

EVALUATION OF PARALLEL FORMS OF A SOFTBALL  
INFORMATION TEST FOR HIGH SCHOOL GIRLS

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A THESIS  
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BY

LAVERNE SITTON, B.S.

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## PREFACE

The investigator gratefully acknowledges the invaluable aid and generous guidance of Doctor Mary Agnes Murphy, the director of this study.

Grateful acknowledgment is made, also, to the instructors and the pupils in each of the schools in which the data were collected. The expenditure of their time and effort made the study possible.

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## CHAPTER I

### INTRODUCTION

#### Orientation to the Study

Softball, unlike many other popular games of today which have a long history of play in this and other countries, has taken its place among the great sports in less than fifty years, with the greatest development coming during the last ten years. Absolute proof as to the inventor and location of the original game is not available. Perhaps because softball evolved from humble variations of its parent game, baseball, there never was a time and place that softball was born; it just grew.

A game similar to softball adapted for play in gymnasiums was called indoor baseball. Credit for inventing the game (the first step in the evolution of softball) has been given to George W. Hancock, of the Farragut Boat Club. The following is a quotation from the Indoor Baseball Guide for 1906, published by the American Sports Publishing Company:

The game of indoor baseball was invented in Chicago in 1887. Members of the Farragut Boat Club had assembled in the gymnasium hall to spend the Thanksgiving afternoon. An old boxing glove was carelessly thrown around the room; then one of the boys took a broom and batted it back to the thrower. Suddenly, George W. Hancock exclaimed, "Say, boys, let's play ball." A lively game of "scrub" took place, the broom handle used for a bat and the unwieldy glove taking the place of a ball. It proved great fun and at its conclusion, Mr. Hancock gathered the members around him and unfolded a plan for the game which had occurred during the game of "scrub."

"I believe this affair can be worked into a regular game of baseball which can be played indoors and if you all will come Saturday night I'll make up some rules and have a

ball and bat which will suit the purpose of the game,"

And so, on the night of the announced game two teams were chosen and Mr. Hancock read the rules and presented the huge ball and small rubber-tipped bat to the gaze of the members. The contest was one of the funniest ever witnessed and members went away loud in their praises of Indoor Baseball, as the new sport was christened. The game was quickly transferred to the playground and here we place the origin of the name "Indoor-Outdoor Baseball."<sup>1</sup>

The game as it has been played today has been known as kitten ball, army ball, playground ball, and many other names.

There was so much confusion over names and rules for the game that in 1923, at the National Recreation Congress, Dr. Joseph Lee delegated a committee of men to standardize the rules of the game. This committee was known as the Playground Baseball Committee.

The Playground Baseball Committee was enlarged in 1933 to include representatives from other national organizations and was called the Joint Rules Committee on Softball. The Committee was composed of both men and women. At a Committee meeting in 1934, the decision was made to secure the publication of one set of rules. The Committee on Publications was appointed and the members secured the support of the principal sportsequipment manufacturers to agree to their proposal that any rules published for softball would be in accord with those published by the Joint Committee on Softball.

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<sup>1</sup>Arthur T. Noren, Softball (New York: A.S. Barnes and Co., 1940), pp. 7-8.

It is natural that as the range of sports in which girls and women participated became wider the American Physical Education Association through its Committee on Women's Athletics (now the National Section on Women's Athletics) would aid by establishing committees of experts to lend a guiding hand in the development of rules and practices governing these sports. By 1922 five committees were organized; basketball, field hockey, swimming, track and field, and soccer; and in 1925 baseball was added. In 1927 the Baseball Committee adopted the rules for girls and women which Miss Gladys Palmer had developed in 1926. The work of these Committees of the American Physical Education (now the American Association for Health, Physical Education, and Recreation) has been concerned primarily with making, revising, and interpreting rules. They are responsible for the Guides which are published for the various sports.

A survey conducted by the Baseball Committee of the American Association for Health, Physical Education, and Recreation in the spring of 1937 found that softball had become increasingly popular in schools and communities. The Committee decided to change the name of the Guide to Softball and adopt the rules set up by the Joint Rules Committee on Softball.

During the period from 1937 to 1943 clarifications, revisions, and uniform interpretations of the rules were made and published by the Softball Sub-Committee (formerly the

Baseball Committee). As a result the rules published in 1943, which have been authoritatively set forth as the official softball rules for girls and women, are to be official through 1947 or until further revisions are made.

With the widespread interest in softball came the need for competent officials. The purpose of the Women's National Officials Rating Committee of the National Section on Women's Athletics is to set up acceptable standards of officiating which will provide a better game situation for the players as well as well-trained officials for local games. Examinations for Softball Ratings are conducted by local boards which are affiliated with the Women's National Officials Rating Committee.

The examinations which the Committee administers are designed for mature people, and even many college-trained persons fail them. The interest in an information test suited to the ability of high school girls has become widespread.

Many requests have been made to the Women's National Officials Rating Committee to lower the passing mark on the theoretical examination or to develop a special examination for high school girls. The following is a quotation from the Minutes of the National Softball Committee Meeting held in 1941, and it is the form of a suggestion to the Women's National Officials Rating Committee: "The Committee felt that high school officiating should be encouraged and asked that a special theoretical examination be prepared that could be sent

to any high school teacher applying for it (not limited to localities having local boards)."

Three hundred and fifty high school girls' softball teams participated in the Texas University Interscholastic League in 1941. The officials of these games were men and women, most of whom held no official's rating of any kind.<sup>1</sup>

This does not take into consideration the thousands of boys and girls and men and women who play softball in vacant lots and parks all over the country. Softball as it is played today occupies an important position in the world of sports, and probably no organized team game excels it in terms of active participation.

#### Purposes of the Study

This study was undertaken in an effort to determine the need for, and to develop a softball information test suited to the ability of high school girls who are interested in becoming softball officials. In order to proceed with the study it was necessary:

1. To develop suggested methods for teaching the girls to learn the rules preparatory to taking the softball information test.
2. To construct parallel forms of the softball information test.

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<sup>1</sup>Personal correspondence between Dr. Mary Agnes Murphy and Mr. R.J. Kidd, Athletic Director, Texas University Interscholastic League.

### 3. To evaluate the tests statistically.

After a thorough study of methods and techniques of teaching had been made, the suggested methods for teaching the girls to learn the rules were developed.

Parallel forms of the softball information tests were developed and administered to 225 high school girls.

In evaluating the test statistically, the investigator checked the criteria of objectivity, validity, and reliability.

#### Limitations of the Study

This study has certain limitations, and the results of the tests should be interpreted with these limitations in mind.

First, the tests were confined to 225 high school girls in six schools of Texas.

Second, the girls selected the activity and were carefully trained preparatory to taking the tests.

Third, the tests are limited to information concerning softball rules and umpiring techniques.

#### Surveys of Previous Studies

A survey of available sources revealed no study which has been conducted previously to this one that could be considered identical with this investigation. However, the most relevant studies will be discussed briefly because they offer precedence for procedures employed in this study.

Schwartz<sup>1</sup> reported a study in 1937 on knowledge tests in girls' basketball. The validity of the test items was established by sending letters to fifty-four women who were authorities in basketball for high school girls. They were asked to criticize the tests severely and offer suggestions for improvement. To further validate the tests, the authorities had them administered to fifty freshman girls at the University of Southern California. The test contained fifty true-false, fifteen matching, twenty best-answer, and fifteen pictorial questions. The questions covered rules, team play, strategy, fundamental techniques, and position of players during game. The test was administered to one thousand girls. No report was made on the reliability of the test.

Snell<sup>2,3</sup> made a study which was reported in 1935. The project was developed by the Department of Physical Education for Women at the University of Minnesota, and includes tests in the following activities: archery, baseball, volleyball, basketball, field hockey, fundamentals, golf, riding, tennis, and soccer.

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<sup>1</sup>Helen Schwartz, "Knowledge and Achievement Tests in Girls' Basketball," American Association for Health, Physical Education, and Recreation Research Quarterly, VIII (1937), pp. 143, 156.

<sup>2</sup>Catherine Snell, "Physical Education Knowledge Tests," American Association for Health, Physical Education, and Recreation Research Quarterly, VI (1935), pp. 86-89.

<sup>3</sup>Ibid., VII (1936), pp. 73-82, 77-80, 84-87, 87-91.

Each test had forty-five questions of the multiple-choice type with reliabilities ranging from .51 to .85. They were constructed for college students and were validated by expert opinion.

Schleman<sup>1</sup> developed a written practical basketball test which was used in the Basketball Technique class for physical education majors at Ohio University. The test was used as a teaching device. Two teams played a game and the officials purposely missed calling some fouls and violations. Each foul or violation the officials failed to call was checked on a chart by the students.

Hewitt<sup>2</sup> published a tennis knowledge test in 1937. The test contained fifty-five true-false, fifteen multiple-choice, fifteen completion, and fifteen matching questions. The questions dealt with the history of tennis, equipment necessary, rules of the game, playing situation, and the actual fundamentals. The self-correlation corrected by the Spearman-Brown prophecy formula was .900, and for the entire test of 100 items the correlation was .947.

Scott<sup>3</sup> developed a written test for basketball officials which was reported in 1937. The test was in the form of a

<sup>1</sup>Helen B. Schleman, "Written Practical Basketball Officiating Test," Journal of Health and Physical Education, III (1932), p. 37.

<sup>2</sup>Jack E. Hewitt, "Comprehensive Tennis Knowledge Test," American Association for Health and Physical Education Research Quarterly, VIII, (1937), p. 74.

<sup>3</sup>M. Gladys Scott, "Written Test for Basketball Officials," Journal of Health and Physical Education, VIII (1937), pp. 41, 60.



chart. Students watched a game in progress and checked the correct decisions. The test was used as a teaching and testing device. The construction of the questions followed the general rules for developing objective tests.

Scott<sup>1,2</sup> reported a study in 1940-41 which was developed by the Research Committee of the Central Association of Physical Education for College Women. The study includes tests in swimming, badminton, and tennis. The individual test items were based on materials commonly taught in the college classes in the Central District. Items retained in the final test were based on the index of discrimination and a difficulty rating.

The most recent study reported was that by French<sup>3</sup> in 1943. This study was concerned with the construction of knowledge tests which would serve as a partial determiner of the technique requirements for women students majoring in physical education at the State University of Iowa. The following activities were included: badminton, basketball, body mechanics, canoeing, field hockey, folk dancing, golf, recreational sports, rhythms, soccer, softball, stunts and tumbling, tennis, track

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<sup>1</sup>Ibid., "Achievement Examinations for Elementary and Intermediate Swimming Classes," American Association for Health and Physical Education Research Quarterly, XI (1940), pp. 110-111.

<sup>2</sup>Ibid., "Achievement Examinations for Elementary and Intermediate Tennis Classes," American Association for Health and Physical Education Research Quarterly, XII (1941), pp. 40-49, 242-253.

<sup>3</sup>Esther French, "The Construction of Knowledge Tests in Selected Courses in Physical Education," American Association for Health and Physical Education Research Quarterly, XIV (1943), pp. 406-424.

and field, and volley ball.

Each test was weighted with items in proportion to the emphasis given in the technique course itself. Items were based on courses of study, reading assignments, mimeographed material distributed in class, and material from notebooks. The multiple-choice type item was used. After the items were constructed, they were critically evaluated.

The difficulty or percentage of incorrect responses of each item was obtained by dividing the number of errors by N. Item discrimination was determined by the formula  $\frac{Mr - Mw}{N}$ -- the difference in mean criterion score of those persons succeeding on a given item and of those failing to pass the item. The difficulty rating and the index of discrimination were used as guides in deciding which items to retain in the final forms of the tests.

Reliabilities were computed by the odd-even method and corrected to actual length by the Spearman-Brown prophecy formula. The reliabilities of the long forms ranged from .702 to .884. Reliabilities of the short tests ranged from .619 to .878.

These studies were valuable only as points of reference for the construction of the tests developed in this study. The investigator did not find similar tests developed for high school girls.

### The Investigation

Parallel forms of a Softball Information Test were developed for rating the information of softball rules and umpiring techniques of high school girls. The tests were administered to 225 high school girls in 6 Texas high schools. Suggested methods for teaching the girls to learn the rules preparatory to taking the tests were developed.

## CHAPTER II

### PROCEDURES IN TEST CONSTRUCTION AND ADMINISTRATION OF THE SOFTBALL INFORMATION TEST

The procedures followed in attempting to solve this problem consisted of the following steps: (1) definition of the objectives of the tests, (2) selection of material for the tests, (3) construction of tests, (4) preparation for and the administration of the tests, (5) development of the suggested methods for teaching the rules to the girls preparatory to taking the tests, (6) general treatment of data, (7) determination of objectivity, reliability, and validity.

The procedures will be discussed in each section according to those relating to: first, Form A of the Softball Information Test; second, Form B of the Softball Information Test.

#### Objectives of the Tests

1. To test the pupils' knowledge of softball rules.
2. To test the pupils' ability to interpret the softball rules.
3. To test the pupils' knowledge of the duties of an umpire.

#### Selection of Material for Tests

The material for the tests was selected from the Official Softball Volley Ball Guide published in 1943 for the National

Section on Women's Athletics of the American Association of Health, Physical Education, and Recreation. The two forms of the Softball Information Test were compiled from the 1943 edition. These forms will be up-to-date until 1947 or until the rules are revised. The items are based on the "Technique for the Woman Official in Softball," by Esther French,<sup>1</sup> and the "Official Softball Rules for Girls and Women."<sup>2</sup>

### Construction of the Tests

Parallel forms of the tests were constructed and are designated as Form A and Form B of the Softball Information Test. In the experimental edition of the tests, Form A contained 110 items and Form B contained 107.

The following criteria served as guides in the construction of the tests:

1. The items of the tests should adequately sample the material selected for the tests and should be expressed in a vocabulary easily understood by high school pupils.

2. The number of items must be limited in order that each girl taking the test might finish in one class period of fifty-five minutes.

3. Each item must be clear and concise so that high

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<sup>1</sup>Ibid., "Technique for the Woman Official in Softball," Official Softball Volleyball Guide, (A.S. Barnes and Company, 1943), pp. 52-56.

<sup>2</sup>"Official Softball Rules for Girls and Women," ibid., pp. 59-92.

school pupils may grasp the meaning.

4. Each item must have only one correct response or determinate that authorities agree is the correct response.

5. The tests should yield scores susceptible to objective calculation, statistical treatment and interpretation.

#### Types of Test Items

The types of items selected for the tests were the multiple-response or multiple true-false, matching, and true-false. The Women's National Officials Rating Committee of the National Section on Women's Athletics of the American Association of Health, Physical Education, and Recreation use the same types of items in the National Softball Official's Examination.

The test forms selected for use in this study have the following possibilities and limitations:

#### Multiple-Response or Multiple True-False

1. The items are arranged in a "cluster," all items in a single cluster relating to an introductory statement.

2. The pupils select the one, none, or all correct responses.

3. "Items of this sort are serviceable for measuring knowledge of generalizations or classifications. This type of test item is particularly well adapted to examining of knowledge of similar or related facts."<sup>1</sup>

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<sup>1</sup>Lee J. Cronbach, "Note on the Multiple True-False Exercise," Journal of Educational Psychology, XXX (1939), p. 630.

### Matching

1. "The matching exercise is particularly well adapted in who, what, when, and where types of situations, and for naming and identifying abilities."<sup>1</sup>
2. "Matching exercises make practicable the use of a large number of responses and therefore tends to reduce the guessing element."<sup>2</sup>
3. "The matching form of test is adapted to the testing of relatively discreet phases of comparatively homogeneous material."<sup>3</sup>

### True-False

1. "The principal advantage of the true-false test lies in the ease with which it can be constructed and in the fact that a wide sampling of individual elements can be tested in a short time."<sup>4</sup>
2. "The true-false form can be used to test for fact, principle, reason, inference, meaning and application, etc."<sup>5</sup>

In the experimental edition Form A of the Softball Information Test contained sixty-five items of the multiple-response type, twenty items of the matching type, and twenty-five

<sup>1</sup>Herbert E. Hawkes, E.F. Lindquist, and C.R. Mann, The Construction and Use of Achievement Examinations (Dallas: Houghton Mifflin Company, 1936), p. 150.

<sup>2</sup>Ibid., p. 149.

<sup>3</sup>M.W. Richardson, J.T. Russell, J.M. Stalnaker, and L.L. Thurstone, Manual of Examination Methods (Chicago: University of Chicago Bookstore, 1933), p. 62.

<sup>4</sup>Hawkes, op. cit., p. 153.

<sup>5</sup>Richardson, op. cit., p. 17.

of the true-false type. Form B contained sixty-two of the multiple-response type, nineteen matching type items, and twenty-six true-false items.

#### Preparation for and Administration of the Tests

Letters were sent to ten instructors of physical education asking them to participate in the study. The investigator or the director of the thesis knew them personally. Six schools participated in the study.<sup>1</sup>

The experimental forms of the test were administered to 225 high school girls. One hundred and thirteen girls took Form A and 112 took Form B. Forms A and B were administered at the same time. Alternate forms were given each girl at the time of the examination.

In the scoring of the tests each item had a value of one. Experimental Form A had a possible score of 110 and Experimental Form B, a possible score of 107.

The investigator developed "Suggested Methods of Teaching High School Girls to Learn the Rules Preparatory to Taking the Softball Information Test."

The methods were developed to aid the instructors in teaching the rules preparatory to taking the test. Various methods of teaching were studied in an attempt to find teaching techniques and aids which were suited to this type of

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<sup>1</sup>Appendix.



activity. The material to be tested was analyzed, and after much study, it was divided into sections for rules discussions. The material which was closely related was placed in the same sections. In some cases, because of the large amounts of related material, this could not be done.

The "Simplified Rules"<sup>1</sup> and the "Questions and Answers on Rules"<sup>2</sup> were included in the material to be studied by the students in order to help them clarify and interpret the Official Rules.<sup>3</sup> The article on "Technique for the Woman Official in Softball"<sup>4</sup> was included in order that the pupils might learn the officiating technique. They are discussed more fully in this article than they are in the Official Rules.

After the Suggested Methods for Teaching the Rules were developed, they were offered to the instructors; and the six who participated in the study requested them about six weeks before the tests were administered.

Below is given the Suggested Methods in the same form in which they were sent to the six instructors who participated in the study.

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<sup>1</sup>Bernice Cooper, "Simplified Rules," Official Softball Volleyball Guide, (New York: A.S. Barnes and Company, 1943), pp. 35-39.

<sup>2</sup>"Questions and Answers on Rules," ibid., pp. 93-100.

<sup>3</sup>Ibid., pp. 59-92.

<sup>4</sup>French, op. cit., pp. 52-56.

SUGGESTED METHODS FOR TEACHING HIGH SCHOOL GIRLS TO LEARN  
THE SOFTBALL RULES PREPARATORY TO TAKING SOFT BALL  
INFORMATION TEST

- I. Source of Softball Rules--Official Softball Volleyball Guide of the National Section on Women's Athletics of the American Association of Health, Physical Education, and Recreation for 1943<sup>1</sup>
  - A. The Simplified Rules, Bernice Cooper, pp. 35-39.
  - B. The Official Softball Rules, pp. 59-92.
  - C. Questions and Answers on Rules, pp. 93-100.
  - D. Esther French, "Technique for the Woman Official in Softball," pp. 52-56.
- II. Suggestions for Conducting Discussions and Methods of Teaching
  - A. Time and Place
    1. A regular scheduled time for rules discussions should be made. If possible, schedule in the physical education class period; if this is not feasible, schedule definite days after school, or definite library periods. As a last resort, conduct rules discussions on rainy days.
    2. Assign a definite meeting place and provide a bulletin board and blackboard.
  - B. Suggestions for Number of Meetings and Assignments for Each Meeting
    1. At least six or eight meetings will be necessary. Divide the reading material into sections, depend on the number of meetings.

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<sup>1</sup>The Guide may be bought at Voertman's, Denton, Texas, or A.S. Barnes, 67 West 44th Street, New York, or at a local book store. Price 35 cents.

"Distributed practice is more effective than concentrated practice."<sup>1</sup>

A plan should be prepared and announced at the first meeting. This plan should include the number of meetings and the material to be discussed at each meeting.

2. Suggestions for distribution of material to be discussed at each meeting. (eight meetings)
  - a. Simplified Rules, by Bernice Cooper
  - b. Rules 1-9
  - c. Rules 10-19
  - d. Rules 20-23
  - e. Rules 24-28
  - f. Rules 29-32
  - g. Questions and Answers on Rules
  - h. Esther French, "Technique for the Woman Official in Softball."

#### C. Suggestions for Conducting Each Meeting

1. In each discussion period provide periods of a review of the previous discussion. The reviews and reteaching should be based on pupil difficulties.
2. Present the new material.
3. It is imperative that all important ideas be clear, accurate, and well-organized. If the rules are not well understood, efforts to provide for future use will be largely a waste of time.

"The impression, whether through reading, hearing, or observation, should be interspersed with

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<sup>1</sup>A.S. Barr, Introduction to the Scientific Study of Supervision (New York: D. Appleton Century Company, 1931), p. 166.

attempted recalls, in order to show the shortcomings of the impression."<sup>1</sup>

4. The instructor should prepare short tests over each section of the rules.
  5. In summaries bring together the areas upon which the group are all agreed. Have it clear that no further discussion is needed at these points.
  6. Keep a reserve list of problems raised during the discussions which cannot well be faced until after the business at hand is settled.
  7. Make clear and definite assignments for the next meeting.
  8. Encourage the students to have an aggressive, active, purposeful attitude in building determination to learn and remember.
- D. Suggestions for Additional Techniques or Devices to be Used in Conducting Meetings
1. All students should take part in the discussion.
  2. Students should bring written questions to the meetings. Encourage the students to bring different type questions--true-false, multiple response, matching, or others which they may wish to devise. The students may exchange questions and attempt to answer them. These questions should be kept in a notebook.
  3. Spell-downs may be held. The students may be divided into two teams and a leader chosen for each team. The students should prepare questions to ask the opposing team. The leader of each team should be responsible for avoiding duplicate questions.
  4. Demonstrate the rules on the field or on the blackboard.
  5. Situations may be set up on the field and the students may make the decision.

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<sup>1</sup>E. Horn, Methods of Instruction in the Social Studies (New York: Charles Scribner's Sons, 1931), p. 497.

"Demonstration and active participation are often superior to verbal description in learning."<sup>1</sup>

### III. Suggestions for Umpiring Practice

- A. The students should serve as the judges or officials in any softball skill tests that are used.
- B. Students should officiate class games and intramural games.

"The learner must engage in activity designed to attain his goal."<sup>2</sup>

- C. The students who are not officiating the games should be encouraged to observe the game closely and help the instructor analyze the faults of the officials.

"The teacher has the important task of carefully observing and analyzing the pupil's activities for the sake of helping her compare her present performance with her past performance and with an ideal."<sup>3</sup>

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<sup>1</sup>Ibid., p. 499.

<sup>2</sup>Robert W. Frederick, Clarence Ragsdale, and Rachel Sailbury, Directed Learning (New York: D. Appleton Century, 1938), p. 51.

<sup>3</sup>Ibid., p. 97.

### General Treatment of Data

The data obtained in the form of scores made on the two administrations of the tests were subjected to statistical treatment to establish the findings of the study. All test papers were scored; the score on each test was the result of subtracting the number of incorrect responses and omissions from the possible total score. The scores were tabulated on tabulation sheets. Distributions were made for: the total groups on the experimental Forms A and B, the total groups for the final editions of Forms A and B, each school for both the experimental and final Forms A and B (Schools are referred to as 1, 2, 3, 4, 5, and 6.), and for each grade level for the experimental and final Forms A and B. For each of these distributions the mean and the standard deviation were computed according to the method recommended by Garrett.<sup>1</sup>

To discover the significance of the difference between the means, the standard error of the difference between the means was computed and interpreted according to Garrett's evaluation.<sup>2</sup> The standard error of the difference between the means was computed for: the experimental and final editions

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<sup>1</sup>Henry E. Garrett, Statistics in Psychology and Education (New York: Longman's Green and Co., 1941), 2nd. Edition, pp. 26-29 and 49-50.

<sup>2</sup>Ibid., pp. 210-214.

of Form A; the experimental and final editions of Form B; experimental editions of Forms A and B; final Forms A and B; senior and junior grade level, senior and sophomore grade level, and senior and freshman grade level for the revised editions of Forms A and B.

In evaluating the Softball Information Tests, the investigator checked the criteria of objectivity, validity, and reliability.

### Objectivity of the Tests

To secure the objectivity of the tests the techniques were standardized by the giving of mimeographed instructions for administering the tests.<sup>1</sup> The same instructions were used for each administration of the test. An objective scoring key was made and used to score all tests, and each item was given a value of one.

### Administrative Economy

The simplicity of the test was secured by organizing the tests in such a manner that each test could be finished in one class period of fifty-five minutes. The test did not require any expensive material; the only essentials were a mimeographed test and a sharpened pencil. Instructions of test were simple enough for any high school pupil to understand.

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<sup>1</sup>Appendix.

### Reliability of the Tests

The reliability of a test depends upon the consistency with which it measures the ability, or information of softball rules and umpire's duties in this case, of those to whom it is applied.<sup>1</sup>

Coefficients of correlation were calculated by the product moment method<sup>2</sup> in ascertaining the reliability of the final Form A and Form B of the Softball Information Tests. Correlations were computed between the odd and even numbered items, after which the Spearman-Brown prophecy formula<sup>3</sup> was applied. Probable errors reported with these correlation coefficients were computed by means of a formula given by Garrett.<sup>4</sup> The reliability coefficients were interpreted according to Guilford's<sup>5</sup> evaluation.

### Validity of the Tests

According to Hawkes, Lindquist, and Mann, "If a test is valid it is valid for a given purpose, with a given group of pupils, and it is valid only to the degree that it accomplishes that specified purpose for the specific group."<sup>6</sup> The purpose

<sup>1</sup>Ibid., p. 311.

<sup>2</sup>Ibid., pp. 265-270.

<sup>3</sup>Ibid., pp. 315-316.

<sup>4</sup>Ibid., p. 316.

<sup>5</sup>J.P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Book Company, Inc., 1942), p. 219.

<sup>6</sup>Hawkes, op. cit., p. 21.



of the Softball Information Tests is to rate the information of high school girls in softball rules for umpiring duties. The tests are intended for a selected group of high school girls who are interested in becoming softball officials. An examination must be constructed so that it measures as thoroughly as possible the objectives given. "The extent to which it does measure these objectives--known as the validity of the examination--is the basic and most important part of an examination."<sup>1</sup>

Clarke states, "The validity of a test may be determined by two methods, (1) content or curriculum validity, and (2) statistical validity."<sup>2</sup>

Content validity.--By content validity is meant the extent to which the content of the test is representative of the content of the softball rules. " . . . a valid test consists largely of a representative sampling of the materials that make up the course."<sup>3</sup>

In 1934, after many requests for a standardized set of softball rules had been made, the Joint Rules Committee on Softball was formed. This committee secured the publication

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<sup>1</sup>Richardson, op. cit., p. 9.

<sup>2</sup>H. Harrison Clarke, The Application of Measurement to Health and Physical Education (New York: Prentice-Hall, Inc., 1945), p. 43.

<sup>3</sup>C.C. Ross, Measurement in Today's Schools (New York: Prentice-Hall, Inc., 1941), p. 78.

of a standardized set of rules. The Joint Rules Committee on Softball is composed of representatives of many interested national organizations of which the National Section on Women's Athletics is one. Each year the rules are studied by the Joint Rules Committee on Softball, and revisions and interpretations are made. Since these rules have been authoritatively set forth by the National Section on Women's Athletics as the Official Softball Rules for Girls and Women, items based on them are valid for inclusion in a test designed for those who are interested in becoming softball officials.

Doctor Esther French, who is a member of the Softball Sub-Committee, is the author of "Technique for the Woman Official in Softball."<sup>1</sup> Doctor French, having served on various softball committees of the National Section on Women's Athletics, is considered an authority in the field of softball. Therefore, items based on her article are considered valid for inclusion in an information test for softball officials.

There are thirty-two rules listed in the 1943 Official Softball Rules for Girls and Women<sup>2</sup> published for the National Section on Women's Athletics of the American Association of Health, Physical Education Education, and Recreation. These rules are published with the permission of and approved by the Joint Rules Committee on Softball.

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<sup>1</sup>French, op. cit., pp. 52-56.

<sup>2</sup>Official Softball Volley Ball Guide, op. cit., pp. 59-

In Table I, below, is given the number and name of each rule as it appears in the official rules. In parallel columns is given the number of items selected from each rule and included in each experimental form of the parallel tests. At the bottom of the table appear items selected from the article on "Technique for the Woman Official in Softball."<sup>1</sup>

TABLE I

NUMBER AND NAME OF SOFTBALL RULES AND THE NUMBER OF ITEMS SELECTED FROM EACH RULE, ALSO THE NUMBER OF ITEMS SELECTED FROM "TECHNIQUE FOR THE WOMAN OFFICIAL IN SOFTBALL"

Number of Rule	Name of Rule	Form A	Form B
		Number of Items	Number of Items
1.	The Diamond	0	1
2.	Laying Out the Diamond	1	0
3.	Equipment	0	2
4.	Teams, Players, and Substitutes	6	1
5.	The Game	3	0
6.	Forfeited Games	3	1
7.	Choice of Innings	0	0
8.	Pitching Rule	2	1
9.	Illegal Pitches	4	7
10.	Fairly Delivered Ball	3	5
11.	Unfairly Delivered Ball	2	1
12.	Rules for Batter	1	0
13.	Order of Batting	4	1
14.	A Fair Hit Ball	1	2
15.	A Foul Hit Ball	2	1
16.	A Foul Tip	1	2
17.	A Bunt Hit Ball	0	1
18.	Balls Batted Outside the Playing Field	1	1

<sup>1</sup>French, op. cit., pp. 52-56.

TABLE I--CONTINUED

		Form A	Form B
Number of Rule	Name of Rule	Number of Items	Number of Items
19.	An Illegally Batted Ball	0	1
20.	When Batter Is Out	8	15
21.	Definitions	3	2
22.	Ball Dead Not in Play	5	3
23.	Ball in Play	8	5
24.	An Overthrow	0	1
25.	Legal Order of Bases	0	2
26.	When the Batter Becomes a Base-Runner	3	1
27.	Entitled to Bases	5	4
28.	Returning to Bases	6	9
29.	When Base-Runners Are Out	13	14
30.	Scoring of Runs	3	5
31.	Umpires	9	7
32.	Coach's Rules	0	3
	"Technique for the Woman Official in Softball," by Esther French*	5	8
Total		110	107

\*Ibid.

Table I shows the number of items taken from each section for the experimental Forms A and B. The range of the number of statements taken from each section for Form A is zero to thirteen. The range for Form B is zero to fifteen. Each section is sampled by one of the tests except Rule 7, which concerns Choice of Innings. The rules which have a large number of statements selected for inclusion in the test forms include those which have several sections pertaining

to officiating duties and techniques.

The facts included above in Table I show that the rules were sampled widely and adequately by the parallel forms of the tests as they were administered to 225 high school girls.

The number of items based upon each rule and the article on "Technique for the Woman Official in Softball"<sup>1</sup> was selected upon the bases of: (1) number of sections in the rule, (2) overlapping of content in the various rules, (3) the usability of the content in each section in construction of the items, (4) variety in number of items representing each rule in Forms A and B.

A variety in number of items representing each rule in Form A and in Form B was desired in order to construct parallel forms of the test which could be re-administered to other groups. Parallel forms of the Softball Information Test were constructed in order to allow high school girls the opportunity to take the second form if they failed in the first. The second form is to be administered after study and review of the rules.

Statistical validity.--Statistical validity refers to the mathematical processes for determining the degree to which the test agrees with some criterion set up as an acceptable measure of the thing in question.

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<sup>1</sup>Ibid.

In this study the statistical validity was determined by item validity and by increase of scores in successive grades. Increase of scores is discussed first, followed by item validity.

Increase of scores in successive grades: The validity of the test scores was determined by computing the mean and standard deviation of each grade level to find the percentage of increase in successive grades. To find whether differences between the means of the grade levels were significant--that is, whether such differences might be expected upon further testing of similar groups--the reliability of the differences between the means was determined.<sup>1</sup> The actual difference between the means was then divided by the standard error of the difference. The result was interpreted according to Garrett's evaluation: "It is usually customary to take a  $d/s_d$  of three as indicative of a significant difference."<sup>2</sup>

Item validity: In the selection of items, after try-out, for a test intended to measure a given ability, one is concerned particularly with two attributes: its difficulty and its validity. Various indices of discrimination have been studied and compared by research workers, but no one index is

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<sup>1</sup>Garrett, op. cit., pp. 210-211.

<sup>2</sup>Ibid., p. 213.

an infallible measure of the validity of an item for all situations, for all students, and for all levels of ability.

"The problem of securing a quantitative measure of the validity of a single test item has not been satisfactorily solved."<sup>1</sup>

"The biserial coefficient of correlation has been quite widely used in educational research as an 'index of validity' or 'index of discrimination' of individual test items."<sup>2</sup> "By far the most common index of validity for a test item is some type of correlation coefficient. The most accurate of these, and also one of the most laborious, is the biserial  $r$ ."<sup>3</sup>

In the use of the biserial coefficient of correlation, the criterion group was divided into two sub-groups, those passing and those failing to pass the item. On the assumption of a normal distribution of ability to pass the item, a correlation with the total criterion score was computed and the ratio of standard error to the size of biserial for each item was computed and interpreted by the techniques outlined by Guilford.<sup>4</sup>

In the item analysis the criterion score used was the score on the test itself. It would have been preferable to

<sup>1</sup>E.F. Lindquist and W.W. Cook, "Experimental Procedures in Test Evaluation," Journal of Experimental Education, I (1933), p. 183.

<sup>2</sup>E.F. Lindquist, Statistical Analysis in Educational Research (Dallas: Houghton Mifflin Company, 1940), p. 242.

<sup>3</sup>Guilford, op. cit., p. 295.

<sup>4</sup>Ibid., pp. 239 and 295.

validate the tests on the basis of tests known to be valid, constructed for the same purpose, and covering the same material; but no such tests were available.

In determining the difficulty of each item the investigator calculated the percentage of incorrect responses. The mean difficulty and the standard deviation was computed to find the average difficulty of the items for each test.

After the item analysis was made, the items were selected for the final tests. The biserial  $r$ , the ratio of the size of the biserial  $r$  to the standard error, and the difficulty of each item served as guides in deciding which items to retain in the final forms of the test.



## CHAPTER III

### FINDINGS

The findings will be discussed and interpreted in each section of the treatment of data according to those relating to: first, the original, or experimental forms of the test, and second, the final revised forms of the test.

The findings relating to the experimental forms were based on 110 items in Form A and 107 items in Form B of the Softball Information Test. Form A was administered to 113 high school girls and Form B, to 112 high school girls in six high schools of Texas.

The edited or revised forms were a result of eliminating ten items from Form A and seven items from Form B, each test containing one hundred items in its final form.

The elimination of items was based on item discrimination and will be discussed under Item Validity below.

#### General Treatment of Data

The comparison of the administration of experimental and final Forms A and B with respect to number, mean scores, standard deviations, and standard error of total groups, and groups from each of the six high schools.---Table II shows the number of scores and items, mean scores, standard deviations, and the standard errors between the experimental and final editions

of Form A of the Softball Information Test.

TABLE II

NUMBER OF SCORES AND ITEMS, MEAN SCORES, STANDARD DEVIATIONS,  
AND STANDARD ERRORS OF THE EXPERIMENTAL AND FINAL EDITIONS  
OF FORM A

	No. of Scores	No. of Items	Mean	S.D.	S.D.
Experimental Form A	113	110	88.71	9.12	.85
Final Edited Form A	113	100	81.20	9.21	.87

Eliminating ten items from the experimental edition of Form A reduces the mean score 7.51 points.

The mean of 88.71 of the experimental Form A represents an eighty-one per cent ratio in answering 110 items, and the ratio is the same between the mean of 81.20 and one hundred items of the revised edition of Form A.

The variability of the middle 68.26 per cent of the scores and the reliability of the means, for all practical purposes, remained the same.

The number of scores and items, mean scores, standard deviations, and the standard errors between the experimental and final editions of Form B of the Softball Information Test is shown in Table III.

TABLE III

NUMBER OF SCORES AND ITEMS, MEAN SCORES, STANDARD DEVIATIONS,  
AND THE STANDARD ERRORS OF THE EXPERIMENTAL AND FINAL EDITIONS  
OF FORM B

	No. of Scores	No. of Items	Mean	S.D.	$\sigma_M$
Experimental Form B	112	107	84.99	11.64	1.13
Final Edited Form B	112	100	78.72	11.94	1.15

Seven items were eliminated from the experimental Form B, reducing the mean score from 84.99 to 78.72.

The ratio between the number of 107 possible items that could be the answered and the mean of 84.99 was seventy-nine per cent for the experimental edition of Form B. The same ratio was found between the mean of 78.72 and one hundred items for the final edition of Form B.

Removing the seven items increased the variability of answers of the group in the final Form B by .30, which is, for all practicable purposes, negligible. The increase of .02, from 1.13 to 1.15, in unreliability as indicated by the standard error of the final edition of Form B is insignificant.<sup>1</sup>

The standard errors of the experimental and final editions of Form B are larger than the standard errors of the experimental and final editions of Form A. One of the factors affecting the reliability of a measure is variability of the

<sup>1</sup>Garrett, op. cit., p. 202.

distribution. The variability of the scores of the sophomores and freshmen taking Form B undoubtedly accounts for the larger standard errors.

TABLE IV

STANDARD ERROR OF THE DIFFERENCE BETWEEN THE MEANS OF THE EXPERIMENTAL EDITIONS OF FORMS A AND B, AND BETWEEN THE MEANS OF THE FINAL EDITIONS OF FORMS A AND B

	No. of Scores	No. of Items	Mean	S.D.	$\sigma_M$	Critical Ratio
Experimental Form A	113	110	88.71	9.12	.85	2.63
Experimental Form B	112	107	84.99	11.64	1.13	
Final Edition Form A	113	100	81.20	9.21	.87	1.83
Final Edition Form B	112	100	78.72	11.94	1.15	

The critical ratio of 2.63 between the experimental Forms A and B appears to be significant. The difference of three scores between the possible score of 110 for Form A and 107 for Form B and the greater variability around the mean of Form B accounts for the apparent reliability or the favorable difference of the experimental Form A.

The critical ratio of 1.83 does not indicate a significant difference between the means of final Forms A and B. According to Garrett's<sup>1</sup> interpretation, a critical ratio of 1.83 means there are ninety-six chances in one hundred that a

<sup>1</sup>Ibid., p. 213.

true difference does exist.

The difference in the means of the revised editions of Form A and Form B can be accounted for, in part, by the higher possible score on Form A in its experimental form. More items with a low validity index were retained in Form A than in Form B of the final test. Form B is a more heterogeneous group as indicated by the difference in the size of the standard deviations.

The freshmen and sophomores taking Form B answered fewer items correctly than did the same grade levels taking Form A. Their low mean scores on both the experimental and final Form B tend to lower the mean score for the total group.

Since the difference in the mean scores on the revised editions of Form A and Form B is insignificant, it is believed that upon further administration to larger groups that this apparent difference will be eliminated.

Comparison of the mean scores between schools and the total mean scores.--The mean scores and standard deviations were computed for the experimental Forms A and B for the total groups. These data are presented in Table V.

TABLE V

COMPARISON OF THE MEAN SCORES AND STANDARD DEVIATION OF THE EXPERIMENTAL FORMS A AND B OF THE SOFTBALL INFORMATION TEST WITH RESPECT TO THE TOTAL GROUP AND GROUPS FROM EACH OF THE SIX HIGH SCHOOLS

Form A				Form B		
	No.	Mean	S.D.	No.	Mean	S.D.
Total Group	113	88.71	9.12	112	84.99	11.64
1	15	93.14	6.98	15	87.70	11.31
2	20	90.45	6.00	14	86.40	10.08
3	23	90.27	8.55	27	87.39	7.59
4	20	88.65	7.29	20	87.30	9.12
5	17	86.48	10.86	18	83.49	12.72
6	18	82.50	9.84	18	79.20	15.84

The higher possible score on Form A, in part, accounts for the higher mean score on Form A for each school.

The range of mean scores for the experimental Form A in the six high schools was 82.50 to 93.14, a difference of 10.64. The range of the mean scores on Form B for the same six high schools was found to be 79.20 to 87.70, a difference of 8.50.

The greater range of mean scores of Form A is due to the mean score of School 1, which is much higher in relation to the other mean scores in Form A than it is in Form B.

School 1 ranked highest on Form A and Form B, School 5 ranked fifth, and School 6 ranked sixth. The mean scores of Schools 2, 3, and 4 did not retain the same relative positions on Form B as on Form A.

It is interesting to note that in each school the mean score for Form A is higher than for Form B and that the variability around the means is greater for Form B in each school except School 3.

No explanation can be given for the greater variability around the means of Form B unless the freshmen and sophomores who took Form B were spread over each school and not concentrated in one.

TABLE VI

COMPARISON OF THE MEAN SCORES AND STANDARD DEVIATIONS OF THE FINAL EDITIONS OF FORM A AND FORM B OF THE SOFTBALL INFORMATION TEST WITH RESPECT TO THE TOTAL GROUP AND GROUPS FROM EACH OF THE SIX HIGH SCHOOLS

Form A				Form B		
	No.	Mean	S.D.	No.	Mean	S.D.
Total Group	113	81.20	9.21	112	78.72	11.94
1	15	85.11	7.41	15	81.30	10.32
2	20	83.25	5.91	14	80.58	9.51
4	20	82.05	7.77	20	80.55	9.36
3	23	81.72	8.40	27	81.28	7.26
5	17	80.55	12.39	18	75.33	13.02
6	18	75.18	9.54	18	72.33	17.04

The range of the mean scores for the final Form A was 75.18 to 85.11, a difference of 9.93. For Form B the range was 72.33 to 81.30, or a difference of 8.97. The variability of the scores for Form B was greater for each school than that of Form A, with the exception of School 3. This variability

of scores in Form B coincides with findings under grade level (which will be discussed below) and variability for the total group.

School 1 ranked first in the mean scores for the final Forms A and B, School 5 ranked fifth, and School 6 ranked sixth. Schools 2, 3, and 4 did not retain the same relative positions on the final editions of Form A and B.

In the comparison of the ranking according to mean scores of the various schools on the experimental and final editions of Forms A and B, it was found that School 1 ranked first, School 5 ranked fifth, and School 6 ranked sixth. Schools 2, 3, and 4 interchanged places on each test.

Reliabilities of the tests.--The reliabilities of the final forms of the tests were computed by the product-moment method of correlation,<sup>1</sup> correlating the odd-even items and correcting by the Spearman-Brown prophecy formula.<sup>2</sup> The reliability coefficients and the probable errors were found to be for Form A  $.88 \pm .02$  and for Form B  $.91 \pm .01$ , which is an average of .90. According to Guilford's<sup>3</sup> evaluation, a reliability coefficient of .90 is sufficiently high for individual prediction.

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<sup>1</sup>Ibid., pp. 265-271.

<sup>2</sup>Ibid., pp. 315-319.

<sup>3</sup>Guilford, op. cit., p. 219.



Validity of the tests.--Content validity: The value, the meaning of content validity, and the extensiveness of the sampling of the content of the experimental Forms A and B were discussed in Procedures.

In the revised editions ten items were eliminated from Form A and seven from Form B. (See below under Item Validity for discussion.) The range of the number of items sampling each rule except seven, and the section on "Technique for the Woman Official in Softball"<sup>1</sup> is zero to thirteen for each of the final forms of the Softball Information Test. Each rule is sampled by one of the tests, except seven, which is Choice of Innings-Fitness of Field for Play.

Statistical validity: Statistical validity means validity as determined by increase of scores between grade levels.

To find the increase of scores of successive grades, the mean score and the standard deviation was computed for each grade level for the experimental editions of Forms A and B.

In Table VII is shown the number, mean score, and standard deviation of Forms A and B for each grade level.

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<sup>1</sup>French, op. cit., pp. 52-56.

TABLE VII

COMPARISON OF NUMBER, MEAN SCORE, AND STANDARD DEVIATION OF THE EXPERIMENTAL EDITIONS OF FORMS A AND B WITH RESPECT TO GRADE LEVEL

Form A				Form B		
Grade Level	No.	Mean	S.D.	No.	Mean	S.D.
Senior	47	91.44	8.52	42	90.42	8.79
Junior	24	89.49	7.62	20	87.45	8.34
Sophomore	20	86.25	7.74	24	83.49	10.74
Freshman	22	84.54	11.76	26	77.55	13.38

There is a fairly close comparison in the number of freshmen, sophomores, and juniors participating in each test. The senior grade level had almost twice as many participants as any other grade level in each test.

The mean score increases from the freshman to the senior grade level in each test. The mean score of the sophomore group in Form B is lower than the mean score of the freshman group in Form A. The mean score was much lower and the variability of scores was greater for the freshmen taking Form B than for the freshmen taking Form A.

The apparent reason for the low mean scores and variability of scores will be discussed after the following table.

TABLE VIII

COMPARISON OF THE NUMBER, MEAN SCORE, AND STANDARD DEVIATION  
OF THE FINAL FORMS OF A AND B WITH RESPECT TO GRADE LEVEL

Form A				Form B		
Grade Level	No.	Mean	S.D.	No.	Mean	S.D.
Senior	47	83.91	8.13	42	83.40	9.09
Junior	24	81.38	7.86	20	81.15	8.61
Sophomore	20	79.20	6.75	24	77.01	11.70
Freshman	22	77.19	12.21	26	70.80	13.50

The number of participants in Forms A and B for the freshman, sophomore, and junior grades compare fairly well. The senior group had the largest number of participants in the tests.

There was a gradual increase from 77.19 to 83.91, or 6.72, from the freshman to the senior grade level in the revised edition of Form A. The range of the mean scores from the freshman to the senior grade level of Form B was 70.08 to 83.40, or 12.60.

The mean scores and the variability of the scores around the means for the juniors and the seniors are practically the same in both the final editions of Form A and Form B. The variability of scores for the juniors and seniors was slightly larger in Form B than in Form A.

The mean of the sophomore group is .18 lower in the final edition of Form B than the mean score of the freshmen

in the final edition of Form A.

The low mean scores of the sophomore groups who took the final edition of Form B account for the difference in the means of the final editions of Form A and Form B. The mean score for the total group taking Form A was 81.20 and for Form B, 78.72 as given in Table VI.

The largest variabilities in scores was found in the freshman groups taking both forms and the sophomore group taking Form B.

In the comparison of the mean scores for the experimental and final editions, it was found that the sophomore and freshman groups who took Form B had much lower mean scores than did those taking Form A. Also the variability of the scores of the freshman group taking Form B is greater than the variability of the freshmen taking Form A. No explanation can be given for this, unless through chance the sophomores and freshmen with low ability were grouped together and took Form B of the test; or vice versa, the sophomores and freshmen taking Form A may have been superior sophomores and freshmen. The same instructors taught both groups, and the tests were administered at the same time. The numbers are so small that it is believed that upon administration of the tests to larger groups these findings will be confirmed if the groupings in this study were not made by chance. If the groupings were a

result of chance, the differences in the findings of this study would be eliminated.

The critical ratio was computed between the mean scores of the seniors and each of the other three grade levels for the final editions of Forms A and B of the Softball Information Test. They are given in Table IX below.

TABLE IX

MEAN SCORES, STANDARD ERRORS, AND CRITICAL RATIOS BETWEEN GRADE LEVELS FOR REVISED EDITIONS OF PARALLEL FORMS OF THE SOFTBALL INFORMATION TEST

	Revised Edition Form A			Revised Edition Form B		
	Mean	$\sigma_M$	Critical Ratio	Mean	$\sigma_M$	Critical Ratio
Seniors	83.91	1.16	1.28	83.40	1.40	.95
Juniors	81.38	1.60		81.15	1.93	
Seniors	83.91	1.16	2.48	83.40	1.40	2.32
Sophomores	79.20	1.51		77.01	2.37	
Seniors	83.91	1.16	2.36	83.40	1.40	4.22
Freshmen	77.19	2.60		70.80	2.65	

The critical ratios are discussed in descending order of grade level for each of the final editions of Forms A and B.

For Form A the critical ratio between the seniors and the juniors was 1.28, which means that upon further administration of the tests there would be ninety chances in one hundred<sup>1</sup> that the softball information of seniors would be superior to that of juniors. The critical ratio between the seniors and

<sup>1</sup>Garrett, op. cit., p. 213.

juniors in the revised edition of Form B is .95. There are eighty-three chances in one hundred<sup>1</sup> that upon further administration, the senior information of softball would be superior to that of the juniors taking Form B.

A comparison between the mean scores of the senior and the sophomore grade levels gave a critical ratio of 2.48, which indicates that the seniors had ninety-nine chances in a hundred<sup>2</sup> of being superior to sophomores taking Form A of the revised test. In Form B the critical ratio of 2.32 showed that the seniors had 98.9 chances in one hundred<sup>3</sup> of being superior to the sophomores.

The critical ratio computed for the senior and the freshman grade levels was 2.36 for the revised edition of Form A. This critical ratio indicates that the seniors have 99.2 chances in one hundred<sup>4</sup> of being superior to the freshmen upon further administration of the tests. The reliability of the difference between the means of the seniors and freshmen taking Form B was 4.22, which is very significant. A  $d/\sigma_d$  of three times the standard error, according to Garrett,<sup>5</sup> is virtual certainty that the practical lower limit of probability

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<sup>1,2,3,4,5</sup>Ibid.

will not reach zero. A critical ratio of 4.22 is that much added certainty.

The apparent lack of significant differences between the means of successive grades is due to the fact that the groups as a whole were highly selected and given the same training preparatory to taking the test.

The investigator believes that the tests are valid because of a gradual increase in scores in successive grades on Form A of the test and a similar increase in scores between the junior and senior grade levels in Form B. The reliability of the difference of the means between the freshman and senior scores in Form B as indicated by the critical ratio is partially accounted for by the variability in scores of the freshmen. The standard deviation is 13.50 for the freshmen and 9.09 for the seniors with a standard error for the seniors of 1.40 as compared with 2.65 for the freshmen.

Item validity.--In the selection of items for the final forms of the Softball Information Test, the investigator was concerned particularly with the difficulty and the discriminating power of each item.

Test experts have found that the average difficulty of the items in a test is related to the validity of the test as a whole. Tests may be altered in validity as they are easy or difficult for the group examined. "Items for a test covering

a narrow rang discriminate best when their difficulty is such that each item is passed by 50 per cent of the group."<sup>1</sup> According to Guilford, "Because tests of this average of difficulty are sometimes discouraging to the testees, the rule may have to be violated somewhat by lowering the general level of difficulty."<sup>2</sup> When validity is desired, the general average of difficulty of items must be tempered to the ability level of the group.

The difficulty of items in Forms A and B of the Softball Information Test do not coincide with the statements of authorities as to the range of the difficulty of items. The percentage of pupils missing each of the items in each test was calculated. In Table X is given the frequency according to the per cent of 113 students missing each of the one hundred items in the revised edition of Form A of the Softball Information Test. The per cent missed ranged from zero to sixty with a mean score of  $20.05 \pm 14.65$ . The reasons for the low level of difficulty will be discussed after Table XI.

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<sup>1</sup>Ross, op. cit., p. 87.

<sup>2</sup>Guilford, op. cit., p. 293.



TABLE X

PERCENTAGE OF MISSES MADE BY 113 STUDENTS OF THE ONE HUNDRED ITEMS IN FORM A OF THE SOFTBALL INFORMATION TEST

Range of Percentage Missed	Frequency	
60-64.9	1	
55-59.9	4	
50-54.9	0	
45-49.9	3	
40-44.9	3	
35-39.9	7	Mean 20.05
30-34.9	4	S.D. 14.65
25-29.9	7	σM 1.47
20-24.9	12	
15-19.9	14	
10-14.9	15	
5-9.9	19	
0-4.9	11	

TABLE XI

PERCENTAGE OF MISSES MADE BY 112 STUDENTS OF THE ONE HUNDRED ITEMS IN FORM B OF THE SOFTBALL INFORMATION TEST

Range of Percentage Missed	Frequency	
55-59.9	2	
50-54.9	3	
45-49.9	0	
40-44.9	0	
35-39.9	11	
30-34.9	7	Mean 23.00
25-29.9	16	S.D. 12.45
20-24.9	14	σM 1.25
15-19.9	9	
10-14.9	21	
5-9.9	13	
0-4.9	4	

In Table XI is shown the frequency according to the per cent of 112 students missing each of the one hundred items

in the revised edition of Form B of the Softball Information Test. The per cent missed ranged from zero to fifty-nine with a mean score of  $23.00 \pm 12.45$ .

The mean score of per cent misses of Form A is 20.05, and the mean score of per cent misses of Form B is 23.00, the difference in the means is 2.95 per cent larger in Form B. This coincides with the fact that the mean scores of right answers in Form A is 81.20 and the mean score of right answers for Form B is 78.72.

In the opinion of the investigator, the combination of the following facts accounts for the low percentage of incorrect responses (or high percentage of correct responses) for Forms A and B of the Softball Information Test.

Five of the six instructors who participated in this study are working toward graduate degrees, and their professional interest was challenged by a study being done for graduate work. The instructors accepted and used the suggested outline for teaching the rules to the pupils preparatory to taking the Softball Information Test and they entered into the project wholeheartedly. The number of participants in each school was small; therefore, the instructors were able to give individual attention to the pupils, and motivation was easy.

The pupils who participated in this study represent a highly selected group who showed enough interest in the activity to select it. Girls of this age have a natural live

interest in softball. They like to become leaders, to direct others, and to be able to conduct their own activities. They realize the need for competent officials, and they appreciate a well-conducted game.

The minimum essentials of the softball rules and official duties of softball officials have been authoritatively set forth in the Official Softball Volley Ball Guide published for the National Section on Women's Athletics of the American Association for Health, Physical Education, and Recreation. Thus, the pupils had a definite goal toward which to work.

#### Discussion of Item Difficulty and Discrimination

Difficulty alone is not a dependable measure of discrimination. An item of any difficulty may have any degree of discriminating power. Hawkes states, " . . . There is no apparent reason for assuming any relationship between the discriminating power of a test item and its 'difficulty'."<sup>1</sup>

The worth or effectiveness of a test item depends, therefore, not only upon its desirability for inclusion in the curriculum and upon its 'difficulty,' but also upon its power to discriminate between pupils of high and low levels of achievement in the field involved.<sup>2</sup>

A question may be said to zero discriminating power when there is no difference between the ability of those who succeed on it

<sup>1</sup>Hawkes, op. cit., p. 46.

<sup>2</sup>Ibid., p. 40.

and those who fail. A question is said to have minus discriminating power when more pupils of low ability succeed on it than pupils of high ability. A question is said to have perfect discriminating power when every pupil who succeeds on it ranks higher in ability than those who fail on the item. Between the extremes of minus discriminating power and perfect discriminating power are questions of all degrees of discrimination.

The discriminating power or the validity index of each of the test items in the experimental forms of the test was determined by the use of a numerical index, the biserial coefficient of correlation between the right and the wrong responses.

The index of discrimination, the size of the standard error of the biserial  $r$ , and the difficulty of the items served as guides in deciding which items to eliminate from the experimental forms of the tests. For content purposes some deviations were made. According to Hawkes, "The fact that a given item shows a relatively low index in comparison with other items in the same test does not necessarily mean it is less essential."<sup>1</sup>

#### Elimination of Items from the Softball Information Tests.--

In Table XII is shown the item number, biserial  $r$ , the standard error of the biserial  $r$ , and the percentage of incorrect responses of the items eliminated from the experimental edition of Form A of the Softball Information Test. The item numbers appearing here do not appear in subsequent tables, as

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<sup>1</sup>Ibid., p. 53.

they were eliminated and items retained were re-numbered.

TABLE XII

## ITEMS ELIMINATED FROM FORM A OF THE SOFTBALL INFORMATION TEST

Item No.	Biserial r	S. E. of Biserial r	rbis S.E. rbis	Percent of Incor- rect Responses
11	.05	.10	.50	21
20	-.95	.13	-7.30	4
32	.15	.15	1.00	12
55	.10	.13	.77	25
63	-.91	.13	-7.00	4
75	.32	.17	1.66	6
95	.06	.12	.50	30
104	.08	.12	.67	38
107	.09	.17	.53	80
109	.18	.11	1.64	35

In the opinion of the investigator, items 11, 20, 32, 55, 63, 95, 104, 107, and 109 failed to function because of insufficient learning. A deliberate attempt was made to have the incorrect responses appear as plausible as possible in order that the uninformed pupil might be likely to select the incorrect response instead of the correct one on the basis of chance or random guessing. The items were tests of the pupil's ability to relate other information to that directly called for, and a test of their knowledge of what is correct as well as what is not correct. It is the belief of the investigator that these items failed to function because in the attempt to test for relatively high levels of understanding, the wrong responses were made to appear so plausible that they defeated

their own purpose.

In item 75 the situation was not clearly defined; therefore, there were two possible correct responses to this item. The item was eliminated in order to keep the scoring techniques objective.

TABLE XIII

ITEMS ELIMINATED FROM FORM B OF THE SOFTBALL INFORMATION TEST

Item No.	Biserial r	S. E. of Biserial r	$\frac{rbis}{S.E. rbis}$	Percent of incor- rect Responses
29	-.21	.14	-1.50	25
44	.08	.15	.53	13
49	.83	.13	6.38	5
50	.14	.14	1.00	13
51	.36	.10	3.60	10
74	.39	.11	3.55	20
100	.12	.11	1.10	25

In Table XIII is shown the item number, biserial r, standard error of the biserial r, and the percentage of incorrect responses of the items eliminated from Form B of the Softball Information Test.

It is the belief of the investigator that items 29, 44, and 100 failed to function because of insufficient learning, which was discussed in elimination of items from Form A of the Softball Information Test.

In the effort to cover each rule thoroughly, the investigator included three items which covered the same information tested in another statement. For this reason items 49, 50, and

51 were eliminated from the final form of the test.

Item 75 of Form B was similar to item 74 of Form A. The situation was not clearly defined, which fact made two possible correct responses. To keep the scoring objective, this item was eliminated.

TABLE XIV

INDEX OF VALIDITY FOR EACH ITEM IN FORM A ARRANGED IN DESCENDING ORDER OF DISCRIMINATING VALUE; THE STANDARD ERROR, RATIO OF BISERIAL  $r$  TO SIZE OF STANDARD ERROR, AND PER CENT MISSING EACH ITEM

Item	rbis	S.E.rbis	$\frac{rbis}{S.E.rbis}$	Percent Missed
38	1.31	.21	6.24	4
58	1.01	.19	5.79	5
25	1.03	.12	8.58	4
28	1.02	.12	8.5	4
22	1.00	.09	11.1	6
46	.94	.13	7.15	12
67	.92	.06	5.33	17
19	.90	.06	15.00	13
24	.89	.37	2.14	1
26	.87	.12	7.25	6
43	.87	.10	8.7	8
44	.87	.11	7.91	7
21	.84	.11	7.64	7
30	.84	.11	7.64	7
74	.82	.06	13.67	35
55	.79	.15	5.27	5
73	.79	.10	7.90	12
36	.78	.07	11.14	11
33	.75	.10	7.5	11
57	.69	.19	3.63	4
20	.69	.14	4.93	6
51	.68	.07	9.71	46
1	.67	.14	4.79	6
41	.66	.17	3.88	4
96	.66	.11	6.00	12
34	.62	.09	6.89	12

TABLE XIV--CONTINUED

Item	rbis	S.E.rbis	rbis S.E.rbis	Percent Missed
53	.60	.11	5.45	18
14	.58	.12	4.83	12
63	.58	.09	6.33	36
45	.57	.18	3.17	4
79	.57	.09	6.33	60
2	.56	.15	3.73	7
61	.56	.09	6.22	36
68	.56	.10	5.60	24
16	.55	.04	13.75	34
18	.55	.13	4.23	12
60	.55	.12	4.58	7
6	.54	.11	4.90	8
31	.53	.07	7.57	20
91	.53	.10	5.30	22
29	.50	.13	4.08	12
42	.50	.19	2.63	4
62	.48	.11	4.36	23
32	.46	.07	6.57	22
49	.45	.10	4.50	20
54	.45	.11	4.09	25
13	.44	.10	4.4	46
3	.42	.13	3.23	16
94	.42	.11	3.82	27
9	.41	.16	2.56	15
75	.41	.14	2.93	10
17	.40	.26	1.54	2
71	.40	.11	3.64	42
47	.39	.13	3.00	15
78	.39	.10	3.9	58
65	.38	.12	3.17	27
66	.38	.13	2.93	16
82	.38	.12	3.17	21
8	.37	.16	2.31	9
12	.35	.11	3.18	29
100	.34	.11	3.09	42
15	.32	.13	2.46	15
11	.31	.09	3.45	35
39	.31	.14	2.21	13
72	.31	.15	2.07	10
85	.31	.16	1.75	42
86.	.31	.12	2.00	36
40	.30	.11	2.73	25



TABLE XIV--CONTINUED

Item	rbis	S.E.rbis	$\frac{\text{rbis}}{\text{S.E.rbis}}$	Percent Missed
50	.30	.11	2.73	59
56	.30	.11	2.73	28
59	.29	.11	2.64	8
80	.29	.13	2.23	20
27	.28	.13	2.15	18
48	.28	.12	2.33	21
70	.28	.13	2.15	16
76	.28	.14	2.00	13
93	.28	.11	2.55	55
35	.25	.09	2.78	21
37	.25	.12	2.08	8
88	.24	.12	2.00	36
92	.24	.12	2.00	28
95	.23	.13	1.77	23
84	.22	.16	1.38	10
97	.22	.11	2.00	46
7	.21	.17	1.24	7
87	.21	.12	1.75	42
4	.20	.19	1.06	6
5	.18	.18	1.00	4
89	.18	.15	1.20	15
52	.18	.12	1.50	34
81	.17	.12	1.42	33
64	.16	.12	1.33	31
83	.14	.18	.80	7
98	.13	.14	.93	17
69	.12	.12	1.00	58
99	.11	.16	.69	22
90	.10	.14	.71	16
77	.03	.12	.003	36
10	.02	.13	.002	19
23	0	0	0	0

In Table XIV is shown in descending order for each item the biserial  $r$ . The standard error, the ratio of the standard error to the size of the biserial  $r$  and the percentage of incorrect responses for each item in columns three, four, and five.

The range of the biserial for Form A was from zero to 1.31.

The first four items in Table XIV--38, 58, 25, and 28-- have biserials exceeding one. They represent ninety-six, ninety-five, and ninety-four per cent correct responses (four, five, and six per cent difficulties). High discriminating power is indicated by the ratio of their standard errors to the size of the biserials. The incorrect responses in each of these items group together near the lower limit of the range; therefore, the dichotomy is not normally and continuously distributed, which accounts for this absurdity. According to Guilford, " . . . the dichotomy should not be too lopsided; probably never more than a .9 to .1 division."<sup>1</sup>

Items having a biserial which correlates with the criterion two standard errors were considered to have significant validity.<sup>2</sup> Twenty items with a biserial which was less than two times its standard error were retained in the final form of the test, for the reasons that follow.

The items are based on the Official Softball Rules for Girls and Women<sup>3</sup> which are approved by the Joint Rules Committee on Softball. These rules have been authoritatively

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<sup>1</sup> Guilford, op. cit., p. 240.

<sup>2</sup> Ibid., p. 295.

<sup>3</sup> Official Softball Volley Ball Guide, op. cit., pp. 59-

set forth by the National Section on Women's Athletics as the official rules. Therefore, items based directly on these rules are valid from the content viewpoint.

Two instructors of college English and two high school English instructors studied the items and made the needed revisions. According to these four experts the items are free from technical imperfections.

Questions were included in the test which tested the meaningfulness of the pupil's knowledge rather than his verbal memory of facts which may have been learned by rote. Items were included in the test in which the pupil had to relate other information to that directly called for. These characteristics may lead to complete failure of the item to function properly, although they are desirable. To conduct a softball game efficiently, a pupil must be able to relate the rules to one another; and for this reason the items were retained.

Shown in Table XIV is the ratio of the standard error to the size of the biserial  $r$ . Eighty per cent of the items in Form A of the Softball Information Test correlate with the criterion two standard errors and above. Sixty-four per cent of the items in the test correlate with the criterion more than two and six-tenths standard errors.

According to Guilford, "An item which correlates with the criterion more than two standard errors may be regarded as having significant validity, whereas one correlating more than

2.6 SE's has very significant validity."<sup>1</sup>

And, finally, fifty-five per cent of the items in the final edition of Form A correlate with the criterion within the range of three to fifteen errors with a mean of 6.02 standard errors.

The range of the ratio of the standard error to the size of the biserial  $r$  was zero to fifteen with a mean of 4.24 standard errors.

TABLE XV

INDEX OF VALIDITY FOR EACH ITEM IN FORM B ARRANGED IN DESCENDING ORDER OF DISCRIMINATING VALUE; THE STANDARD ERROR, RATIO OF BISERIAL  $r$  TO SIZE OF STANDARD ERROR, AND THE PER CENT MISSING EACH ITEM

Item	rbis	S.E.rbis	$\frac{\text{rbis}}{\text{S.E.rbis}}$	Per cent Missed
1	1.11	.06	18.50	8
18	1.10	.06	18.33	7
28	1.03	.08	12.87	7
52	1.02	.08	12.75	6
38	1.00	.11	9.09	4
49	.99	.07	14.14	8
13	.95	.07	13.43	9
19	.93	.06	15.50	14
2	.92	.07	13.14	10
14	.88	.07	12.57	12
15	.87	.11	7.91	6
60	.87	.05	17.40	26
74	.84	.07	12.00	18
46	.84	.06	14.00	19
4	.83	.08	10.37	11
30	.80	.09	8.89	15
70	.78	.07	11.14	18

<sup>1</sup>Guilford, op. cit., p. 295.

TABLE XV--CONTINUED

Item	rbis	S.E.rbis	<u>rbis</u> S.E.rbis	Per Cent Missed
54	.77	.09	8.56	10
37	.75	.07	10.71	28
75	.72	.08	9.00	17
62	.69	.08	8.63	21
5	.69	.09	7.66	17
68	.69	.08	8.63	18
50	.67	.16	4.19	4
72	.65	.11	5.90	24
56	.64	.13	4.92	7
66	.62	.11	5.64	13
39	.62	.11	5.64	12
63	.61	.09	6.78	22
44	.60	.09	6.67	53
82	.59	.09	6.56	25
33	.57	.16	3.56	11
69	.57	.08	7.13	59
73	.56	.12	4.33	24
57	.56	.20	2.80	3
58	.56	.08	7.00	36
91	.56	.09	6.22	18
34	.56	.12	4.33	9
9	.55	.14	3.93	7
29	.55	.15	3.67	6
76	.55	.09	6.11	26
6	.53	.12	4.42	12
20	.53	.12	4.42	12
42	.53	.09	5.89	27
48	.53	.11	4.82	20
84	.52	.11	4.73	11
11	.50	.13	3.85	9
83	.50	.09	5.56	29
17	.49	.11	4.45	14
65	.49	.11	4.45	17
71	.49	.09	5.44	35
25	.48	.10	4.80	23
26	.47	.10	4.70	28
12	.46	.13	3.54	13
10	.45	.13	3.46	10
7	.44	.13	3.38	12
61	.44	.11	4.00	29
67	.44	.10	4.40	30
22	.43	.14	3.07	8
59	.42	.11	3.82	37
36	.40	.10	4.00	37
45	.39	.10	3.90	37

TABLE XV--CONTINUED

Item	rbis	S.E.rbis	rbis S.E.rbis	Per Cent Missed
3	.38	.13	2.92	11
95	.37	.11	3.36	24
98	.37	.10	3.70	35
47	.36	.10	3.60	51
96	.35	.13	2.69	12
64	.34	.09	3.78	36
81	.34	.10	3.40	30
92	.34	.10	3.40	30
97	.34	.09	3.78	52
78	.33	.10	3.30	37
77	.32	.12	2.67	20
94	.32	.11	2.90	26
55	.31	.13	2.38	12
100	.31	.10	3.10	35
35	.31	.11	2.82	29
51	.30	.11	2.73	21
53	.30	.11	2.73	22
85	.30	.10	3.00	31
90	.30	.10	3.00	32
80	.29	.14	2.07	13
21	.29	.14	2.07	13
23	.28	.10	2.80	37
24	.27	.11	2.45	24
40	.27	.10	2.70	29
27	.27	.11	2.45	25
88	.27	.12	2.25	21
8	.27	.12	2.25	21
86	.26	.11	2.36	33
89	.24	.10	2.40	55
93	.23	.11	2.19	37
79	.21	.11	1.91	29
99	.20	.12	1.67	12
41	.20	.12	1.67	20
43	.18	.13	1.38	15
27	.17	.11	1.55	29
16	.15	.11	1.36	29
32	0	.15	0	10
31	0	0	0	0

In Table XV is shown the descending order of the biserial  $r$ ; and the standard error, the ratio of the standard error to

the size of the biserial  $r$  and the percentage of incorrect responses.

The range of the biserial  $r$  is from zero to 1.11. Items 1, 18, 28, and 52 have biserials exceeding one. These items represent eight, seven, and six per cent difficulties. The incorrect responses for each of these items are concentrated at the lower limit of the dichotomy; therefore, the dichotomy is not normally and continuously distributed. The lack of a normal and continuous distribution accounts for the absurdity of the biserial  $r$  of these four items.

Table XV reveals the fact that the last eight items have discriminating power which is insignificant. In the opinion of the investigator they are free from technical imperfections and valid from the viewpoint of content. The investigator included items in the test which attempt to test the pupil's reasoned understanding and ability to use that which is learned. An attempt was made to test for high levels of understanding, through making wrong responses appear as plausible as possible. In this attempt, the wrong responses were made to appear so plausible that the superior pupils who had enough information to make them appear plausible, selected the wrong response more often than did the inferior pupils who had not enough information to recognize the plausibility. In the group tested in this study the proportion of pupils who have reached this high level of understanding is small; therefore, the discriminating power of the items was low. In a test designed for pupils who

are interested in becoming softball officials, items which test for the ability to relate facts, to recognize what is incorrect as well as what is correct is desirable; therefore, these items were retained in the final form of the test.

Table XV shows the ratio of the standard error to the size of the biserial  $r$ . Ninety-two per cent of the items in Form B have significant validity, correlating with the criterion two standard errors and over. Eighty-one per cent have very significant validity, correlating with the criterion 2.6 standard errors and over. Seventy-two per cent of the items correlate with the criterion within a range of from 3 to 18.5 standard errors with a mean of 5.92 standard errors.

The range of the ratio of the standard errors to the size of the biserial was zero to 18.5 with a mean of 5.44 standard errors.



## CHAPTER IV

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Summary

This study was undertaken in an effort to determine the need for, and to develop parallel forms of, a Softball Information Test suited to the ability of high school girls who are interested in becoming softball officials. In particular, this study purported to develop suggested methods for teaching the girls to learn the rules preparatory to taking the Softball Information Test; to construct parallel forms of the Softball Information Test; and to evaluate the tests statistically.

This study was conducted in six high schools of Texas. The suggested methods for teaching the rules were developed, and the six instructors who participated in this study used them. Parallel forms of the Softball Information Test were constructed and administered to 225 high school girls.

The procedures employed by the investigator in conducting this study included the following steps:

1. Definition of the objectives of the tests.
2. Selection of the material for the tests.
3. Construction of the tests.
4. Selection of schools in which to administer the

tests.

5. Development of suggested methods for teaching the girls to learn the rules preparatory to taking the Softball Information Test.

6. General treatment of data.

7. Determination of objectivity, reliability, and validity.

The findings which resulted from the treatment of data show that the difference between the means of the experimental forms A and B is significant. The difference of 3 scores between the possible score of 110 for Form A and 107 for Form B, and the greater variability of the scores of the group taking Form B accounts for the apparent reliability between the means in favor of the experimental Form A.

The critical ratio of 1.83 does not indicate a significant difference between the means of the final Forms A and B. The difference in the means of the revised editions of Form A and Form B can be accounted for, in part, in that Form B was taken by a more heterogeneous group.

In the comparison of the mean scores and standard deviations of the experimental Forms A and B of each school, it was found that the mean scores for freshman and sophomore groups taking Form A was higher than that of Form B and the variability of scores was greater for Form B than for Form A in each school

School 1 ranked highest on Forms A and B, School 5 ranked fifth, and School 6 ranked sixth. The mean scores of

Schools 2, 3, and 4 did not retain the same relative positions on each test.

The mean score of each school was higher on the revised edition of Form A than the revised edition of Form B. The variability of scores in Form B was greater than that of Form A, with the exception of School 3. This coincides with the findings under the experimental forms and grade level, which will be discussed below.

In the comparison of the ranking according to mean scores of the experimental and revised editions of Form A and Form B, it was found that School 1 ranked first, School 5 ranked fifth, and School 6 ranked sixth on each edition of the test. Schools 2, 3, and 4 interchanged places on each test.

The reliability coefficients for the final editions of the tests were found to be  $.88 \pm .02$  for Form A and  $.91 \pm .01$  for Form B, which is as high as the reliability coefficients reported for many standardized, published tests.

The validity of the tests was determined by content and statistical validity. The findings show that each rule, except Rule 7, --Choice of Innings--Fitness of Field for Play--, and the article on "Technique for the Woman Official in Softball"<sup>1</sup> was sampled by one of the revised forms of the tests. The range of the number of items sampling each rule was zero to 13 for

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<sup>1</sup>French, op. cit., pp. 52-56.

each form of the test.

Statistical validity was determined by finding the increase in mean scores in successive grades and by item discrimination or item validity.

The critical ratio was computed between the mean scores of the seniors and the other three grade levels for the final editions of the tests. The comparison showed no significant differences between the mean scores for the grade levels for either test, except between the means of the seniors and freshmen taking Form B of the revised test.

The apparent lack of significant differences between the mean scores of successive grades is due to the fact that the group as a whole were highly selected and given the same training preparatory to taking the tests.

In the selection of items for the final tests, the investigator was concerned with the difficulty and the discriminating power of each item.

The difficulty of items in Forms A and B does not coincide with the statements of authorities as to the range of difficulty of items. The per cent of items missed by the 113 pupils taking Form A ranged from zero to 60, with a mean of  $20.05 \pm 14.65$ . The per cent of items missed by the 112 pupils taking Form B of the test was zero to 59 with a mean score of  $23.00 \pm 12.45$ . The difference in the means is 2.95,

which coincides with the fact that the mean score of right answers in Form A is 81.20 and for Form B, 78.72.

The instructors who participated in this study were challenged by a study being done for graduate work, and they entered into the study wholeheartedly. Each instructor used the suggested methods for teaching the girls to learn the rules. The number of participants was small and motivation was easy.

The pupils who participated in the study represent a highly selected and trained group who showed enough interest in the activity to select it. They have a natural live interest in softball, and they know the need for competent officials. They appreciate a well-conducted game. They like to be able to direct others and to be able to direct their own activities.

The minimum essentials of the softball rules and the duties of officials have been authoritatively set forth in the Official Softball Volley Ball Guide; therefore, they had a definite goal toward which to work.

The combination of these facts accounts for the high percentage of correct responses on Forms A and B of the Softball Information Test.

The discriminating power or the validity index of each of the test items in the experimental editions of Form A and Form B was determined by the use of a numerical index, the biserial coefficient of correlation between the right and wrong responses. The standard error of each biserial  $r$  was

computed and the ratio of the standard error to the size of the biserial  $r$  was determined.

The index of discrimination, the ratio of the standard error to the size of the biserial  $r$ , and the difficulty of each item served as guides in determining which items to eliminate from the tests. For content purposes some deviations were made.

Ten items were eliminated from Form A and seven from Form B. In the opinion of the investigator, most of these items failed to function because of insufficient learning.

The range of the biserial  $r$  for the revised edition of Form A was zero to 1.31.

Four items have biserials exceeding one. The number of incorrect responses was less than 10 per cent, and the incorrect responses were grouped together near the low limit of the range. Therefore, the dichotomy was not normally and continuously distributed, which fact accounts for this absurdity.

Twenty items with a biserial  $r$  less than two times the standard error were retained in the final edition of Form A. The items were valid from the content viewpoint and they appear to be free from technical imperfections.

In the final Form A, the range of the ratio of the standard error to the size of the biserial  $r$  was zero to 15 with a mean of 4.24 standard errors. Eighty-one per cent of the items correlate with the criterion two standard errors and above. Sixty-four per cent of the items have very significant validity correlating with the criterion 2.6 standard errors and above. Fifty-five per cent of the items correlate

with the criterion within the range of 3 to 15 standard errors with a mean of 6.02 standard errors.

The range of the biserial  $r$  for the final edition of Form B is zero to 1.11.

Four items have a biserial exceeding one. The explanation for this is given above.

Eight items of the revised edition of Form B have discriminating power which is insignificant, correlating with the criterion less than 2 standard errors. These items appear to be free from technical weaknesses and they are valid from the content viewpoint.

The range of the ratio of the standard error to the size of the biserial  $r$  was zero to 18.5 with a mean of 5.44 standard errors. Ninety-two per cent of the items have significant validity, correlating with the criterion 2 standard errors and above. Eighty-one per cent correlate with the criterion 2.6 standard errors and above. Seventy-two per cent of the items correlate with the criterion within the range of 3 to 18.5 with a mean of 5.44 standard errors.

### Conclusions and Recommendations

As a result of this study, the investigator offers:

- (1) suggested methods for teaching the pupils to learn the rules preparatory to taking the Softball Information Test, and
- (2) parallel forms of a Softball Information Test which are reliable, objective, and valid and which are suited to the

ability of high school girls who are interested in becoming softball officials.

The investigator recommends the use of the suggested methods for teaching the girls to learn the rules for softball in preparation for the tests. The tests should be preceded by at least five or six weeks of organized instruction and study.

The reliability of the difference between the means of the final editions is insignificant. Therefore, the tests are, for all practical purposes, equal or parallel. The investigator recommends that one form of the test be administered; and if there are pupils who fail on it, that the second form be given after the rules and umpiring techniques have been reviewed.

The tests are valid from both the content and the statistical viewpoints. The reliability coefficients are as high as many of those reported with standardized and published tests.

The Softball Information Test developed in this study is suggested as an instrument to be employed in rating the softball information of high school girls who are interested in becoming softball officials. The investigator cautions against the use of the tests for this purpose unless a period of study precedes the administration of the tests.

The investigator recommends the administration of the Women's National Official Rating Committee's Softball Examination



to a group of high school girls. This examination should be followed by the administration of one of the tests developed in this study. The objective is to determine how closely the scores of the two tests compare.

## APPENDIX

Box 158  
Vidor, Texas  
March 10, 1945

Dear Miss \_\_\_\_\_:

Doctor Mary Agnes Murphy of the Health, Physical Education, and Recreation Department of Texas State College for Women said she had communicated with you and that you might be interested in a project which I have undertaken.

As a thesis, in partial fulfillment of the requirements of my Master's Degree in Health and Physical Education at Texas State College for Women, Denton, Texas, I have constructed a softball information test in parallel forms for high school girls. Also, I have developed a guide of suggested methods as an aid in teaching the pupils to learn the softball rules and umpiring techniques preparatory to taking the test. This test should be given high school girls for determining the objectivity, validity, and reliability. This test is designed for girls who are interested in becoming softball officials, but it may be given to the entire softball class as an information test.

I would like to solicit your cooperation and assistance in administering this project. The tests and suggestions for teaching the rules will be mimeographed and sent to you. I will grade the papers.

If you are interested in becoming a National Rated Softball Official or in rating your pupils, you may apply to the nearest Board. The two in Texas are:

Miss Betty Autry  
University of Texas  
Physical Education Department  
Austin, Texas

Texas State College for Women Officials Rating Board  
Health, Physical Education, and Recreation Department  
Denton, Texas

If you are interested in my project and will administer it in your school, please fill out the enclosed card and return it to me as soon as possible. This project must be completed this spring, so I shall greatly appreciate your prompt reply.

I hope this study will be of sufficient value to all those interested in softball to warrant the expenditure of time and effort.

I thank you in advance for your cooperation.

Sincerely,

Box 158  
Vidor, Texas  
May 1, 1945

Dear Miss -----:

Under separate cover I am sending to you equal numbers of Form A and Form B of the Softball Information Test.

Before the day the examinations are given, the girls should have had experience in taking the three types of questions included in the examination. They are multiple-response, matching, and true-false.

In order to assure objective administration of the tests the following directions are given:

1. All students should take the tests at one time.
2. Preliminary to passing out the tests, everyone should be seated in a comfortable chair, with all distractions removed. Allow no talking or discussion and secure the attention of the group.
3. Pass Form A to every other girl and Form B to alternate girls.
4. Pass the test to each girl and have her turn the face down and wait for the signal to begin.
5. When the group has finished collect the papers and return them to me.
6. Instructions to be given the students before they take the tests:
  - a. The mimeographed papers you have are Softball Information Tests. The tests are arranged in three sections:
    - 1). A section of multiple-response or multiple true-false.
    - 2). A section of matching.
    - 3). A section of single true and false.
  - b. Read the directions carefully before answering the questions.
  - c. Do not rush through the examination. You will have fifty minutes to complete taking the test. Do not waste time on one question. Answer all questions you are sure of, then go back and answer those that are difficult. Answer all questions.
  - d. To avoid distraction, if a question must be asked, hold up your hand and I will come to you and answer it.

- e. When you finish, re-read the examination carefully and if you have answered any statement wrong, make corrections in the answers.
- f. When you have finished taking the test, turn your paper face down and sit quietly until the group has finished.

If it is possible, I would like for you to re-administer the test a few days after the first administration. After the first administration, your group might like to take the test again. In the second administration each student who took Form A the first time should take Form B and vice-versa. If you would like to do this, let me know and I will send the tests.

If you would like to have a key to the tests, I shall be glad to send you one. I will send the money for postage to return the tests to me. Please send the papers to me as soon as you have finished giving the tests, or not later than May 23. If you have any questions, don't hesitate to write me.

Thanks so much for your assistance.

Yours sincerely,

Laverne Sitton

LS:ad

SOFTBALL EXAMINATION  
FORM A

NAME \_\_\_\_\_

SCHOOL \_\_\_\_\_ ADDRESS \_\_\_\_\_

GRADE \_\_\_\_\_ AGE \_\_\_\_\_ SCORE \_\_\_\_\_

## PART I MULTIPLE RESPONSE

Read the first part of the sentence carefully then check all the phrases which make a true statement when combined with the first part of the sentence. None, one, or more phrases under each statement may make true sentences. Be sure to check the true response.

1. A foul hit that touches the batter before touching the ground or another player is called a strike on the:  
☐ a. First hit.  
☐ b. Second hit.  
☐ c. Third hit.
2. A pitched ball touches the batter's clothing while she is standing in position to bat. The ball is:  
☐ a. In play.  
☐ b. Dead.
3. Base runners who have attempted to advance on a foul fly ball that is not caught may return to their bases:  
☐ a. With liability of being put out.  
☐ b. Without liability of being put out.
4. A block occurs when a ~~thrown~~ or batted ball is touched by a:  
☐ a. Spectator.  
☐ b. Fielder in foul territory.  
☐ c. Member of team at bat.
5. When a fair hit ball strikes a base-runner before touching a fielder, the batter is:  
☐ a. Given a "free pass" to first base.  
☐ b. Allowed to advance with liability of being put out.
6. When a batter is struck by a pitched ball making it "four balls," runners on bases may advance:  
☐ a. Before the struck batter gets to first base.  
☐ b. After the struck batter gets to first base.  
☐ c. After the struck batter gets to first base and the ball is put in play by a fielder.  
☐ d. After the struck batter gets to first base and the ball is put in play at the pitcher's position.

7. Runners may advance without liability to be put out:
- ☐ a. When forced to advance by the batter being walked to first base.
  - ☐ b. On an illegally pitched ball not hit by the batter.
  - ☐ c. If the catcher moves out of position before the ball leaves the pitcher's hand.

8. A forfeited game shall be declared in favor of the team not at fault if:

- ☐ a. There are fewer than ten players on a team.
- ☐ b. The order for the removal of a player is not obeyed within one minute.
- ☐ c. A team employs tactics to delay the game.

9. When a substitute enters the game, she:

- ☐ a. Becomes the last batter.
- ☐ b. Must take the place in the batting order of the player for whom she is substituted.
- ☐ c. May play some other position than that of the player for whom she is substituted.

10. The batter shall be declared out if she steps:

- ☐ a. Outside the lines of the batter's position and hinders the catcher in fielding the ball.
- ☐ b. Outside the lines of the batter's position when a runner attempts to steal home.
- ☐ c. From one side of the plate to the other while the pitcher has the ball in pitching position.

11. The batter becomes a base-runner on the third strike if there:

- ☐ a. Are no outs and a runner on first base.
- ☐ b. Is one out and a runner on first base.
- ☐ c. Is one out and no runner on first base.

12. The ball is dead and not in play:

- ☐ a. When a base-runner is called out for leaving her base too soon.
- ☐ b. When a ball is dropped by the pitcher.
- ☐ c. In case of a foul hit ball not legally caught.
- ☐ d. After a fly ball has been legally caught.

13. Base-runners may not advance:

- ☐ a. On an illegally pitched ball not hit fairly by the batter.
- ☐ b. On an illegally pitched ball hit fairly by the batter.
- ☐ c. On a foul bunt.
- ☐ d. On a passed ball legally delivered by the pitcher that should have been held by the catcher with ordinary effort.

14. An illegal pitch shall be declared by the umpire if the pitcher:

- ☐ a. Holds the ball ten seconds.
- ☐ b. Takes more than one step before releasing the ball.
- ☐ c. Makes any motion to pitch without immediately delivering



the ball.

     d. Continues to wind-up after taking a step forward.

15. A runner on third base may score on a:

     a. Wild pitch.

     b. Passed ball.

     c. Throw-back to catcher to pitcher.

16. Which of the following are appeal plays?

     a. Runner fails to touch base.

     b. The third strike is dropped by the catcher and there is one out and a runner on first base.

     c. Runner over-runs first base, starts for second, and then returns to first.

17. When one player is substituted for another:

     a. The player must notify the umpire.

     b. Play is suspended by the umpire.

     c. The captain must notify the score-keeper.

18. Only one umpire is available, first base is occupied; the umpire should stand behind:

     a. The pitcher.

     b. Home plate.

19. Signals used by umpires in softball are:

     a. Uplifted right hand with fingers pointed skyward to indicate number of strikes.

     b. Uplifted left hand with fingers pointed skyward to indicate number of balls.

     c. Clenched fist, thumb thrust over right shoulder to indicate "Out."

20. The ball remains in play:

     a. When a fair hit ball strikes an umpire on foul ground.

     b. When an overthrown ball touches a coacher.

     c. After a foul tip has been legally caught.

## PART II MATCHING

Number each of the following sentences according to the correct decision. Read the sentence first; then find, from the accompanying list, the number of the correct decision and place the number in front of the sentence in the blank.

There are two sections:

### Section I

1. Ball in play

2. Ball

3. Strike

4. Safe

5. No run scored

6. Foul hit ball

7. Out

8. Run scored

- \_\_\_\_(1) A batter bunts a foul after she has had two strikes.
- \_\_\_\_(2) A fair hit ball strikes a base-runner before touching a fielder.
- \_\_\_\_(3) After "four balls" have been called and the batter has reached first base.
- \_\_\_\_(4) A runner touches home base as a third player is called out for leaving her base too soon.
- \_\_\_\_(5) After a fly ball has been caught.
- \_\_\_\_(6) Pitcher makes a motion to pitch but holds the ball.
- \_\_\_\_(7) First baseman juggles the ball after tagging a runner.
- \_\_\_\_(8) A legally batted ball settles on foul territory between home and third base.
- \_\_\_\_(9) With two outs and a runner on second and third, both advance; the runner on second fails to touch third, and is put out; the runner from third crosses home plate during the play.
- \_\_\_\_(10) Runner runs more than three feet outside a direct line between bases in reverse order to avoid being tagged by a fielder.
- \_\_\_\_(11) A pitched ball at which the batter strikes but misses and which touches her.
- \_\_\_\_(12) All bases are full; the batter is given a walk to first base on an illegal pitch.

## Section II

Indicate on the blanks the number of the official who renders the decision, or indicate whether they have equal authority in rendering the decision.

- 1. Plate umpire.
- 2. Base umpire.
- 3. Equal authority.

- \_\_\_\_(1) Removing players from the game.
- \_\_\_\_(2) Illegal pitches.
- \_\_\_\_(3) First base.
- \_\_\_\_(4) Balls and strikes.
- \_\_\_\_(5) Batted balls--fair or foul.
- \_\_\_\_(6) Calling runners out for leaving bases too soon.
- \_\_\_\_(7) Declaring forfeited games.

## PART III TRUE-FALSE

If the statement is correct, encircle the "T". If the statement is totally or partially incorrect, encircle the "F".

- T F 1. The coacher must remain six feet away from the first and third base lines and not closer to home plate than forty-five feet.
- T F 2. A legally batted fly ball that goes over a fence or into a stand less than 200 feet from the home base entitles the batter to a home run.
- T F 3. A fair fly must be judged according to the relative position of the fielder.
- T F 4. If a base-runner leads off a base while the pitcher is in position to pitch, she is safe.
- T F 5. By and with the consent of the opposing captain or manager, a base-runner may have another player run for her.
- T F 6. A fly ball is hit. The ball is caught and played to first base before a runner, who has led off the base, can return; the runner is out.
- T F 7. An appeal play is one in which the umpire does not make a decision until her attention has been called to the play by a member of the fielding team, and the play has been completed.
- T.F 8. A base-runner between bases is declared out if she is touched by the glove in which the ball is held.
- T F 9. The batting order is changed when the player's position is shifted to the field.
- T F 10. If a runner from first base passes a runner from second before the runner from second is put out, the runner from first is out.
- T F 11. An illegal pitch shall be declared if the pitcher in delivering the ball fails to follow through with the wrist and hand passing the stright line of the body.
- T F 12. The time allowed the pitcher in which to deliver the ball is 30 seconds.
- T F 13. The short-fielder may be stationed in either the infield or outfield at any point on fair territory.

- T F 14. When two umpires are used, either umpire may reverse a decision of the other if she was in a better position to judge the play.
- T F 15. A regulation tie-game is re-played.
- T F 16. If a substitute runner runs for another player, the regular player is not eligible for further participation in the game.
- T F 17. A regulation game consists of seven innings.
- T F 18. The infield fly rule protects the team in the field.
- T F 19. On a forced play it is not necessary to tag the runner to put her out.
- T F 20. The umpire may be changed during a game even though she is not incapacitated.
- T F 21. Both teams must play through seven innings in a regulation game.

SOFTBALL EXAMINATION  
FORM B

NAME \_\_\_\_\_

SCHOOL \_\_\_\_\_ ADDRESS \_\_\_\_\_

GRADE \_\_\_\_\_ AGE \_\_\_\_\_ SCORE \_\_\_\_\_

## PART I MULTIPLE-RESPONSE OR MULTIPLE TRUE-FALSE

Read the first part of the sentence carefully; then check all the phrases which make a true statement when combined with the first part of the sentence. None, one, or more phrases under each statement may make true sentences. Be sure to check the true responses.

1. Base-runners may advance without liability to be put out if:  
☐ a. A thrown or pitched ball strikes an umpire.  
☐ b. A ball delivered by the pitcher passes the catcher and touches an obstruction within 25 feet of home plate.  
☐ c. If the umpire declares a foul ball not legally caught.  
☐ d. The pitcher drops the ball or rolls it along the ground.
2. A pitch is legal if:  
☐ a. The pitcher takes more than one step before releasing the ball.  
☐ b. The pitcher holds the ball more than 20 seconds.  
☐ c. The catcher is outside the lines of the catcher's position.
3. A batted ball hits on foul ground, then rolls into fair territory before it touches any object other than the playing field and before it reaches first base. The umpire declares:  
☐ a. Foul ball.  
☐ b. Fair ball.
4. On the second ball delivered to her, the batter hits a ball which goes sharp and direct into the hands of the catcher. The umpire declares:  
☐ a. A strike.  
☐ b. An illegally batted ball.
5. The ball is dead and not in play:  
☐ a. In case of a thrown ball which remains inside the foul lines.  
☐ b. In case an overthrown ball touches a coacher.  
☐ c. In case of interference with a fielder or batter.  
☐ d. If the batter steps from one batter's box to the other when the pitcher is ready to pitch.

6. The batter becomes a base-runner:  
\_\_\_\_ a. Instantly after 3 strikes have been called unless first base is occupied and two are out.  
\_\_\_\_ b. If a fair hit ball strikes the clothing of an umpire on fair ground.
7. A base-runner may return to her base without liability to be put out if the umpire:  
\_\_\_\_ a. Is hit by a fair hit ball before it touches a fielder.  
\_\_\_\_ b. Declares an illegally batted ball.  
\_\_\_\_ c. Declares a batter or base-runner out for interference.
8. A blocked ball is a thrown or batted ball that is touched by a:  
\_\_\_\_ a. Fielder in foul territory.  
\_\_\_\_ b. Person not engaged in the game.
9. If a player from third crosses the home plate during a play in which a third player is put out before reaching first base, the run shall:  
\_\_\_\_ a. Count.  
\_\_\_\_ b. Not count.
10. The coaches may:  
\_\_\_\_ a. Coach the team in the field.  
\_\_\_\_ b. Address words of assistance to their team mates.  
\_\_\_\_ c. Be stationed anywhere in foul territory.
11. A strike shall be called if the:  
\_\_\_\_ a. Batter hits a foul tip and it is caught by the catcher while she is standing within the lines of her position.  
\_\_\_\_ b. Pitcher pitches the ball legally and it goes over the plate between the batter's knees and shoulders.  
\_\_\_\_ c. Batter strikes at and misses a pitched ball which touches part of her person.
12. When a substitute enters the game:  
\_\_\_\_ a. She must take the place in the batting order of the player for whom she is substituted.  
\_\_\_\_ b. The player for whom she is substituted may re-enter the game.
13. A player bats out of turn; if the error is discovered before the improper batter has been put out or has become a base-runner:  
\_\_\_\_ a. The proper batter replaces her and takes the balls and strikes called against the improper batter.  
\_\_\_\_ b. The improper batter completes her turn at bat.  
\_\_\_\_ c. The proper batter takes the place of the batter who batted out of turn.

14. Runners on first and second bases; batter makes a long hit; both runners score but the runner who was on second failed to touch third base; a play is made; the runner beats the ball back to third base and later scores:  
☐ a. Both runs are scored.  
☐ b. Runner from first base is out.
15. The base-runner shall return to her base with liability of being put out if:  
☐ a. The umpire declares a dead ball.  
☐ b. A thrown ball touches a coacher.
16. Bases may be run if the batter is declared out on:  
☐ a. A bunted ball after the second strike.  
☐ b. A ball batted while the right foot is outside the line of the batter's position.  
☐ c. The batter's interference with the catcher.
17. An umpire miscalled a play:  
☐ a. She can reverse her decision after a succeeding play.  
☐ b. The associate should call time and suggest to the umpire that the decision be reversed.
18. One umpire is available; all bases are empty; she should stand behind the:  
☐ a. Pitcher.  
☐ b. Catcher.
19. The batter is out:  
☐ a. If she does not take her batting position within 30 seconds after the umpire has called for batter.  
☐ b. If the third strike struck at and missed touches any part of her person.  
☐ c. If she steps from one batter's box to the other while the pitcher is in position ready to pitch.
20. A base-runner is out:  
☐ a. If she leaves her base while the pitcher is in pitching position.  
☐ b. If, with two outs and a base-runner on third base, the batter interferes with a play at home plate.  
☐ c. If she passes a preceding base-runner before each runner has been legally put out.
21. The batter hits a fly ball. Which official determines whether it is an infield or an outfield fly?  
☐ a. Base umpire.  
☐ b. Plate umpire.

22. The batters are out; runner is on second; batter hits a fly ball which lands in the infield.
- a. Batter is out.
  - b. Runner may advance with liability of being put out.
  - c. Batter becomes a base-runner.

## PART II MATCHING

Number each of the following sentences according to the correct decision. Read the sentence first; then find, from the accompanying list, the number of the correct decision and place the number in the front of the sentence in the blank.

There are two sections.

### Section I

- |                 |                  |
|-----------------|------------------|
| 1. Ball in play | 5. No run scored |
| 2. Ball         | 6. Foul hit ball |
| 3. Strike       | 7. Out           |
| 4. Safe         | 8. Run scored    |

- (1) A fair hit ball strikes an umpire on foul ground.
- (2) A runner touches home plate as a third player is called out for leaving her base before a pitched ball has left the pitcher's hand.
- (3) Runner going from first to second obstructs a fielder who is attempting to field the ball.
- (4) Batter has one strike; she strikes and misses a pitched ball which touches her.
- (5) Pitcher takes 30 seconds to deliver the ball.
- (6) A runner advances from second to third on a fair hit ball. Third baseman tags the base with the ball.
- (7) A fair hit ball strikes a base-runner before it touches a fielder.
- (8) A batted ball touches inside the diamond, then rolls foul before it reaches third base.
- (9) All bases are full; batter is given a walk.
- (10) A fair hit ball strikes an umpire on fair ground after passing a fielder.



- \_\_\_\_(11) The pitcher takes two steps before delivering the ball.
- \_\_\_\_(12) A base-runner is called out for leaving her base too soon.

## Section II

The signals and decisions used by umpires are listed below. Indicate on the blank the decision the umpire makes when she uses the signal.

1. Out
2. Safe
3. Strike
4. Foul
5. Ball
6. Time

- \_\_\_\_(1) Uplifted right hand, fingers pointing skyward.
- \_\_\_\_(2) No arm signal.
- \_\_\_\_(3) Outstretched arms, obliquely down and out to side, palms down.
- \_\_\_\_(4) Raised left or right arm to indicate direction of a ball.
- \_\_\_\_(5) Clinched fist, thumb thrust over right shoulder.
- \_\_\_\_(6) Arms extended above the head.

## PART III TRUE-FALSE

If the statement is correct, encircle the "T". If the statement is totally or partially incorrect, encircle the "F".

- T F 1. An associate umpire has the right to reverse a decision made by an umpire.
- T F 2. A runner must be touched with the ball to be put out.
- T F 3. The pitcher must wear a dark blue or black uniform with no lettering on the front.
- T F 4. If, before two are out, while first and second, or first, second, and third are occupied, the batter hits a fly ball which is handled or should be handled in the infield, she is out.

- T F 5. A game may be forfeited in favor of the team not at fault if, after warning by the umpire, a player willfully violates any of the rules.
- T F 6. A base-runner shall be declared out for leaving her base too soon if the pitcher is in position ready to pitch but the catcher is out of her box.
- T F 7. In case of a force-out it is necessary to tag the runner in order to put her out.
- T F 8. The batter strikes at but misses an illegally pitched ball; the umpire calls a strike.
- T F 9. A ball which touches the bat while the batter is attempting to avoid being hit by a pitched ball shall be considered a bunt.
- T F 10. The batter is out after the third strike if there are no outs, a runner on first base, and the catcher drops the ball.
- T F 11. A fair hit ball that bounds into the stands shall be a three base hit.
- T F 12. Gloves may be worn by any player.
- T F 13. The preliminary starting position for pitching is both feet in contact with the pitcher's plate and the body facing first or third base line.
- T F 14. Baseman tags runner before she reaches base, then juggles ball but retains possession of it. Umpire declares runner out.
- T F 15. When a block occurs, the base-runners, without liability of being put out, may advance one base in addition to the one to which they were going at the start of the play.
- T F 16. The umpires have equal authority in removing players from a game.
- T F 17. The pitching distance remains the same when a 45 foot diamond is used instead of a 60 foot diamond.
- T F 18. A force-out may occur only at second or third base.

- T F 19. A runner from third may score on a throwback from catcher to pitcher.
- T F 20. The pitcher can stop a play already in action by returning to pitching position.
- T F 21. A base-runner is out if she runs more than three feet outside the base line to avoid being tagged.
- T F 22. Base-runners may advance at their own risk on an illegally batted ball.
- T F 23. When a base-runner leaves her base before foul or fair hit ball and is legally caught, she is declared out, automatically.
- T F 24. If the pitcher makes an illegal delivery, the base-runners may advance on base without liability to be put out.
- T F 25. The umpire can be changed during the game by the consent of the contesting clubs.

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