and accelerate slowly.
d) Apply more pressure to the front wheel.

 Continue to next page . . .

22. When you have trouble seeing because of rain, snow, fog, sun, etc., you should:
   a) Follow a larger vehicle more closely.
   b) Be very careful because other vehicles may not see you.
   c) Put on your bright lights and move from side to side.
   d) Go 10-15 mph slower than the other vehicles.

23. After heavy rains you should:
   a) Avoid downshifting if possible.
   b) Not use the brakes to slow down.
   c) Watch for large puddles on the road.
   d) Lean your body instead of turning the front wheel.

24. When approaching loose gravel or dirt, it is best to:
   a) Slow down.
   b) Speed up slightly.
   c) Shift to a higher gear.
   d) Lean forward.

25. When your tires are wet:
   a) Speed up slightly.
   b) Increase your following distance from other vehicles.
   c) Take both feet off the footpegs and keep them just above the water.
   d) Open the throttle but be ready to use the brakes.

26. When driving a motorcycle rather than a car, it is more important to:
   a) Know the rules of the road.
   b) Keep a safe following distance.
   c) Watch for objects on the road.
   d) Adjust the mirrors carefully.

27. When your vision is reduced by fog or rain, it may help to:
   a) Turn on your high beam headlight.
   b) Speed up to gain better traction.
   c) Not worry about the pavement warnings.
   d) Stop and clean your eye protection.

28. When riding or turning on gravel or brick roads, you should:
   a) Use the front brake with caution.
   b) Speed up slightly before beginning to turn.
   c) Lean the motorcycle less than your body when turning.
   d) Have more air pressure in the rear tire.

29. When coming to an intersection covered with ice or snow, you should:
   a) Press the clutch lever before the intersection and keep it pressed in.
   b) Reduce your speed before getting to the intersection.
   c) Turn on your bright lights and blow your horn.
   d) Stop and ask your passenger to get off before getting to the intersection.

30. When driving on a gravel or brick road, you should:
   a) Increase the distance between you and the other vehicles.
   b) Use the clutch to control your speed.
   c) Drive with the throttle all the way open in a lower gear.
   d) Ride with a slight zig-zag motion.

31. If you are becoming bogged down in sand, you should:
   a) Try to move at an angle rather than straight.
   b) Keep the throttle open to have steering control.
   c) Press and release the clutch lever to gain traction.
   d) Stand up on the foot pegs and lean forward.

32. When you want to slow down on water, ice, snow or sand, you should:
   a) Pump the front brake first and then apply the rear brake.
   b) Pump the rear brake and then apply the front brake.
   c) Shift to neutral and not apply the brakes.
   d) Apply both brakes firmly at the same time.

33. When driving through deep snow you should:
   a) Keep the motorcycle in high gear.
   b) Keep moving at a constant speed.
   c) Close the throttle and keep the clutch lever pressed in.
   d) Press down on the handlebars.

 Continue to next page . . .

34. When driving in extremely cold weather, you should:

a) Drive faster than usual.
b) Wear dark-colored clothing.
c) Use a pivoted faceshield.
d) Follow close behind other vehicles.

35. When driving on a wet or slippery road, it is best to:

a) Put more weight on the front wheel.
b) Reduce your tire pressure.
c) Avoid pavement markings or metal surfaces.
d) Lean the motorcycle more than usual when turning.

36. When it is very windy you should:

a) Hold the handlegrips lightly.
b) Drive at a slower speed.
c) Shift to a higher gear and use less throttle.
d) Stay near the inside of the curves.

37. The most slippery place to ride on a wet road is:

a) The right wheel track.
b) The center of the lane.
c) The left wheel track.
d) Near the shoulder or the curb.

38. If you see a pothole ahead, you should first:

a) Slow down.
b) Swerve to the left or right.
c) Stop immediately.
d) Put on your turn signals.

39. When you are trying to get through deep snow:

a) Shift to a higher gear after entering the snow.
b) Stop and start often to get traction.
c) Shift your weight to the rear wheel.
d) Don't use your feet for balance.

40. When stopping on ice you should:

a) Press the clutch and front brake at the same time.
b) Pump the rear brake.
c) Firmly apply the front brake.
d) Shift to neutral.

41. If you are about to drive over a pothole, you should:

a) Swerve sharply to avoid it.
b) Lean forward in your seat.
c) Put your weight on the footpegs and open the throttle slightly.
d) Put both feet out in case you begin to fall to one side.

42. If you see a road sign indicating a bumpy road ahead:

a) Stand up on the footpegs to get ready for the bumps.
b) Pull off the road and turn around.
c) Ride on the shoulder until you pass the bumps.
d) Slow down in advance of the bumpy area.

43. To recover from hydroplaning you should:

a) Close the throttle to slow down.
b) Apply the rear and then the front brake firmly.
c) Steer in a zig-zag motion to keep balance.
d) Maintain your speed and sit back on the motorcycle.

44. When driving your motorcycle on a road where there is only a narrow, soft shoulder:

a) Keep in the left lane.
b) Pay more attention to the traffic and road ahead.
c) Speed up to get off the road more quickly.
d) Brake hard when stopping to avoid a loss of traction.

45. In order to slow down safely on the shoulder of the road, you should:

a) Use pressure on both brakes.
b) Drag your feet on the ground.
c) Close the throttle gradually.
d) Apply the brakes and lean the motorcycle away from the road.

46. When you are riding on a bumpy road, you should:

a) Keep the brakes on until you are over the bumps.
b) Place more of your weight on the footpegs.
c) Keep both feet down for balance.
d) Ride on the shoulder or in the median.

47. If you are stuck on the road and a vehicle is rapidly approaching, you should:

a) Push the motorcycle to the side of the road.
b) Place the motorcycle on its parking stand and turn on the lights.
c) Stand behind the motorcycle and direct other vehicles around.
d) Leave the motorcycle where it is and get off the road.

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48. When you are going slowly over an icy patch on the road:
   a) Apply the rear brake lightly.
   b) Be ready to put your feet down for balance.
   c) Turn the front wheel slightly to one side.
   d) Downshift as you are going over the ice.

49. In order to see better when it is raining, you can:
   a) Put on a pair of sunglasses.
   b) Drive at a faster speed.
   c) Follow close to a larger vehicle.
   d) Look over the top of your windshield.

50. If you see an object in the middle of your lane, it is best to:
   a) Move into the lane used by oncoming traffic.
   b) Drive onto the shoulder.
   c) Slow down and avoid running over it.
   d) Stop and remove it from the road.

51. If your motorcycle gets stuck in deep snow, you may have to:
   a) Shift to a higher gear and speed up.
   b) Bounce on the motorcycle to get more traction.
   c) Open the throttle slightly and steer in a zig-zag motion.
   d) Get off and lift the motorcycle out of the drift.

52. When driving on a road covered with water, snow, or sand, you should:
   a) Drive closer to the center line of the road.
   b) Follow other vehicles more closely than usual.
   c) Use your front brake only.
   d) Drive slower than usual.

53. If you are driving on a dirt, gravel, or brick road surface:
   a) Pump the brakes in order to stop.
   b) Apply the rear brake first then the front brake.
   c) Keep the rear brake on when driving through a turn.
   d) Do not lean your body or the motorcycle when turning.

54. If you have trouble seeing because of fog, rain, or sun, you should drive:
   a) In the lane that keeps you away from other traffic.
   b) On the line separating the two lanes so that you can go into either.
   c) In a zig-zag pattern in order to be seen.
   d) At the posted speed limit.

55. When riding on gravel or other loose road material, it is most important to <u>avoid</u>:
   a) Using hand signals.
   b) Changing lanes.
   c) Downshifting.
   d) Making sharp turns.

56. In order to keep your balance when turning on a gravel road, you should:
   a) Increase your speed before the turn.
   b) Use the front brake frequently.
   c) Lean the motorcycle instead of turning the wheel.
   d) Maintain or slightly increase your speed when in the turn.

57. If your motorcycle becomes stuck in sand, you should:
   a) Slide your weight back onto the rear wheel.
   b) Apply great pressure on the handlebars.
   c) Not remove your feet from the footpegs.
   d) Turn the front wheel to either side.

58. If you need more traction on wet and slippery roads:
   a) Shift your weight to the front wheel.
   b) Slow down and shift to a lower gear.
   c) Stand up on the footpegs.
   d) Lean the motorcycle so that the sides of the tires grip the road.

59. When you come to a building or hill along the road during a <u>strong</u> cross wind:
   a) Pull up on the handgrip closest to the building or hill and lean backward.
   b) Hold the handgrips tightly and speed up slightly.
   c) Be ready to shift your weight to keep your balance.
   d) Downshift and apply the rear brake lightly.

60. If you cannot get your motorcycle started in motion on snow or ice:
   a) Spin the rear wheel until you get traction.
   b) Turn the front wheel to the right.
   c) Shift your weight to the rear wheel and push with your feet.
   d) Push the motorcycle in gear and jump on when it starts moving.

<u>End of the Test.</u>

Go back and answer any questions you may have missed.

Appendix A-8. Items--Test 5.

11. This sign means:

a) Slow down to 35 mph and prepare to enter a curve.
b) Exit ahead, exit speed 35 mph.
c) Construction area, slow down to 35 mph and use the right lane only.
d) Vehicles turning right must reduce speed to 35 mph.

12. In making a left turn, you should not:

a) Pull halfway into the intersection and edge into cross traffic.
b) Signal before you arrive at the intersection.
c) Slow down to a stop if traffic is heavy.
d) Stay in one lane while turning.

13. When driving where there are many people, you should avoid distractions from:

a) People crossing the street.
b) Other vehicles pulling out or turning in front of you.
c) Store signs and displays.
d) Traffic signs or signals.

14. When driving at night your top speed should be determined by the:

a) Posted speed limit.
b) Age and condition of your motorcycle.
c) Speed of the vehicles in front of you.
d) Distance your headlights light up.

15. When driving on city streets you should:

a) Ride between two lanes of traffic.
b) Maintain an even pace with other traffic.
c) Change lanes if a space opens up.
d) Stay close to the right curb.

16. When riding a motorcycle in the city, you should:

a) Not pace your speed to the traffic lights.
b) Change your speed every few minutes so as not to stall.
c) Stay in the lane which offers the best movement and vision.
d) Take advantage of your motorcycle and weave in and out of traffic.

17. A special danger of city rather than country driving is:

a) Vehicles coming out from alleys and parking spaces.
b) Animals crossing the road.
c) High speed traffic.
d) Poor driving conditions such as gravel and sand roads.

18. At night you should:

a) Pass vehicles more quickly than during the day.
b) Follow vehicles more closely than during the day.
c) Allow more time to stop than during the day.
d) Drive closer to the center of the road than during the day.

19. When entering or leaving a freeway, you should:

a) Stop before merging with other traffic.
b) Downshift to second gear and open the throttle all the way.
c) Check for loose material on the ramp.
d) Hit the brakes several times to alert the vehicles around you.

20. If you are being followed at night by a car with bright lights, you should not:

a) Pull over to the right part of the lane.
b) Flick your own headlight from high to low beam.
c) Gradually slow down and let the car pass you.
d) Pull off the road when safe and let the car pass you.

21. If someone is following very close behind you, you should:

a) Speed up in order to lose them.
b) Slow down gradually and let them pass.
c) Hit the brakes to warn them that they are too close.
d) Continue to drive at the legal speed limit.

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22. When driving on country roads you should be prepared for:
    a) Many unmarked intersections.
    b) Few curves or sharp turns.
    c) Fast moving farm vehicles.
    d) Good road surfaces.

23. When driving with other motorcycles you should not:
    a) Drive more cautiously.
    b) Drive at a steady, constant pace.
    c) Talk to other riders or passengers.
    d) Drive in the same lane or abreast of another motorcycle.

24. When riding with other motorcycles, there should never be:
    a) Two motorcycles side by side.
    b) More than two motorcycles side by side.
    c) More than three motorcycles side by side.
    d) More than four motorcycles side by side.

25. On a mountain road, you should:
    a) Stay just to the right of the center of the lane except when meeting traffic.
    b) Keep your brakes on when going downhill.
    c) Ride on the right shoulder, if possible.
    d) Move from one side of the lane to the other.

26. When driving with other motorcycles you should not:
    a) Drive at a steady speed at or below the posted speed limit.
    b) Ride on high speed divided highways.
    c) Carry passengers if going more than 100 miles.
    d) Weave in and out of traffic in order to keep up with other motorcycles.

27. You should not ride close to parked cars because:
    a) The right edge of the traffic lane is the "oil slick" area.
    b) People may be getting out of the parked vehicle.
    c) The vehicle may have been improperly parked.
    d) It is illegal to ride less than 5 feet away from a parked car.

28. If you have to change speed or direction because of an animal, you should first:
    a) Press in the clutch lever.
    b) Check for vehicles behind and around you.
    c) Apply both brakes lightly and signal.
    d) Take both feet off the footpegs for balance.

29. When you approach a long line of oncoming vehicles, you should:
    a) Move to the right side of your lane.
    b) Stay in the left part of the lane.
    c) Flash your lights and slow down
    d) Drive in a zig-zag manner to attract attention.

30. If a runaway vehicle is coming toward you, you should:
    a) Pull off onto the right shoulder and drive behind any available protection.
    b) Speed up until you come to an exit or side road.
    c) Slow down and then jump off your motorcycle.
    d) Move into another lane and stop and wait until the other vehicle passes you.

31. When you drive past a line of parked vehicles:
    a) Speed up slightly if there are no people on the road.
    b) Drive close to the right side of the lane.
    c) Blow your horn.
    d) Look for vehicles that may be leaving their spaces.

32. When in the residential area of a city:
    a) Try to go at a constant speed of 35 mph.
    b) Watch for pedestrians, especially children.
    c) Slow down if you want to drive through a "play street."
    d) Do not use your horn.

33. If you are coming to an animal crossing, you should:
    a) Keep going at the same speed.
    b) Speed up and move to the left.
    c) Slow down and be prepared to stop.
    d) Stop and push your motorcycle.

34. If you are about to have a crash on the road:
    a) Steer toward large, rigid objects near the roadway.
    b) Leave the road at any point rather than risk a head-on collision.
    c) Jump off your motorcycle to get clear of the other vehicle.
    d) Steer so that you will be hit broadside rather than head-on.

35. In order to drive safely in traffic, you should:
    a) Watch vehicles on both sides of you in case you have to change lanes.
    b) Drive as close as possible to the vehicles parked on the right.
    c) Keep your speed slightly below that of other vehicles.
    d) Not carry a passenger.

36. If it looks like you might hit a pedestrian, you should:
    a) Slow down, lean to the right and downshift.
    b) Apply the rear brake, blow the horn and move to the left.
    c) Shift into neutral, blow the horn and check for traffic.
    d) Blow the horn, check for traffic and slow down.

37. When driving at night you should:
    a) Ride in the right wheel track of the lane.
    b) Go slower than during daytime.
    c) Not carry a passenger.
    d) Keep your bright lights on.

38. If you are being passed you should:
    a) Move to the right.
    b) Increase your speed slightly.
    c) Signal the other driver when it is safe for him to pass.
    d) Look over your shoulder to check the vehicle that is passing you.

39. If the freeway entrance ramp to a freeway feeds into the left lane, you should:
    a) Wait until you can cross over to the right lane before entering the main road.
    b) Slow to a stop before entering and then proceed with extra care.
    c) Drive along the shoulder until you can safely enter the main road.
    d) Make sure that you can travel at the freeway speed limit before entering.

40. When coming to a railroad crossing without warning signals, you should:
    a) Stop even if you don't see any trains coming.
    b) Speed up and look quickly in both directions.
    c) Slow down and look before crossing the tracks.
    d) Signal other vehicles to pass you.

41. If there is a small animal in the path of your motorcycle, you should:
    a) Avoid hitting it at all costs.
    b) Hit it, and don't worry about it.
    c) Hit it if it would be unsafe to avoid it.
    d) Hit it only if it is smaller than a dog.

42. When being passed you should move to the right:
    a) When being crowded by the passing vehicle.
    b) Whenever it is possible to do so.
    c) Only on undivided roads.
    d) Only if you are going below the speed limit.

43. The best way to cross railroad tracks is to:
    a) Go slow and cross at an angle to the right.
    b) Reduce speed and cross at an angle to the left.
    c) Speed up slightly and lean forward for balance.
    d) Reduce speed and cross at a right angle, if possible.

44. When coming to a live animal on the road, you should:
    a) Come to a full stop and wait until the animal is off the road.
    b) Drive onto the shoulder.
    c) Slow down until you pass the animal.
    d) Downshift and continue at the same speed.

45. When you ride by parked cars, you should:
    a) Move to the right side of the lane.
    b) Slow down and stay 1/2 to 3/4 of a lane away.
    c) Blow your horn or flash your lights.
    d) Speed up and drive in the lane farthest away from the parked cars.

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46. If a dog is chasing you, you should:
   a) Speed up.
   b) Slow down.
   c) Attempt to run over the animal.
   d) Stop as soon as possible.

47. When crossing railroad tracks at a low speed, you should:
   a) Start across the tracks in third or fourth gear.
   b) Slip the clutch to avoid jerking the motorcycle.
   c) Shift into second or first gear when going over the tracks for more speed.
   d) Use only the front brakes.

48. When following behind another motorcycle you should always:
   a) Drive in the center of the lane.
   b) Drive in another lane.
   c) Stay in the far left side of the lane.
   d) Stay further behind than if following a car.

49. When driving with other motorcycles it is best to drive:
   a) In second or third gear.
   b) In single file in a staggered position.
   c) 10-15 mph below the posted speed limit.
   d) In the passing lane.

50. If you drop something off your motorcycle while crossing railroad tracks, you should:
   a) Stop on the tracks and pick it up right away.
   b) Circle back if it looks like no train is coming.
   c) Keep going until you can pull off the road and walk back to the tracks.
   d) Leave the object where it is, since it's illegal to pick things up from the tracks.

51. When there is a vehicle behind you, you should:
   a) Move into another lane.
   b) Check to see if it is following too closely.
   c) Speed up so that it does not get too close.
   d) Move over to the right part of your lane.

52. If you are carrying a passenger, you:
   a) Will need to open your throttle more or allow more distance when entering a high speed road.
   b) Should let your passenger watch out for approaching cars.
   c) Will need less distance in order to stop because of the extra weight.
   d) Should drive only in the left-hand lane.

53. When driving with other motorcycles you should:
   a) Drive close to the other motorcycles or vehicles.
   b) Stay close to the left side of the right-hand lane.
   c) Set a pace slow enough for the slowest motorcycle.
   d) Keep your headlight on high beam.

54. When driving in mountainous terrain:
   a) Keep to the far right of your lane.
   b) Stop every 50 to 60 miles to guard against fatigue.
   c) Drive as fast as you like.
   d) Watch for rock slides and washouts.

55. When on a right-hand entrance to a freeway, you should:
   a) Look back over your left shoulder and into the left rearview mirror.
   b) Only look straight ahead at the road.
   c) Not speed up until you are on the main road.
   d) Assume the right-of-way when merging with freeway traffic.

56. After leaving the road to avoid a collision, you should:
   a) Return to the road without stopping if possible.
   b) Lean the motorcycle away from the road and apply the rear brake.
   c) Start steering sharply toward the road.
   d) Downshift and apply both brakes to stop.

57. When coming to an animal crossing or refuge area at night, you should:
   a) Speed up and flash your lights several times.
   b) Stop and continue with care.
   c) Slow down and watch for animals near the roadway.
   d) Sound your horn and then continue at normal speed.

End of the Test.

Go back and answer any questions you may have missed.

Appendix A-9. Items--Test 6.

11. This sign means:

a) Slow down to 35 mph and prepare to enter a curve.
b) Exit ahead, exit speed 35 mph.
c) Construction area, slow down to 35 mph and use the right lane only.
d) Vehicles turning right must reduce speed to 35 mph.

12. In making a left turn, you should not:

a) Pull halfway into the intersection and edge into cross traffic.
b) Signal before you arrive at the intersection.
c) Slow down to a stop if traffic is heavy.
d) Stay in one lane while turning.

13. If a vehicle is coming from your right at an intersection it may be unsafe to:

a) Try to estimate the speed and distance of the vehicle.
b) Prepare to slow down and stop if the vehicle is close.
c) Look ahead of the vehicle to see if you will have to stop.
d) Continue at the same speed through the intersection.

14. Motorcycles must be capable of stopping at 20 miles per hour in not more than:

a) 20 feet.
b) 30 feet.
c) 40 feet.
d) 50 feet.

15. When passing a truck rather than a car, you will have:

a) To go faster in order to pass.
b) A better view of the road ahead.
c) To drive closer to the truck in order to pass safely.
d) More control problems because of the air pressure.

16. In order to carry a passenger on your motorcycle, it must be equipped with:

a) Chain and exhaust pipe guards.
b) Mechanical directional signals.
c) Footrests for the passenger.
d) An engine of more than 15-brake horsepower.

17. If an oncoming vehicle is preparing to turn left at an intersection:

a) Drive to the left to get around it.
b) Speed up and continue straight before he completes his turn.
c) Stop and let him turn.
d) Lag slightly behind other vehicles going in your direction.

18. High beams on a motorcycle should reveal objects at a distance of not less than:

a) 100 feet.
b) 150 feet.
c) 350 feet.
d) 500 feet.

19. When you park your motorcycle on the shoulder of a road:

a) Put on your turn signals.
b) Turn on the light and leave the rear wheel on the road.
c) Lean the motorcycle on its side.
d) Stand between the motorcycle and the road.

20. If you are on a main road and coming to an intersection, you should:

a) Watch for vehicles slowing down or giving other signs of making left turns.
b) Protect yourself by driving between lanes of traffic.
c) Shift to higher gear and coast through the intersection.
d) Move to the far left lane and turn on your lights.

21. When you approach the top of a hill, you should not:

a) Slow down slightly.
b) Stand up on footpegs to see over the top.
c) Drift toward the center line.
d) Dim your lights.

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22. When passing other vehicles it is safest to pass on the:

a) Right side.
b) Left side.
c) Side away from the sun.
d) Side with the least traffic.

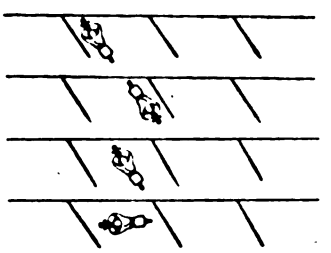
23. If your motor-driven cycle is to be driven at night, it must be:

a) Equipped with a headlight and taillight.
b) Driven faster than 35 mph.
c) Driven in the right lane only.
d) Equipped with turn signals.

24. When parallel parking your motorcycle, you should:

a) Pull the front wheel against the curb close to the front of the parking space.
b) Back the motorcycle against the curb at an angle in the center of the space.
c) Stop the motorcycle with both wheels against the curb at the center of the space.
d) Park in the center of the space with both wheels about two feet from the curb.

a)
b)
c)
d)



25. Motorcycle drivers:

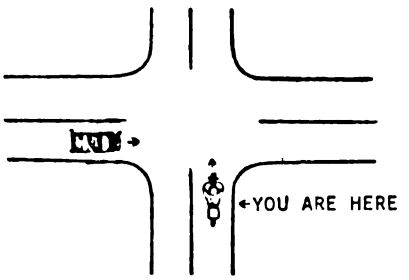
a) Are allowed the use of the full width of a lane.
b) Must share a lane with bicycle riders.
c) Must not share a lane with another motorcycle driver.
d) Should share the lane with passenger cars and trucks.

26. It is illegal for a motorcycle driver to:

a) Ride two abreast on an undivided highway.
b) Drive faster than 35 mph at night.
c) Cling to other vehicles.
d) Drive in the left part of the lane.

27. If you are going straight through the intersection and see a vehicle to your left:

a) Drive partially into the intersection to warn the other vehicle to slow down.
b) Prepare to yield right-of-way.
c) Speed up to get through the intersection before the other vehicle.
d) Pull off the road until the vehicle gets through the intersection.



28. You should not park in a space that:

a) Has a coating of oil or grease.
b) Is less than 60 feet from a corner.
c) Is within 25 feet of a fire hydrant.
d) Has a parking meter.

29. The first thing to do before changing lanes is:

a) Signal with your lights and hand.
b) Slow down.
c) Check your mirrors and look over your shoulder.
d) Move closer to the lane you want to be in.

30. Upon approaching an intersection you need not stop when:

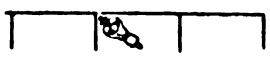
a) A vehicle suddenly makes a left turn in front of you.
b) You are making a left turn and oncoming traffic is approaching.
c) A vehicle on your left is signaling for a right turn.
d) Traffic allows complete passage through the intersection.

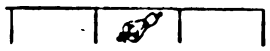
31. When deciding to pass on a 2-lane road, it is most important to consider the:

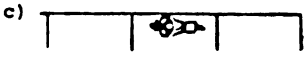
a) Time it will take you to speed up and pass.
b) Number of vehicles behind you.
c) Type of vehicle you are passing.
d) Air pressure from larger vehicles like trucks.

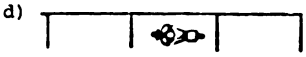
Continue to next page . . .

32. **When angle parking your motorcycle, it should be positioned as shown in figure:**

a) 

b) 

c) 

d) 

33. **When overtaking and passing a vehicle in your lane, pass:**

a) On the right.
b) On the left in the same lane.
c) By changing to the left or passing lane.
d) On either side in the same lane.

34. **When making a left turn you should:**

a) Rely on your front brake.
b) Put your feet down for balance when in the turn.
c) Go fast enough to keep the motorcycle steady.
d) Shift gears during the turn.

35. Motorcycles must be equipped with:

a) Parking lights.
b) At least two headlights.
c) A red reflector on the rear.
d) Emergency flashing lights.

36. **A motor-driven cycle is a 2-wheel vehicle whose engine:**

a) Is larger than 250 cc.
b) Produces less than 5 brake horsepower.
c) Is mounted over the front wheel.
d) Has 2 or more cylinders.

37. **If your headlight cannot reveal people at 200 feet at night, you must not go faster than:**

a) 25 mph.
b) 35 mph.
c) 45 mph.
d) 55 mph.

38. **When you are stopped and waiting to turn left at an intersection and oncoming traffic is close:**

a) Stop on the centerline and wait.
b) Turn your front wheel to the left.
c) Keep your foot firmly on the brake.
d) Drive past the corner and wait in the intersection.

39. **When approaching an intersection it is most important to:**

a) Stay in the right lane.
b) Watch for traffic making right turns.
c) Watch for traffic going straight.
d) Watch for traffic making left turns.

40. **You may need more distance to pass on a 2-lane road because:**

a) Motorcycles cannot change lanes as quickly as other vehicles.
b) Other vehicles in your lane may not yield when you try to re-enter the lane.
c) Motorcycles can go faster than other vehicles.
d) It will take you longer to slow down before you can move back to the right.

41. **It is illegal for a group of motorcycles to drive:**

a) Through a residential area.
b) In more than one lane of a highway.
c) More than two abreast in one lane.
d) In single file when there are more than ten motorcycles in the group.

42. **A person who operates a motorcycle:**

a) Must wear light or white clothes.
b) Cannot drive on high speed highways.
c) Has all the rights and duties of other drivers.
d) Must not stop his motorcycle on the shoulder of the road.

43. **When carrying a package on a motorcycle, it is illegal to:**

a) Place it on the tank between your legs.
b) Tie it to the handlebars.
c) Use saddlebags.
d) Hold it with your hands.

44. **After entering a new traffic lane, you should:**

a) Slow down.
b) Switch off your turn signal.
c) Stay on the far right side of the lane.
d) Put your feet out to stabilize your motorcycle.

Continue to next page . . .

45. It is illegal for motorcycle handlebars to be higher than:

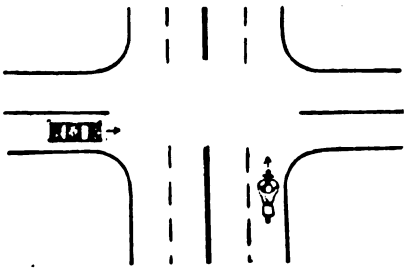
a) 12" above the empty seat.
b) 15" above the empty seat.
c) 18" above the empty seat.
d) 21" above the empty seat.

46. If you are passing a vehicle that starts to drift toward you, blow your horn and:

a) Speed up to pass.
b) Watch to see if the driver hears you.
c) Apply your brakes and pull over to the right.
d) Pull into the lane to the left or onto the median.

47. When on a main road at an intersection and a vehicle is approaching from the left, you should:

a) Stop; he always has the right-of-way.
b) Speed up to make sure he knows you're there.
c) Yield if he does not slow down.
d) Slow down immediately and blow your horn.



48. When in a line of cars at a stop sign or red light, you should:

a) Maintain your position in line.
b) Pull over to the right and pass them.
c) Pull over to the left of the lane and pass them.
d) Drive between the lanes of cars, stop and then continue.

49. When going downhill you should <u>not</u>:

a) Maintain a constant speed.
b) Close the throttle to prevent speeding up.
c) Keep your rear brake on until you reach the bottom.
d) Shift to lower gear if the grade is long.

50. Before yielding to a vehicle which is turning left in front of you:

a) Move into the right lane.
b) Move to the left so you can pass when he starts to turn.
c) Check the vehicles behind you.
d) Signal the vehicle that he should turn.

51. Under good conditions, the rider approaching a curve to the right should:

a) Lean to the left and brake on the curve.
b) Reduce speed before the curve and speed up slightly in the curve.
c) Turn the wheels sharply to the right and sit straight up.
d) Speed up before the curve and brake when in the curve.

52. Equipment required by state law does <u>not</u> include:

a) A red tail lamp.
b) A license plate lamp.
c) A headlamp.
d) Turn signals.

53. When coming to and driving through an intersection, you should always:

a) Slow down to 15-20 mph.
b) Stay close to the vehicle in front of you.
c) Check the traffic lights and signs.
d) Move to the right lane.

54. When you come to a stop sign or red traffic light, you should stop:

a) Near the left tire marks in the lane.
b) After you have passed the crosswalk.
c) Only if the car in front of you stops.
d) Between lanes of traffic.

55. When turning right at an intersection, you should:

a) Speed up until you complete the turn.
b) Put your feet down only when needed for support.
c) Go faster than 5 mph.
d) Lean farther than the motorcycle.

56. When passing another vehicle you should:

a) Drive alongside the vehicle until you are sure that the driver sees you.
b) Move to the far right of the passing lane.
c) Not be in the same lane as the vehicle you are passing.
d) Pass between two lanes of moving traffic.

57. When you are driving through a curve, you should:

a) Continue to slow down until you come out of the curve and begin going straight.
b) Lean your body with the motorcycle and turn the handlebar as needed.
c) Sit far back in the seat.
d) Steer toward the outside of the lane.

Continue to next page . . .

58. After parking on a hill be sure to:
   a) Leave the lights on so other vehicles can see the motorcycle.
   b) Lean the motorcycle against a wall or another vehicle.
   c) Turn the motorcycle so the slope does not tip it over.
   d) Use the parking stand instead of the kick stand.

59. When going up a steep hill, you should:
   a) Stay in high gear and open the throttle all the way.
   b) Shift to a lower gear to maintain your speed.
   c) Drive on the extreme right of the lane.
   d) Decrease your speed to cool the engine.

60. When completing a U turn:
   a) Put your feet out to get your balance.
   b) Speed up quickly.
   c) Turn the front wheel slightly to the left.
   d) Shift your weight to the right to straighten the motorcycle.

End of the Test.

Go back and answer any question you may have missed.

APPENDIX B

TESTING INSTRUCTIONS, ANSWER SHEET, BUMPER STICKER

Appendix B-1. Instructions, First Testing.

GENERAL INSTRUCTIONS

To the Examiner:

1. **Distribute the tests, pencils and answer sheets and proceed to administer the test.** SEE THE INSTRUCTIONS TO THE STUDENT **on the next page. Distribute the test booklets from the top of the pile, counting out only enough for each row.**

2. **Circulate among the students during the first few minutes of the test to see that they are marking the answer sheet correctly.**

3. **Do not answer any questions concerning the substance of the test. Define words only if you can do so without giving away the answer.**

4. **Normal test decorum should be maintained. All students should remain in their seats and there should be no talking.**

5. **At the end of the period collect all answer sheets, test booklets and our pencils.**

6. **Place the test booklets and answer sheets in the envelopes provided.**

INSTRUCTIONS TO THE STUDENTS

READ ALOUD TO THE STUDENTS

TODAY YOU WILL BE PARTICIPATING IN A SPECIAL TESTING PROGRAM. PLEASE LISTEN AND FOLLOW THE DIRECTIONS GIVEN.

1. REMOVE ALL BOOKS, ETC. FROM YOUR DESK.
2. USE ONLY A NUMBER 2 OR SOFT PENCIL WHEN ANSWERING THE TEST (pass out pencils to those who do not have them).
3. REMAIN IN YOUR SEAT AT ALL TIMES. IF YOU HAVE A QUESTION RAISE YOUR HAND AND I WILL COME TO YOU. WHEN YOU FINISH WITH THE TEST, PLACE THE ANSWER SHEET INSIDE THE BOOKLET AND LEAVE IT ON YOUR DESK.
4. NOW I WILL PASS OUT THE ANSWER SHEETS AND TEST BOOKLETS. DO NOT WRITE ON THE ANSWER SHEET OR OPEN THE TEST BOOKLET UNTIL I TELL YOU TO. (distribute the booklets and answer sheets).
5. FOLLOW ALONG WITH ME AS I READ THE INSTRUCTIONS ON THE FRONT OF THE TEST BOOKLET.

continued on next page . . .

(test booklet cover)

This test is designed to find out how much you know about certain areas of motorcycle riding.

Whether you have a lot of experience on a motorcycle, a little experience, or have never been on a motorcycle, please try and answer each question as well as you can.

There is one BEST answer for each question. Mark the space on the answer sheet which corresponds to the letter of the answer you have chosen. See the answer sheet for an example of how to mark the answer. Erase completely any answer you wish to change.
NOTE: The question numbers go across the answer sheet.

Use only a number 2 or soft pencil.

Consider each question by itself and assume, unless otherwise stated, that the road and weather conditions are ideal and that all riding is done on the road.

Write your name on the line marked "YOUR NAME" at the top of the answer sheet. Also write in the name of your instructor. Do not write anything in the boxes on the right hand side of the sheet.

Write your name on the line below.

NAME:_____

DO NOT make any other marks in this booklet.

ARE THERE ANY QUESTIONS? (pause)

NOW TURN THE PAGE AND BEGIN ANSWERING THE QUESTIONS . . .

END OF THE PERIOD

(3 minutes before)

READ ALOUD TO THE STUDENTS

1. STOP WORK ON THE TEST.
2. MAKE SURE YOUR NAME IS ON THE COVER OF THE TEST AND ON THE ANSWER SHEET.
3. PLACE THE ANSWER SHEET INSIDE YOUR TEST BOOKLET.
4. PASS THE TEST BOOKLETS FORWARD.
5. RETURN ALL OF OUR (U OF M) PENCILS.
6. THANK YOU FOR YOUR COOPERATION.

* *

DISMISS THE CLASS AT THE PROPER TIME.

PLACE ALL TEST BOOKLETS IN THE PROPER ENVELOPE.

Appendix B-2. Instructions, Re-testing.

GENERAL INSTRUCTIONS

To the Examiner:

1. **Distribute the tests, pencils and answer sheets and proceed to administer the test. SEE THE INSTRUCTIONS TO THE STUDENT on the next page. Distribute the test booklets from the envelope for that class. Use blank booklets only when necessary.**

2. **Circulate among the students during the first few minutes of the test to see that they are marking the answer sheet correctly.**

3. **Do not answer any questions concerning the substance of the test. Define words only if you can do so without giving away the answer.**

4. **Normal test decorum should be maintained. All students should remain in their seats and there should be no talking.**

5. **At the end of the period collect all answer sheets, test booklets and our pencils.**

6. **Place the test booklets and answer sheets in the envelopes provided.**

INSTRUCTIONS TO THE STUDENT

RE-TESTING

READ ALOUD TO THE STUDENTS

LAST WEEK YOU PARTICIPATED IN AN EXPERIMENTAL TESTING PROGRAM. I WOULD NOW LIKE TO ASK FOR YOUR HELP ONCE MORE. IT IS IMPORTANT TO KNOW WHETHER YOU WOULD ANSWER THE QUESTIONS TODAY IN THE SAME WAY YOU DID LAST WEEK. IN SCIENTIFIC TEST ITEM DEVELOPMENT THIS IS KNOWN AS ITEM RELIABILITY. I AM GOING TO GIVE EACH OF YOU THE SAME SET OF QUESTIONS THAT YOU HAD LAST WEEK AND ASK YOU TO ANSWER THEM AGAIN. YOU MAY NOW THINK THAT SOME OF YOUR ANSWERS WERE WRONG OR YOU MAY WISH TO CHANGE SOME OF YOUR ANSWERS. PLEASE READ EVERY QUESTION CAREFULLY AND SELECT WHAT YOU NOW THINK IS THE BEST ANSWER. FOR THOSE WHO DID NOT TAKE THE TEST LAST WEEK, I ASK THAT YOU TAKE IT NOW.

LISTEN CAREFULLY WHILE I READ THE DIRECTIONS.

1. REMOVE ALL BOOKS, ETC. FROM YOUR DESK.

2. USE ONLY A NUMBER 2 OR SOFT PENCIL WHEN ANSWERING THE TEST. (distribute pencils to those who do not have them)

3. REMAIN IN YOUR SEAT AT ALL TIMES. IF YOU HAVE A QUESTION RAISE YOUR HAND AND I WILL COME TO YOU. WHEN YOU FINISH WITH THE TEST, PLACE THE ANSWER SHEET INSIDE THE BOOKLET AND LEAVE IT ON YOUR DESK.

continue on next page. . .

4. NOW I WILL PASS OUT THE ANSWER SHEETS. WRITE YOUR NAME ON THE LINE MARKED "YOUR NAME" ON THE ANSWER SHEET. ALSO WRITE IN THE NAME OF YOUR INSTRUCTOR. (pass out answer sheets)

5. NOW I WILL PASS OUT THE TEST BOOKLETS. RAISE YOUR HAND WHEN I CALL YOUR NAME. (distribute the test booklets with the student's name on them from the envelope.) DO NOT BEGIN WORK

6. IF YOU DID NOT RECEIVE A TEST BOOKLET, PLEASE RAISE YOUR HAND. (distribute booklets from your supply to those who did not receive them and/or resolve any problems.)

7. CHECK THE NAME ON THE COVER OF THE BOOKLET TO MAKE SURE THE BOOKLET IS YOURS.

8. ARE THERE ANY QUESTIONS?

9. READ THE INSTRUCTIONS ON THE COVER OF THE BOOKLET AND THEN TURN THE PAGE AND BEGIN WORK.

note-- for those students who took the test last week but are absent today, write absent on the cover of the booklet and place it in the proper envelope.

END OF THE PERIOD

(3 minutes before)

READ ALOUD TO THE STUDENTS

1. STOP WORK ON THE TEST.

2. MAKE SURE YOUR NAME IS ON THE COVER OF THE TEST BOOKLET AND ON THE ANSWER SHEET.

3. PLACE THE ANSWER SHEET INSIDE YOUR TEST BOOKLET.

4. PASS THE TEST BOOKLETS FORWARD.

5. RETURN ALL OF OUR (U OF M) PENCILS.

6. THANK YOU FOR YOUR COOPERATION.

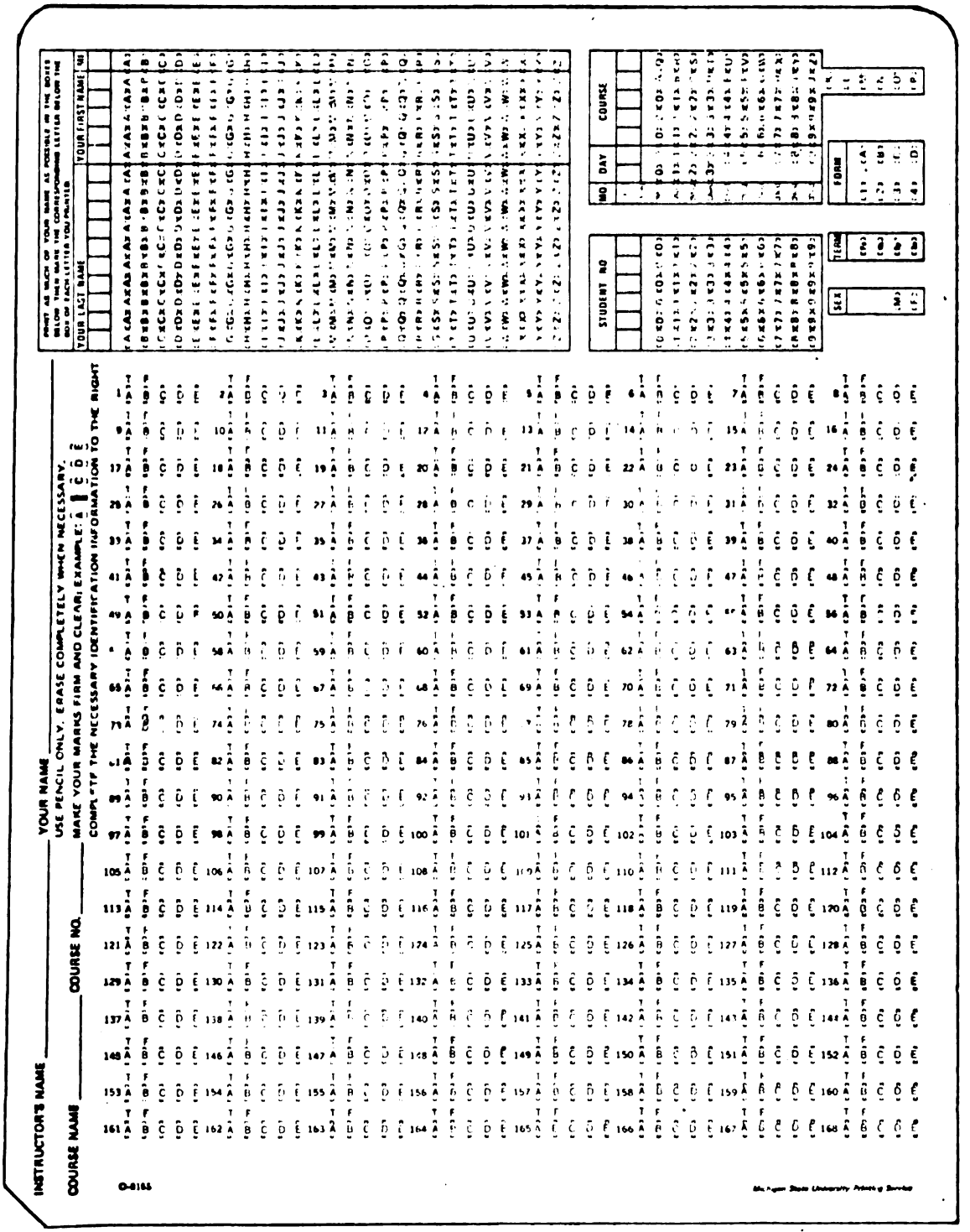
* *

PASS OUT THE BUMPER STICKERS - REMIND THEM NOT TO PASTE THEM ON THE SCHOOL BUILDING, ETC. OR TO LITTER THE SCHOOL WITH THEM.

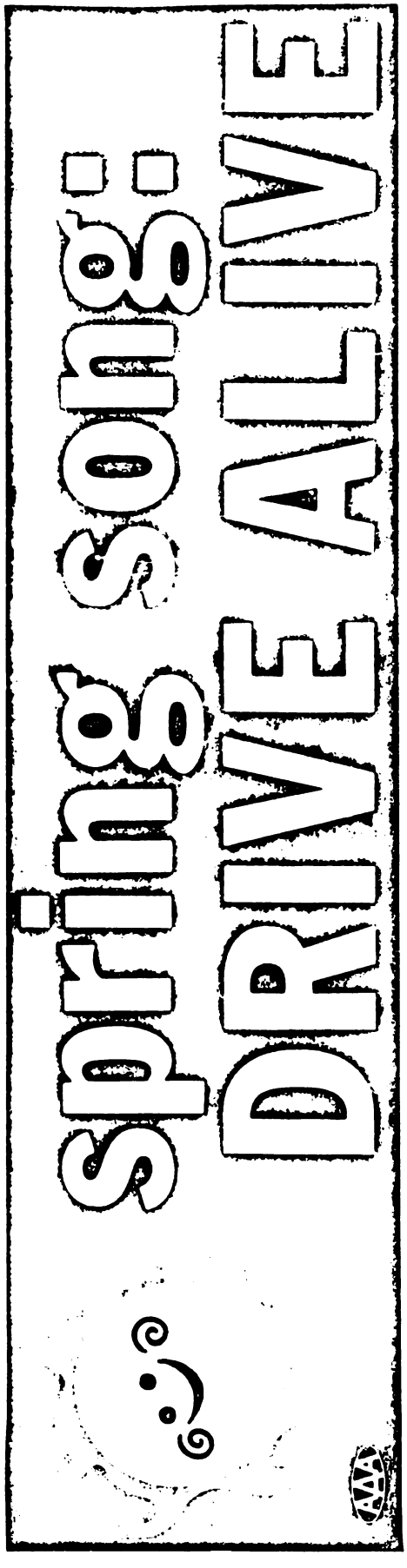
DISMISS THE CLASS AT THE PROPER TIME.

PLACE ALL TEST BOOKLETS IN THE PROPER ENVELOPE.

Appendix B-3. Answer Sheet.



Appendix B-4. Bumper Sticker.



APPENDIX C

ITEM STATISTICS FROM INITIAL TESTING

Appendix C-1. Statistics, Test 1.

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
1-11	M1	1	*a	96	-.07	.00	.17	-.00	.22	.65	96	94	0	100	.00
			b	0								0		0	
			c	0								0		0	
			d	4								6		0	
1-12	M2	2	*a	73	.01	-.12	-.01	.19	.29	.29	73	73	0	73	.10
			b	14								14		20	
			c	7								6		5	
			d	5								6		3	
1-13	8	3	*a	73	.15	-.04	-.16	-.08	.21	.67	73	82	-	65	1.79
			b	11								8		15	
			c	12								8		13	
			d	4								2		5	
1-14	9	4	a	14	-.17	-.30	.09	-.28	.36	.51	56	18	0	5	-.65
			b	23								24		28	
			*c	56								53		60	
			d	7								4		8	
1-15	13	5	a	19	-.01	.03	-.16	-.04	.25	.20	54	24	0	15	1.49
			*b	54								63		48	
			c	13								6		18	
			d	14								4		20	
1-16	250	6	a	27	-.04	-.20	.01	-.03	.28	.54	65	29	0	25	.03
			b	5								4		5	
			*c	65								65		65	
			d	1								0		3	
1-17	23	7	*a	20	.01	-.09	.11	.15	.14	.54	20	20	0	23	-.24
			b	56								61		50	
			c	6								6		5	
			d	16								10		20	
1-18	5	8	a	13	-.22	-.19	.15	.03	.36	.59	49	14	+	10	-2.22
			b	7								10		3	
			*c	49								37		60	
			d	31								37		28	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	p Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
1-19	254	9	a *b c d	0 93 4 4	.03	.00	-.01	.06	.16	.22	93	0 94 2 4	0	0 93 15 0	.26
1-20	97	10	a *b c d	7 85 5 3	-.18	-.12	.12	.32	.36	.46	85	10 82 6 2	0	5 88 3 5	-.75
1-21	25	11	a b c *d	5 8 26 60	-.09	.15	-.04	.12	.23	.40	60	4 4 31 61	0	8 13 20 58	.35
1-22	2	12	a b *c d	22 10 57 10	-.01	-.10	.05	-.21	.34	.54	57	27 0 61 10	0	8 23 60 8	.11
1-23	22	13	*a b c d	30 20 30 20	-.19	-.07	.18	-.07	.21	.56	30	22 29 37 12	0	38 5 28 28	-1.55
1-24	15	14	*a b c d	65 6 3 25	-.18	-.16	.08	-.05	.29	.38	65	65 2 0 33	0	73 10 3 13	-.72
1-25	266	15	a b *c d	8 5 83 5	.13	.03	-.20	-.01	.20	.43	83	4 4 88 4	0	10 8 78 5	1.28
1-26	255	16	a b *c d	31 33 24 12	-.13	.02	-.16	.02	.03	.53	24	29 35 35 2	-	30 33 15 23	2.14

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
1-27	21	17	*a b c d	55 28 5 13	-.02	.01	.06	-.14	.24	.48	55	51 33 2 14	0	60 23 8 10	-.84
1-28	100	18	*a b c d	82 3 5 10	-.21	-.14	.06	.25	.37	.69	82	82 2 4 12	0	83 5 5 8	-.10
1-29	17	19	*a b c d	59 11 22 7	-.15	-.41	.42	-.13	.40	.57	59	35 22 29 12	+	80 3 15 3	-4.74
1-30	24	20	a *b c d	32 43 14 10	-.23	-.15	.25	-.11	.30	.67	43	43 27 12 16	+	30 55 13 3	-2.82
1-31	261	21	a *b c d	27 51 11 11	.09	-.06	.05	.09	.25	.49	51	35 47 10 8	0	15 58 15 13	-.98
1-32	99	22	a b c *d	24 1 35 40	-.09	-.15	.13	-.12	.33	57	40	16 2 43 39	0	30 0 28 43	-.35
1-33	14	23	*a b c d	32 26 27 14	-.11	-.01	-.01	-.01	.21	.36	32	39 16 31 12	0	28 38 23 13	1.11
1-34	263	24	a b *c d	33 5 40 20	.02	-.45	.42	.09	.31	.74	40	45 6 22 24	+	28 0 68 5	-4.74

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
1-35	264	25	*a	78	-.07	-.04	.22	.14	.42	.43	78	73	+	90	-1.99
			b	11								18		3	
			c	5								4		3	
			d	5								4		5	
1-36	7	26	a	2	-.04	.05	.04	.15	.25	.21	95	2	0	0	-.41
			*b	95								96		98	
			c	1								2		0	
			d	1								0		3	
1-37	253	27	a	3	-.08	-.10	.07	.27	.36	.64	92	2	0	0	-1.15
			b	3								2		3	
			*c	92								92		98	
			d	2								4		0	
1-38	258	28	a	2	-.09	-.11	.08	.10	.18	.44	87	2	0	3	-.61
			b	1								0		0	
			c	9								12		8	
			*d	87								86		90	
1-39	4	29	a	21	.00	-.15	.15	-.07	.24	.67	47	24	0	18	-1.22
			*b	47								47		60	
			c	14								12		13	
			d	17								16		10	
1-40	6	30	a	1	.08	.04	-.15	.12	.09	.26	94	0	0	3	1.10
			b	4								4		5	
			*c	94								96		90	
			d	1								0		3	
1-41	3	31	a	10	-.11	-.12	.08	.10	.34	.07	59	10	0	13	-.32
			b	15								18		15	
			c	15								12		10	
			*d	59								59		63	
1-42	96	32	a	4	.02	-.12	-.04	-.04	.25	.54	75	0	0	8	.58
			b	1								2		0	
			*c	75								76		70	
			d	21								22		23	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
1-43	252	33	a	2	-.04	.15	.09	.02	.10	.51	21	0	0	5	-.75
			*b	21								18		25	
			c	13								10		18	
			d	65								71		53	
1-44	1	34	a	11	.01	.08	.06	.23	.47	.51	85	16	0	8	-.75
			b	1								0		3	
			c	4								2		3	
			*d	85								82		88	
1-45	101	35	*a	64	-.27	-.18	.04	.19	.41	.45	64	67	0	68	-.02
			b	18								12		23	
			c	4								2		3	
			d	14								18		8	
1-46	256	36	a	6	-.17	-.14	.09	.21	.22	.50	72	4	0	3	-1.33
			b	5								4		8	
			*c	72								67		80	
			d	16								24		10	
1-47	259	37	a	4	-.06	.29	.12	.07	.38	.63	75	6	0	0	-1.63
			*b	75								67		83	
			c	7								8		8	
			d	14								18		10	
1-48	257	38	a	6	-.13	.00	-.15	.42	.31	.51	89	4	0	8	1.01
			b	2								4		0	
			c	3								0		8	
			*d	89								92		85	
1-49	98	39	a	3	-.17	-.12	-.04	.16	.20	.09	91	4	0	3	.33
			*b	91								90		88	
			c	4								4		5	
			d	3								2		5	
1-50	19	40	a	45	.04	-.07	.07	-.09	.21	.29	26	45	0	53	-.28
			*b	26								22		25	
			c	14								16		5	
			d	14								14		18	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	p Value	Resp. Distribution (%) Low (6-9) Discriminates		Resp. Distribution (%) High (15-30)	T Statistic
1-51	265	41	*a	17	-.12	-.42	.33	-.01	.31	.46	63	20	+	10	-3.78
			b	63								49		85	
			c	9								10		3	
			d	9								16		3	
1-52	251	42	a	3	.02	-.18	.07	.05	.35	.27	72	4	0	3	-.78
			*b	72								67		75	
			c	0								0		0	
			d	25								29		23	
1-53	267	43	*a	46	-.02	-.24	.19	-.03	.33	.29	46	37	+	58	-1.97
			b	11								14		8	
			c	14								8		13	
			d	28								37		23	
1-54	16	44	*a	53	-.14	-.24	.26	-.18	.45	.52	53	39	+	68	-2.78
			b	8								4		13	
			c	22								35		13	
			d	15								18		8	
1-55	262	45	a	11	-.02	-.08	.08	.24	.44	.35	75	12	0	13	-.65
			*b	6								4		5	
			c	75								71		78	
			d	6								8		5	
1-56	18	46	a	7	-.05	-.09	.10	.23	.30	.45	80	10	0	0	-1.56
			b	9								10		5	
			*c	80								78		90	
			d	2								0		3	
1-57	260	47	*a	52	.04	-.12	.09	-.13	.36	.44	52	51	0	65	-.84
			b	12								6		5	
			c	20								24		22	
			d	13								16		8	
1-58	20	48	a	25	.04	.43	-.38	.19	.03	.45	43	18	-	36	4.24
			b	13								2		25	
			*c	43								61		22	
			d	14								14		17	

Appendix C-2. Statistics, Test 2.

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	p Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
2-11	M1	1	*a b c d	95 3 0 3	.06	.08	.10	-.23	.12	.22	95	92 4 0 4	0	97 0 0 3	-.99
2-12	M2	2	*a b c d	71 16 7 5	-.16	-.03	-.24	.29	.35	.40	71	73 18 4 4	0	61 21 9 6	1.53
2-13	44	3	*a b c d	95 2 3 0	.06	-.00	-.20	.00	.12	.33	95	96 0 4 0	0	88 6 3 0	1.31
2-14	60	4	a b *c d	13 7 79 1	.00	.28	-.34	.18	.18	.60	79	4 6 90 0	-	30 6 61 3	3.18
2-15	37	5	*a b c d	9 56 34 0	.05	.07	.12	.17	.08	.30	9	4 69 27 0	+	18 36 42 0	-2.07
2-16	51	6	a *b c d	1 80 2 17	.10	.06	.02	-.09	.22	.50	80	0 78 2 20	0	0 79 3 18	-.01
2-17	67	7	*a b c d	21 19 17 43	-.04	-.01	.03	.08	.12	.01	21	22 20 18 39	0	18 15 12 52	.55
2-18	61	8	*a b c d	80 11 5 4	-.11	-.03	.08	.15	.27	.51	80	78 8 8 6	0	91 6 0 3	-1.45

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
2-19	54	9	a	5	.05	-.13	.25	.11	.30	.32	73	4	+	6	-2.68
			b	14								29		6	
			*c	73								59		85	
			d	5								8		0	
2-20	48	10	*a	52	-.13	-.09	.07	.05	.30	.53	52	47	0	64	-1.29
			b	4								6		0	
			c	33								37		27	
			d	11								10		9	
2-21	41	11	a	5	-.03	-.01	-.00	.14	.29	.45	68	4	0	3	.33
			*b	68								71		67	
			c	17								16		18	
			d	10								8		9	
2-22	63	12	a	7	.12	.19	.06	-.01	.11	.40	73	14	0	0	-1.04
			*b	73								69		79	
			c	13								8		15	
			d	7								8		6	
2-23	42	13	a	31	.02	-.02	-.01	.02	.00	.50	13	37	0	18	1.00
			b	54								47		70	
			*c	13								16		9	
			d	1								0		3	
2-24	66	14	*a	51	-.10	-.15	-.05	-.11	.19	.39	51	55	0	48	.41
			b	5								0		9	
			c	5								6		3	
			d	38								39		36	
2-25	55	15	a	7	-.09	-.15	.23	.17	.22	.41	79	12	+	6	-2.46
			b	13								20		3	
			*c	79								67		91	
			d	0								0		0	
2-26	50	16	a	41	-.10	.02	-.15	.22	.21	.56	48	29	0	61	1.48
			b	8								14		3	
			*c	48								55		36	
			d	2								2		0	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
2-27	39	17	*a	68	-.07	-.21	-.03	.16	.45	.42	68	71	0	64	.61
			b	18								12		15	
			c	4								4		9	
			d	10								12		12	
2-28	11	18	a	4	-.10	-.14	.31	.07	.43	.42	79	10	+	0	-3.47
			*b	79								63		94	
			c	5								8		3	
			d	11								18		3	
2-29	43	19	*a	55	.05	-.05	-.17	.05	.00	.43	55	65	0	45	1.63
			b	21								20		18	
			c	3								2		3	
			d	20								10		33	
2-30	45	20	a	19	.07	-.07	.01	-.23	.17	.26	74	18	0	15	-.22
			b	3								0		3	
			*c	74								78		79	
			d	4								4		3	
2-31	32	21	a	29	.08	.12	-.06	.01	-.03	.48	21	29	0	21	.22
			*b	21								22		21	
			c	23								24		18	
			d	28								24		39	
2-32	12	22	a	0	-.04	.15	-.08	.27	.23	.46	54	0	0	0	1.02
			b	45								47		61	
			*c	54								53		39	
			d	1								0		0	
2-33	57	23	a	20	-.08	-.13	.18	.29	.24	.42	54	20	0	24	-.94
			*b	54								53		64	
			c	6								4		9	
			d	20								22		3	
2-34	35	24	a	4	-.14	.02	-.14	.16	.16	.18	90	4	0	3	.09
			*b	90								92		91	
			c	2								0		0	
			d	4								4		6	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
2-35	34	25	a	64	-.13	-.01	.30	.08	.12	.58	28	69	+	48	-1.82
			*b	28								22		42	
			c	3								2		3	
			d	5								6		6	
2-36	28	26	a	13	.04	-.02	.16	.14	.26	.58	58	12	0	15	-1.20
			b	21								27		9	
			c	8								8		9	
			*d	58								53		67	
2-37	65	27	a	24	-.27	-.05	.04	.07	.37	.35	68	31	0	18	-.44
			b	2								2		0	
			*c	68								65		73	
			d	6								2		9	
2-38	33	28	a	13	.06	-.18	.18	-.18	.22	.45	63	14	0	12	-.92
			b	9								8		15	
			*c	63								55		64	
			d	15								22		9	
2-39	31	29	a	13	-.29	-.29	.29	.07	.40	.43	56	12	+	12	-2.45
			*b	56								45		70	
			c	8								14		0	
			d	22								29		18	
2-40	58	30	*a	49	-.03	.18	-.05	.16	.36	.31	49	55	0	48	.78
			b	13								12		18	
			c	24								20		24	
			d	13								12		9	
2-41	52	31	a	6	-.08	.12	-.02	.10	.32	.57	63	4	0	15	.10
			b	0								0		0	
			*c	63								61		61	
			d	29								33		24	
2-42	69	32	a	11	-.04	-.16	.00	.02	.34	.59	55	10	0	15	.33
			b	19								22		15	
			c	14								14		18	
			*d	55								53		52	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
2-43	56	33	*a b c d	70 4 16 10	-.21	.05	.00	.29	.36	.49	70	71 6 16 6	0	73 3 21 3	-.04
2-44	47	34	a b c *d	2 1 11 86	-.14	.04	.11	.41	.46	.45	86	2 2 12 84	0	3 0 9 88	-.59
2-45	49	35	a b c *d	4 2 1 93	-.10	.06	.15	.13	.25	.26	93	8 2 0 90	0	0 0 3 97	-1.26
2-46	53	36	a b *c d	21 4 71 4	.09	.21	-.03	.07	.26	.61	71	24 2 69 4	0	27 3 70 0	.05
2-47	36	37	a b c *d	13 12 10 66	.06	.18	-.11	.33	.30	.53	66	4 12 14 69	0	21 12 6 61	.68
2-48	10	38	*a b c d	85 1 4 9	-.08	.02	-.02	.13	.43	.47	85	88 0 2 8	0	85 0 3 9	.30
2-49	59	39	a b *c d	42 5 48 4	-.09	-.05	.07	.45	.23	.33	48	39 8 49 4	0	39 3 52 6	-.04
2-50	38	40	a *b c d	19 62 17 3	-.02	-.03	.02	.28	.31	.48	62	20 61 18 0	0	21 64 9 6	-.36

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	p Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
2-51	26	41	a b *c d	4 16 52 27	-.15	-.04	.11	.16	.25	.56	52	6 12 45 35	0	3 27 58 12	-1.13
2-52	40	42	a *b c d	4 71 6 18	-.17	-.09	-.17	.22	.36	.45	71	0 76 6 18	0	6 70 6 15	.91
2-53	27	43	a *b c d	40 38 12 8	.11	-.00	.03	.05	.26	.30	38	39 37 14 8	0	42 42 6 6	-.56
2-54	68	44	a *b c d	4 25 51 18	-.08	.09	.11	.50	.33	.45	51	2 31 45 20	0	6 21 55 15	-.86
2-55	46	45	*a b c d	63 5 21 9	-.16	-.09	-.03	.21	.43	.68	63	69 4 16 8	0	70 9 15 3	.25
2-56	62	46	a b *c d	14 6 76 2	-.14	.01	.12	-.02	.27	.25	76	20 4 71 2	0	6 12 79 0	-.85
2-57	64	47	a *b c d	35 39 21 4	-.22	.01	-.01	.21	.33	.44	39	35 45 12 6	0	30 48 18 0	-.15
2-58	30	48	a *b c d	23 37 3 29	-.18	.15	.23	-.10	.23	.37	37	27 24 14 33	+	21 48 0 27	-2.38
2-59	29	49	a *b c d	31 35 11 17	-.05	-.20	.05	.19	.28	.46	35	41 29 12 12	0	24 39 9 24	-1.31

Appendix C-3. Statistics, Test 3.

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
3-11	M1	1	*a	94	.08	-.03	.10	.11	.27	.36	94	93	0	96	-.61
			b	2								0		0	
			c	1								0		4	
			d	3								7		0	
3-12	M2	2	*a	73	-.06	-.04	.01	.05	.25	.56	73	71	0	75	-.30
			b	10								10		11	
			c	7								7		11	
			d	9								12		4	
3-13	90	3	a	9	-.06	.06	-.01	-.13	.08	.19	28	10	0	14	-.56
			b	7								12		7	
			*c	28								27		32	
			d	55								49		46	
3-14	80	4	a	4	.12	-.31	.16	.18	.30	.35	70	2	0	4	-1.61
			b	13								12		7	
			c	11								17		7	
			*d	70								63		82	
3-15	84	5	*a	41	-.05	.26	.17	.13	.16	.17	41	32	+	64	-2.63
			b	0								0		0	
			c	52								54		36	
			d	6								15		0	
3-16	201	6	*a	33	.13	-.03	.07	-.14	.03	.13	33	17	0	39	-1.19
			b	3								0		7	
			c	28								29		25	
			d	36								44		29	
3-17	196	7	a	9	-.18	.11	.00	.08	.23	.16	80	2	0	11	-.24
			b	1								0		4	
			c	7								12		0	
			*d	80								83		86	
3-18	82	8	a	15	-.00	-.08	.09	-.27	.27	.30	16	15	0	7	-.42
			*b	16								15		21	
			c	31								29		32	
			d	38								41		39	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
3-19	193	9	a	3	-.04	-.21	.09	-.13	.19	.39	53	2	0	4	-.75
			b	11								5		14	
			c	33								39		21	
			*d	53								54		61	
3-20	195	10	a	53	-.05	-.21	.01	-.04	.14	.40	27	68	0	32	.81
			*b	27								27		25	
			c	1								0		0	
			d	19								5		43	
3-21	83	11	*a	32	.10	-.13	.16	-.28	.21	.29	32	20	+	46	-2.58
			b	2								0		7	
			c	44								46		43	
			d	22								34		4	
3-22	198	12	a	14	.13	-.17	.09	.19	.37	.40	79	17	0	11	-.72
			b	3								0		4	
			c	5								5		0	
			*d	79								78		86	
3-23	187	13	*a	10	.00	-.12	-.04	.13	.17	.48	10	12	0	11	.13
			b	18								12		32	
			c	36								37		32	
			d	33								39		25	
3-24	93	14	a	28	-.03	-.37	.24	-.04	.42	.64	36	24	+	25	-2.63
			b	12								5		11	
			*c	36								32		61	
			d	21								37		4	
3-25	184	15	a	4	.12	-.16	.00	.21	.23	.16	36	2	0	7	-.44
			*b	36								32		36	
			c	31								37		29	
			d	30								29		29	
3-26	189	16	*a	61	.06	-.21	.09	-.15	.26	.52	61	51	0	71	-1.57
			b	20								32		14	
			c	16								17		14	
			d	3								0		0	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
3-27	73	17	a	36	.14	-.14	.33	.00	.21	.58	11	37	+	36	-2.73
			b	29								41		18	
			c	23								17		25	
			*d	11								2		21	
3-28	87	18	a	36	-.06	.17	-.18	.14	-.13	.40	31	32	0	46	1.04
			b	20								22		21	
			c	11								10		7	
			*d	31								34		25	
3-29	183	19	a	28	.12	-.11	.15	.22	.17	.22	31	27	0	32	-1.55
			b	12								20		11	
			c	29								37		21	
			*d	31								17		36	
3-30	194	20	a	7	.03	-.02	-.11	.17	.30	.49	55	7	0	11	1.43
			*b	55								59		43	
			c	10								12		14	
			d	27								22		32	
3-31	94	21	a	0	-.03	-.08	.04	-.02	.29	.26	63	0	0	0	-.35
			b	21								22		25	
			*c	63								59		64	
			d	17								20		11	
3-32	91	22	a	51	.04	.15	-.18	-.20	.03	.25	26	37	0	71	1.60
			b	14								17		4	
			c	8								10		7	
			*d	26								37		18	
3-33	190	23	a	4	.11	-.15	.14	-.19	.37	.40	83	2	+	4	-1.81
			b	0								0		0	
			c	12								20		4	
			*d	83								76		93	
3-34	75	24	a	21	-.05	-.13	.08	.12	.22	.19	49	17	0	32	-.24
			*b	49								49		50	
			c	14								12		7	
			d	15								22		11	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
3-35	200	25	*a	68	-.07	.05	.07	.03	.32	.45	68	68	0	71	-.18
			b	6								2		0	
			c	6								5		7	
			d	20								22		21	
3-36	197	26	a	10	.05	-.08	-.05	-.10	.40	.35	79	15	0	4	-.10
			*b	79								80		82	
			c	3								0		7	
			d	7								5		7	
3-37	95	27	*a	20	.06	-.16	.24	-.06	.32	.15	20	12	+	36	-2.49
			b	24								22		14	
			c	13								27		21	
			d	33								37		29	
3-38	186	28	a	4	.01	-.17	.19	-.14	.26	.38	53	2	+	0	-2.88
			b	34								44		18	
			c	8								10		7	
			*d	53								44		75	
3-39	185	29	*a	27	-.01	-.13	.06	.06	.17	.35	27	37	0	36	-.03
			b	21								29		18	
			c	50								34		43	
			d	1								0		0	
3-40	202	30	a	4	-.03	-.31	.23	.12	.51	32	68	7	+	4	-2.62
			*b	68								51		82	
			c	22								32		11	
			d	5								10		0	
3-41	191	31	a	1	.10	-.29	.19	.28	.34	.24	50	0	+	4	-1.85
			*b	50								44		64	
			c	3								5		0	
			d	45								51		29	
3-42	88	32	*a	49	-.11	-.01	-.04	-.09	.11	.23	49	56	0	43	.93
			b	7								5		4	
			c	5								2		0	
			d	40								37		54	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
3-43	76	33	*a	40	.06	-.43	.42	.12	.52	.23	40	24	+	71	-4.56
			b	36								46		11	
			c	20								22		14	
			d	2								2		0	
3-44	92	34	a	8	-.09	-.41	.22	-.01	.48	.50	41	10	+	4	-1.98
			*b	41								32		57	
			c	22								32		11	
			d	26								24		25	
3-45	77	35	a	4	-.06	-.15	.00	.00	.23	.10	31	7	0	0	-.13
			b	13								7		25	
			*c	31								32		36	
			d	50								51		36	
3-46	203	36	a	44	.01	.06	.00	.15	.06	.14	38	44	0	54	.16
			b	3								2		0	
			*c	38								39		36	
			d	12								12		7	
3-47	86	37	*a	36	.04	-.29	.27	-.19	.37	.54	36	24	+	54	-2.38
			b	4								5		4	
			c	22								32		7	
			d	36								39		32	
3-48	78	38	a	10	.09	.12	.02	.09	.27	.35	76	5	0	11	.37
			b	8								10		7	
			*c	76								78		75	
			d	5								7		4	
3-49	71	39	*a	26	.04	-.45	.21	.07	.24	.55	26	20	+	43	-2.25
			b	9								7		4	
			c	41								34		36	
			d	23								39		18	
3-50	89	40	*a	19	-.05	-.29	.20	.13	.15	.03	19	15	+	32	-1.83
			b	30								44		18	
			c	25								17		32	
			d	22								20		14	
3-51	85	41	a	11	-.14	-.25	.05	.24	.13	.25	64	10	0	11	-.17
			*b	64								68		68	
			c	9								5		11	
			d	16								17		11	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
3-52	204	42	*a	42	.07	-.24	.19	.04	.37	.45	42	37	+	61	-1.85
			b	9								15		4	
			c	16								15		14	
			d	32								34		18	
3-53	199	43	a	35	-.11	-.10	.10	.14	.21	.08	53	44	0	32	-1.03
			b	6								7		4	
			*c	53								46		57	
			d	7								2		7	
3-54	188	44	a	5	.11	-.01	-.03	.30	.38	.30	86	5	0	7	.20
			b	6								7		4	
			c	2								2		0	
			*d	86								85		86	
3-55	70	43	a	9	.03	-.09	.16	.13	.26	.18	55	10	0	11	-1.17
			b	14								15		4	
			*c	55								56		71	
			d	21								20		14	
3-56	81	46	a	11	.11	-.33	.17	-.04	.37	.25	51	15	0	7	-1.34
			b	17								15		14	
			*c	51								46		64	
			d	18								22		14	
3-57	72	47	a	10	.06	-.26	.13	.24	.34	.09	56	12	+	7	-1.70
			b	16								12		7	
			*c	56								54		75	
			d	17								22		11	
3-58	192	48	a	3	-.12	-.05	.06	.21	.22	.37	69	5	0	0	-.29
			*b	69								71		75	
			c	21								20		18	
			d	6								5		4	
3-59	74	49	a	10	.04	.05	-.01	.16	.17	.17	68	7	0	7	-.38
			*b	68								66		68	
			c	18								27		14	
			d	2								0		7	
3-60	79	50	a	25	-.15	.37	.12	.38	.30	.56	27	20	0	14	-1.11
			*b	27								24		39	
			c	2								2		4	
			d	40								49		39	

Appendix C-4. Statistics, Test 4.

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (3) Low (6-9)	Discriminates	Resp. Distribution (6) High (15-30)	T Statistic
4-11	M1	1	*a b c d	94 1 0 6	-.03	-.04	-.04	.18	.14	.44	94	92 0 0 8	0	93 0 0 7	-.16
4-12	M2	2	*a b c d	80 10 3 7	-.04	-.00	-.14	.16	.17	.51	80	82 5 5 8	0	72 14 3 10	1.17
4-13	141	3	a *b c d	2 93 5 1	-.00	.07	.05	.07	.23	.21	93	3 92 5 0	0	3 90 3 3	.33
4-14	152	4	a b *c d	23 4 65 8	.03	.07	-.06	-.15	.03	.54	65	21 3 72 5	0	17 3 66 14	.45
4-15	153	5	a *b c d	2 89 6 3	.07	.06	.12	-.00	.26	.21	89	0 90 8 3	0	0 100 0 0	-1.09
4-16	165	6	*a b c d	69 3 14 13	.16	-.20	.12	-.28	.48	.39	69	56 3 26 15	0	76 3 7 10	-1.45
4-17	171	7	a *b c d	2 21 22 55	-.02	-.20	-.06	.07	.15	.73	21	3 18 23 56	0	0 21 14 66	-.21
4-18	142	8	*a b c d	58 8 7 26	.13	-.08	.03	-.00	.25	.70	58	59 10 5 26	0	59 3 10 28	.19

Test-Item	282 Number	Computer Number	*Correct Answer	Resp Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
4-19	156	9	a	13	-.03	.06	-.12	.01	.10	.45	77	8	0	14	1.14
			b	7								5		7	
			*c	77								85		72	
			d	3								3		7	
4-20	174	10	a	0	.20	.05	-.00	.21	.16	.21	87	0	0	0	.06
			b	1								0		0	
			c	12								13		14	
			*d	87								87		86	
4-21	162	11	a	5	.10	-.28	.09	.03	.35	.32	84	8	0	0	-1.17
			b	6								8		7	
			*c	84								79		90	
			d	5								5		3	
4-22	176	12	a	5	-.05	-.01	-.04	.23	.33	.64	69	5	0	0	-.68
			*b	69								69		69	
			c	5								3		7	
			d	21								23		21	
4-23	173	13	a	23	.08	-.17	.17	-.09	.40	.46	51	36	0	17	-1.41
			*b	16								10		10	
			c	51								46		66	
			d	10								8		7	
4-24	135	14	*a	72	-.04	-.09	.08	-.25	.29	.31	72	74	0	76	.94
			b	9								3		14	
			c	16								23		7	
			d	3								0		3	
4-25	154	15	a	6	.07	-.35	.12	-.07	.47	.49	70	0	0	7	-1.34
			*b	73								69		83	
			c	4								3		3	
			d	17								26		3	
4-26	172	16	a	28	-.15	.03	-.08	.15	.27	.70	47	26	0	38	1.13
			b	22								18		21	
			*c	47								54		38	
			d	3								3		3	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
4-27	179	17	a	43	.03	-.14	-.16	.10	.21	.60	55	38	0	59	1.34
			b	1								3		0	
			c	0								0		0	
			*d	55								56		41	
4-28	136	18	*a	45	.10	-.01	.02	-.22	.23	.14	45	44	0	45	-.25
			b	2								3		0	
			c	47								44		52	
			d	6								8		3	
4-29	157	19	a	6	.06	-.09	.06	.27	.36	.54	90	5	0	0	-1.09
			*b	90								90		97	
			c	3								5		3	
			d	0								0		0	
4-30	140	20	*a	56	.12	-.34	.30	-.25	.38	.30	56	44	+	83	-3.61
			b	19								26		7	
			c	9								10		3	
			d	16								21		7	
4-31	167	21	a	35	.01	.03	.03	-.19	-.06	.30	12	31	0	28	.03
			*b	12								10		7	
			c	35								41		38	
			d	17								15		28	
4-32	148	22	a	24	.06	-.06	.12	.02	.22	.45	53	26	0	24	-.57
			*b	53								56		62	
			c	10								5		3	
			d	13								13		10	
4-33	160	23	a	9	-.03	-.44	.28	-.06	.36	.44	67	13	+	7	-4.01
			*b	67								44		86	
			c	18								36		3	
			d	5								5		3	
4-34	180	24	a	1	.20	-.00	.14	-.00	.17	.56	80	0	+	0	-1.88
			b	16								26		10	
			*c	80								72		90	
			d	3								3		0	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	p Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
4-35	151	25	a b *c d	33 28 28 11	-.05	-.18	.15	-.26	.22	.41	28	54 21 21 5	+	21 31 41 7	-2.07
4-36	181	26	a *b c d	4 55 15 27	.06	-.14	.29	-.20	.23	.34	55	8 41 15 36	+	0 72 7 21	-2.78
4-37	149	27	a *b c d	4 48 12 37	.06	.08	-.14	.20	.23	.50	48	0 56 13 31	0	3 38 17 41	1.63
4-38	144	28	*a b c d	78 13 1 6	.03	-.00	.11	-.02	.45	.31	78	77 15 3 3	0	86 0 0 14	-1.01
4-39	161	29	a b *c d	34 12 47 6	.14	-.12	.14	.03	.38	.52	47	36 26 31 8	+	34 3 55 7	-2.20
4-40	164	30	a *b c d	6 78 4 11	.11	-.14	.17	.07	.32	.40	78	3 77 8 10	0	3 90 0 7	-1.42
4-41	145	31	a b *c d	11 24 31 34	.05	.01	.04	-.16	.20	.47	31	23 21 26 31	0	3 31 41 24	-1.26
4-42	143	32	a b c *d	3 2 7 88	-.11	.14	-.08	.12	.14	.16	88	3 0 5 92	0	3 0 10 86	.76

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
4-43	155	33	*a	49	.15	-.30	.07	-.19	.38	.44	49	51	0	62	-.99
			b	16								5		21	
			c	13								21		10	
			d	20								21		3	
4-44	169	34	a	22	-.01	-.10	.12	-.17	.29	.37	68	28	0	17	-.80
			*b	68								64		76	
			c	3								3		3	
			d	6								5		3	
4-45	170	35	a	27	-.15	-.05	-.08	.05	-.04	.38	41	18	-	34	3.62
			b	7								8		3	
			*c	41								41		34	
			d	25								33		28	
4-46	146	36	a	17	.22	-.17	.28	.17	.29	.3½	48	28	+	10	-3.19
			*b	48								33		72	
			c	29								33		14	
			d	6								5		3	
4-47	168	37	a	62	.02	-.20	-.07	-.05	.18	.68	21	56	0	76	1.34
			b	11								10		3	
			c	6								3		3	
			*d	21								31		17	
4-48	163	38	a	28	.31	-.32	.10	-.12	.38	.59	46	33	0	24	-1.07
			*b	46								44		55	
			c	5								5		3	
			d	20								18		17	
4-49	178	39	a	23	-.07	.12	-.19	.19	.08	.66	53	18	0	38	1.41
			b	5								5		7	
			c	17								21		14	
			*d	53								54		38	
4-50	175	40	a	1	-.09	.10	.09	.22	.14	.63	72	0	0	0	-.88
			b	6								8		3	
			*c	72								74		83	
			d	21								18		14	
4-51	159	41	a	4	.10	.05	.12	.11	.30	.45	55	0	0	7	-.72
			b	22								21		10	
			c	19								18		10	
			*d	55								62		72	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	p Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
4-52	147	42	a	2	.08	-.04	.07	.06	.41	.08	92	5	0	0	-.83
			b	3								5		0	
			c	4								3		7	
			*d	92								87		93	
4-53	137	43	a	24	-.00	-.28	.12	.14	.25	.34	28	33	+	21	-1.76
			*b	28								18		34	
			c	11								15		7	
			d	35								33		31	
4-54	177	44	*c	53	.02	-.01	.01	-.16	.36	.46	63	62	0	66	-.43
			b	2								5		0	
			c	11								10		10	
			d	21								21		21	
4-55	138	45	a	3	-.14	.16	-.06	.03	.21	.30	87	0	0	7	1.13
			b	3								0		7	
			c	6								8		0	
			*d	87								90		83	
4-56	139	46	a	6	-.03	.00	.15	.16	.13	.56	22	10	+	0	-2.08
			b	27								36		14	
			c	44								38		48	
			*d	22								13		34	
4-57	166	47	*a	48	.03	-.17	.14	-.09	.29	.23	48	44	0	55	-1.07
			b	14								13		24	
			c	5								5		7	
			d	33								38		10	
4-58	150	48	a	6	-.16	.09	-.01	.03	.16	.12	80	8	0	10	-.54
			*b	80								74		79	
			c	6								8		7	
			d	6								10		0	
4-59	182	49	a	4	.04	-.14	.04	-.13	.25	.25	57	8	0	0	-.71
			b	8								8		10	
			*c	57								51		59	
			d	26								31		21	
4-60	158	50	a	6	.08	-.32	.12	-.14	.43	.38	67	15	+	3	-1.76
			b	8								8		3	
			*c	67								56		76	
			d	11								15		10	

Appendix C-5. Statistics, Test 5.

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	p Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
5-11	M1	1	*a	97	.03	.17	.07	-.07	40	.49	97	97	0	100	.00
			b	1								0		0	
			c	1								0		0	
			d	1								3		0	
5-12	M2	2	*a	76	-.04	.18	-.14	-.08	.29	.47	76	79	0	66	1.27
			b	8								5		16	
			c	11								13		13	
			d	5								3		5	
5-13	205	3	a	4	-.13	.10	.06	.06	.33	.48	90	0	0	3	.45
			b	3								3		3	
			*c	90								95		92	
			d	4								3		3	
5-14	242	4	a	50	-.04	-.28	.19	.03	.32	.57	37	53	0	45	-1.16
			b	5								5		3	
			c	8								8		5	
			*d	37								34		47	
5-15	206	5	a	0	.04	-.02	.04	.14	.14	.24	90	0	0	0	-.35
			*b	90								87		89	
			c	3								0		3	
			d	7								13		8	
5-16	207	6	a	5	-.02	.10	-.10	.16	.30	41	90	3	0	5	1.05
			b	2								3		3	
			*c	90								92		84	
			d	4								3		8	
5-17	208	7	*a	87	-.05	-.05	-.10	.02	.27	.46	87	95	0	84	1.49
			b	1								0		0	
			c	9								5		8	
			d	3								0		8	
5-18	243	8	a	3	.04	-.01	-.00	-.00	.17	.42	81	5	0	0	.90
			b	2								0		0	
			*c	81								87		79	
			d	15								8		21	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
5-19	214	9	a	12	-.08	-.27	.07	-.00	.14	.38	31	24	0	0	-.48
			*b	29								26		29	
			*c	31								29		34	
			d	29								21		37	
5-20	244	10	*a	21	-.03	.01	-.05	.01	.23	.09	21	24	0	18	.55
			b	40								39		45	
			c	18								21		16	
			d	21								16		21	
5-21	224	11	a	2	.07	-.04	-.07	-.05	.21	.52	45	0	0	3	.68
			*b	45								50		42	
			c	15								16		13	
			d	38								34		42	
5-22	210	12	*a	82	-.04	.03	-.11	-.04	.31	.40	82	84	0	79	.58
			b	10								8		13	
			c	6								5		5	
			d	2								3		3	
5-23	229	13	a	1	-.10	.03	.02	-.20	.32	.45	71	0	0	3	.00
			b	5								0		0	
			*c	71								76		76	
			d	22								24		21	
5-24	231	14	a	21	-.08	.01	.05	-.05	.36	.39	74	21	0	16	-.27
			*b	74								76		79	
			c	4								3		5	
			d	1								0		0	
5-25	211	15	*a	56	.07	-.00	.00	.03	.33	.44	56	53	0	58	-.45
			b	19								21		16	
			c	13								18		11	
			d	12								8		16	
5-26	234	16	a	2	.07	.07	-.07	-.09	.29	.46	91	0	0	3	1.38
			b	1								0		0	
			c	6								3		8	
			*d	91								97		89	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
5-27	219	17	a	5	-.13	-.16	.04	-.09	.24	.63	82	0	0	8	-.58
			*b	82								79		84	
			c	2								5		0	
			d	10								16		5	
5-28	237	18	a	11	-.15	.17	-.10	.21	.26	.51	59	8	0	11	.70
			*b	59								66		58	
			c	24								21		26	
			d	5								5		3	
5-29	226	19	*a	74	-.12	.18	-.11	-.01	.00	.41	74	79	0	68	1.03
			b	14								11		21	
			c	9								11		8	
			d	3								0		3	
5-30	225	20	*a	50	-.00	-.17	-.07	-.08	.31	.51	50	55	0	45	.91
			b	5								5		5	
			c	7								3		13	
			d	38								37		37	
5-31	220	21	a	1	-.15	.01	.03	.04	.31	.41	85	0	0	0	.35
			b	5								3		5	
			c	8								8		5	
			*d	85								89		87	
5-32	209	22	a	0	.03	.15	-.05	-.14	.42	.30	93	0	0	0	1.02
			*b	93								97		92	
			c	6								0		5	
			d	2								3		3	
5-33	235	23	a	2	.07	.04	.04	-.1	.38	.40	94	5	0	0	-.45
			b	2								0		3	
			*c	94								92		95	
			d	3								3		3	
5-34	227	24	a	1	-.13	.03	-.06	-.04	.32	.45	79	0	0	3	.86
			*b	79								84		76	
			c	12								8		11	
			d	8								8		11	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	p Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
5-35	217	25	*a	63	.07	-.02	-.22	-.06	.40	.32	63	71	-	50	1.89
			b	5								0		11	
			c	25								24		29	
			d	6								5		11	
5-36	240	26	a	17	.01	.04	-.19	.01	.35	.42	47	11	0	24	1.38
			b	25								24		32	
			c	10								13		5	
			*d	47								53		37	
5-37	241	27	a	13	-.12	.05	.06	.02	.09	.26	74	11	0	13	.00
			* b	74								76		76	
			c	1								5		3	
			d	9								8		8	
5-38	221	28	a	71	.17	-.15	-.09	.12	-.26	.17	7	68	0	71	1.02
			b	2								0		3	
			c	19								24		24	
			*d	7								8		3	
5-39	213	29	a	14	.13	-.33	.04	.22	.41	.42	53	18	0	8	-1.37
			b	19								21		16	
			c	14								16		16	
			*d	53								45		61	
5-40	246	30	a	16	-.02	.25	-.11	.06	.26	.70	81	8	-	21	1.90
			b	3								0		3	
			*c	81								92		76	
			d	0								0		0	
5-41	238	31	a	22	-.14	.20	-.19	.33	.31	.62	73	16	-	29	2.36
			b	0								0		0	
			*c	73								84		61	
			d	4								0		8	
5-42	222	32	*a	25	-.02	-.03	-.02	-.11	-.09	.10	25	26	0	26	.00
			b	62								66		55	
			c	6								5		3	
			d	7								3		16	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
5-43	247	33	a b c *d	20 11 9 59	.20	.02	-.03	.00	.18	.48	59	24 4 8 63	0	24 8 11 58	.46
5-44	239	34	a *b c d	21 5 69 4	-.14	.03	.07	.09	.36	.22	69	34 3 63 0	0	16 0 76 5	-1.24
5-45	218	35	a *b c d	3 82 6 8	-.13	.08	-.23	.24	.44	.34	82	5 89 0 5	0	0 76 11 11	1.52
5-46	236	36	*a b c d	58 19 3 19	.14	-.23	.09	.14	.29	.75	58	58 26 0 16	0	66 11 3 18	-.70
5-47	248	37	a *b c d	27 30 30 12	.01	-.13	-.05	-.02	.21	.52	30	24 32 26 18	0	21 32 34 11	.00
5-48	232	38	a b c *d	21 12 19 47	.01	.11	-.09	.15	.13	.44	47	26 13 21 39	0	18 13 21 45	-.46
5-49	230	39	a *b c d	14 64 19 2	-.01	-.01	-.04	.24	.41	.67	64	16 61 24 0	0	16 58 21 3	.23
5-50	249	40	a b *c d	0 12 81 6	-.05	-.06	-.01	.18	.43	.43	81	0 13 82 5	0	0 5 84 8	-.30

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Rliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
5-51	223	41	a	8	.10	-.02	-.05	.23	.20	.39	48	5	0	13	.45
			*b	48								50		45	
			c	2								0		5	
			d	38								42		32	
5-52	215	42	*a	63	-.17	.05	-.05	.22	.39	.56	63	66	0	61	.47
			b	12								16		8	
			c	15								11		18	
			d	6								5		5	
5-53	233	43	a	2	.03	-.14	-.05	.25	.20	.45	59	5	0	0	.46
			b	28								29		26	
			*c	59								63		58	
			d	6								0		8	
5-54	212	44	a	20	-.19	.22	-.11	.26	.40	.66	49	24	0	18	.68
			b	23								26		29	
			c	2								0		5	
			*d	49								47		39	
5-55	216	45	*a	69	-.22	.07	-.11	.25	.47	.68	69	74	0	66	.74
			b	6								3		11	
			c	6								8		11	
			d	13								13		8	
5-56	228	46	a	19	-.04	-.13	.09	.22	.33	.37	46	5	0	24	-.68
			b	22								39		8	
			c	7								8		8	
			*d	46								45		53	
5-57	245	47	a	2	.00	-.06	-.03	.10	.33	.47	82	0	0	5	.30
			b	7								8		8	
			*c	82								84		82	
			d	4								5		0	

Appendix C-6. Statistics, Test 6.

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
6-11	M1	1	*a b c d	93 1 1 5	.12	-.08	-.02	.20	.19	.49	93	91 2 0 7	0	92	-.45
6-12	M2	2	*a b c d	66 19 7 7	-.22	.01	-.09	-.09	.23	.52	66	62 16 13 9	0	66 26 3 5	-.05
6-13	103	3	a b c *d	58 17 10 58	-.02	.17	-.02	.09	.40	.34	58	18 16 13 53	0	13 24 8 55	-.08
6-14	282	4	a *b c d	54 27 15 4	.13	.05	-.01	.09	.09	.21	27	49 33 13 4	0	50 32 16 3	.10
6-15	124	5	a b c *d	14 15 2 68	-.10	-.11	.15	-.02	.38	.38	68	24 20 0 53	+	8 8 5 76	-1.91
6-16	276	6	a b *c d	27 3 60 10	.09	.17	-.00	-.17	.14	.45	60	31 4 56 9	0	32 3 61 5	-.56
6-17	113	7	a b c *d	3 19 30 46	.10	-.07	.26	-.06	.29	.42	46	2 13 47 36	+	3 18 8 68	-3.21
6-18	280	8	a b *c d	17 46 27 8	-.14	-.03	.00	.30	.28	.30	27	24 42 27 4	0	16 42 32 11	-.32

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
6-19	134	9	*a b c d	71 3 13 11	.05	.27	-.19	.04	.30	.49	71	80 2 7 9	-	63 3 18 13	2.04
6-20	107	10	*a b c d	91 1 4 5	-.03	-.01	.11	.17	.42	.17	91	84 2 7 7	0	95 0 3 3	-1.46
6-21	120	11	a b *c d	15 41 38 6	.00	-.14	.18	.20	.15	.58	38	22 40 31 7	0	8 37 45 11	-1.57
6-22	127	12	a *b c d	6 68 2 24	.02	-.03	.03	.03	.11	.40	68	9 62 2 27	0	3 71 3 24	-.56
6-23	281	13	*a b c d	95 1 1 3	.07	.22	-.10	.03	.19	.48	95	96 0 0 4	0	95 0 3 3	-.19
6-24	131	14	a *b c d	21 26 19 34	-.09	.03	-.04	.04	.09	.59	26	22 24 20 33	0	21 24 18 37	.02
6-25	272	15	*a b c d	86 3 11 0	.07	-.03	.00	.09	.23	.53	86	87 2 11 0	0	92 0 8 0	-.75
6-26	275	16	a b *c d	27 5 65 2	.05	.03	-.08	.02	.32	.46	65	24 7 67 2	0	12 5 61 3	.86

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	p Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
6-27	110	17	a	6	-.10	-.01	.01	-.16	.22	.34	89	9	0	5	-.75
			*b	89								87		92	
			c	4								4		3	
			d	1								0		0	
6-28	130	18	*a	54	.07	.15	.10	-.03	.18	.75	54	49	0	58	-.71
			b	8								4		16	
			c	35								42		21	
			d	3								2		5	
6-29	122	19	a	52	.10	-.10	.15	-.09	.10	.39	42	58	+	39	-1.93
			b	3								0		3	
			*c	42								38		58	
			d	3								4		0	
6-30	112	20	a	2	.16	.09	-.06	-.14	.25	.37	84	2	0	0	-.13
			b	4								4		5	
			c	10								11		11	
			*d	84								82		82	
6-31	123	21	*a	64	.15	-.13	.09	.13	.21	.30	64	67	0	68	-.31
			b	3								2		5	
			c	24								22		21	
			d	9								9		3	
6-32	132	22	a	15	.03	.19	-.22	.10	.20	.38	73	9	-	21	2.04
			b	6								7		8	
			*c	73								80		63	
			d	5								4		8	
6-33	273	23	a	5	.03	-.01	.10	-.09	.20	.16	91	9	0	0	-1.46
			b	3								2		5	
			*c	91								84		95	
			d	2								4		0	
6-34	114	24	a	5	-.03	-.15	.14	-.09	.19	.60	41	7	0	5	-.71
			b	40								42		37	
			*c	41								36		45	
			d	13								13		13	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
6-35	279	25	a *c d	9 6 71 14	-.06	-.01	.00	.04	.40	.58	71	4 7 67 22	0	16 8 68 8	-.09
6-36	268	26	a *b c d	22 52 10 30	-.02	-.12	.20	.03	.13	.46	32	24 27 9 31	0	21 39 13 24	-1.30
6-37	269	27	*a b c d	26 41 23 10	.01	.16	-.14	-.05	-.12	.40	26	31 56 11 2	0	18 42 18 21	1.26
6-38	116	28	a b *c d	30 13 25 31	.04	.01	-.25	-.02	.22	.33	25	31 11 36 20	-	29 18 13 39	2.53
6-39	105	29	a b c *d	16 7 15 61	.12	.00	-.01	.11	.34	.46	61	24 7 11 58	0	11 8 26 55	.31
6-40	125	30	a *b c d	23 49 6 20	-.01	-.13	.07	.04	.16	.38	49	27 47 4 20	0	11 58 8 21	-1.11
6-41	274	31	a b c d	14 9 72 5	-.04	-.03	.19	.03	.19	.42	72	18 9 64 9	0	8 11 76 5	-1.30
6-42	270	32	a b *c d	4 1 89 3	.05	.05	.11	.16	.32	.30	87	9 11 78 2	+	0 5 95 0	-1.95

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest R.liability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
6-43	271	33	a	5	.07	-.11	.07	.18	.46	.27	84	7	0	5	-.13
			b	8								9		11	
			c	4								4		3	
			*d	84								80		82	
6-44	102	34	a	14	.07	-.01	.01	.20	.49	.42	67	20	0	11	.36
			*b	67								69		66	
			c	13								7		13	
			d	5								4		11	
6-45	277	35	a	12	-.05	-.12	.05	.23	-.03	.25	24	16	0	13	.02
			*b	24								24		24	
			c	41								38		50	
			d	23								22		11	
6-46	128	36	a	22	-.05	.19	-.11	.14	.18	.55	32	24	-	24	1.79
			*b	32								36		21	
			c	31								27		38	
			d	14								13		13	
6-47	108	37	a	11	-.06	.03	-.09	.02	.39	.40	78	16	0	11	.75
			b	4								2		5	
			*c	78								78		71	
			d	6								4		11	
6-48	103	38	*a	90	-.01	.21	-.23	-.00	.49	.49	90	96	-	82	2.59
			b	5								2		11	
			c	4								2		5	
			d	0								0		0	
6-49	121	39	a	30	-.17	.07	.17	.27	.12	.43	32	27	0	42	1.38
			b	13								13		11	
			*c	32								33		21	
			d	25								27		26	
6-50	109	40	a	23	.06	.06	.21	.06	.28	.14	55	33	+	8	-1.91
			b	8								9		5	
			*c	55								44		68	
			d	15								13		18	
6-51	117	41	a	12	-.12	.03	-.03	.29	.43	.36	75	18	0	11	.68
			*b	75								71		71	
			c	7								4		11	
			d	5								7		8	

Test-Item	282 Number	Computer Number	*Correct Answer	Response Distribution (%)	r Age	r Sex	r N Dep Var	r Achievement Score	r Total Score	Test-Retest Reliability (r)	P Value	Resp. Distribution (%) Low (6-9)	Discriminates	Resp. Distribution (%) High (15-30)	T Statistic
6-52	278	42	a	8	-.10	.11	.15	-.04	.43	.52	43	11	0	3	-1.03
			b	38								38		32	
			c	11								9		13	
			*d	43								42		53	
6-53	111	43	a	15	.03	.03	.02	.07	.35	.32	67	18	0	16	.36
			b	5								2		11	
			*c	67								69		66	
			d	12								11		8	
6-54	104	44	*a	72	.08	.05	-.06	.16	.44	.57	72	71	0	66	.80
			b	9								7		13	
			c	5								2		13	
			d	9								16		3	
6-55	115	45	a	9	-.15	.07	-.04	.28	.24	.42	52	9	0	13	.63
			*b	52								53		47	
			c	27								27		29	
			d	10								11		11	
6-56	126	46	a	15	-.02	-.07	-.01	.16	.33	.27	63	18	0	11	.43
			b	13								9		24	
			*c	63								62		61	
			d	9								11		5	
6-57	118	47	a	23	.01	-.16	-.01	.24	.34	.28	58	27	0	24	.32
			*b	58								62		61	
			c	6								0		8	
			d	13								11		8	
6-58	133	48	a	10	-.12	-.08	-.04	.10	.14	.27	39	11	0	11	.46
			b	6								2		8	
			*c	39								40		34	
			d	45								47		47	
6-59	119	49	a	22	.12	-.22	.19	-.04	.30	.48	61	36	+	11	-2.32
			*b	61								49		76	
			c	12								16		5	
			d	5								0		8	
6-60	129	50	a	49	.05	-.03	-.02	.17	.29	.54	33	49	0	50	1.03
			b	11								7		11	
			c	7								9		8	
			*d	33								36		26	

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