

Manual for  
Kit of Reference Tests for Cognitive Factors  
(Revised 1963)

JOHN W. FRENCH  
RUTH B. EKSTROM  
LEIGHTON A. PRICE

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Office of Naval Research Contract Nonr-2214(00)  
Project Designation NR 151-174  
John W. French, Principal Investigator

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Educational Testing Service  
PRINCETON, NEW JERSEY

June 1963

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## INTRODUCTION

The tests in this Kit are suggested for use in factorial studies where representation is desired for any of the following named aptitude or achievement factors:

Flexibility of Closure, Cf  
Speed of Closure, Cs  
Associational Fluency, Fa  
Expressional Fluency, Fe  
Ideational Fluency, Fi  
Word Fluency, Fw  
Induction, I  
Length Estimation, Le  
Associative (Rote) Memory, Ma  
Mechanical Knowledge, Mk  
Memory Span, Ms  
Number Facility, N  
Originality, O  
Perceptual Speed, P  
General Reasoning, R  
Semantic Redefinition, Re  
Syllogistic Reasoning, Rs  
Spatial Orientation, S  
Sensitivity to Problems, Sep  
Spatial Scanning, Ss  
Verbal Comprehension, V  
Visualization, Vz  
Figural Adaptive Flexibility, Xa  
Semantic Spontaneous Flexibility, Xs

The purpose of the Kit is to provide research workers with a set of tests for defining each of these factors. It is intended that use of the Kit tests for this purpose will facilitate interpretation and the confident comparison of one factor study with another. In the past it has often been necessary to cross-identify the factors in two studies by means of psychological interpretation alone, sometimes without any tests common to the two studies. It is undesirable that this kind of subjective identification prevail. There are now in existence several

techniques for objectively comparing a factor found in one analysis with that found in another (10, 12, 68). All methods of this kind require sets of tests that are common to the two studies. Use of the Kit tests should provide this common ground for the objective comparison of factors.

While frequent use of these tests should permit a clarity of factorial descriptions not usually possible heretofore, it should also be noted that the intention is not to inhibit an investigator who may be led by special circumstances or a hunch to suggest alternate measures. The systematizing of scientific procedures should never be allowed to restrict creative ingenuity.

This manual does not provide the usual reliability, norming, validity, or other information ordinarily expected in a test manual. Such information has not been included because these tests are suggested for the single purpose of factorial research. It may be expected that use of these tests will ordinarily cause the named factors to appear. However, particular conditions of the testing or of the analysis may sometimes prevent a factor from separating as expected.

#### Development of the Kit

At a conference of persons interested in multiple factor analysis which convened at Educational Testing Service in November 1951, it was recommended that a project be organized to select tests to represent each of the better established factors in the cognitive area.

Separate but overlapping committees were assigned to work on each factor. The tests for each factor were selected so as to be: (a) three in number, (b) such as to provide for covering as much of the range from sixth grade through college as possible, (c) as factorially pure as

possible for the intended factor, (d) as different as possible to balance out uniqueness, and (e) reasonably easy to administer by paper-and-pencil methods. The committees were also to agree on a name for the factor, a symbol, and a description.

The separate committees, for the most part, did not convene after the initial conference, but came to an agreement by mail with regard to each factor and the tests selected to represent it. The committee chairmen sent the results of their correspondence to the editor, and a draft report of the outcome was distributed for comment. Following the suggestions of the committee as set down in the draft report and in the comments upon it, the editor obtained tests that were available for direct reproduction, or adapted tests as specified by the committees. In 1954 a Kit consisting of a manual and specimen sets of reference tests for each of 16 factors was published.

A second and similar conference was convened in November 1958, this time with the support of the Office of Naval Research. There followed committee activity similar to that leading to publication of the 1954 Kit. This activity resulted in the selection of 24 factors and the naming of tests suitable for defining them.

One important change, agreed to at the initiating conference, has been made in the nature of the tests appearing in the Kit. Whereas the tests in the first Kit were usually exact copies of those used in earlier factor studies, most of the tests in the present edition have been newly adapted for the purposes of the Kit. It was felt by participants of the conference that, except for tests of some of the more esoteric factors, this could be done without running the risk of altering the factor composition of the tests.

Adaptation of the tests was undertaken for several reasons:

(1) to give tests a relatively uniform format, and to rewrite test directions so as to be as clear as possible, (2) to give almost all of the tests two separately-timed parallel parts to permit the use of short, one-part forms when necessary for administrative convenience and to permit the proper estimation of test reliability, and (3) to avoid requiring researchers to obtain special permissions, items were frequently rewritten with the consent of test authors.

While adaptations of test ideas, as contrasted to use of particular items, is not considered to be an infringement on the copyright of a test, permission to make the adaptations was obtained from test authors, from Mrs. Thurstone in the case of her husband's tests.

Generally, tests which carry the acknowledgement line "Adapted from..." are parallel with the original test, often by matching the individual new items to old ones. Tests which carry the acknowledgement line "Suggested by..." use item types similar to those in the original test but are not parallel.

Of vital importance to researchers is the question of whether an adapted test should be used as a factor reference test prior to its own repeated use in factor analyses. For some simple tests the adapted form's parallelism to the original form seems obvious. For other tests similarity of factorial content seems highly likely but not obvious. Such tests need trial as reference tests in repeated factor studies, but there is justification in predicting factorial content even before such trial. The reasonableness of using newly adapted tests as factor reference tests rests on the reasonableness for engaging in factorial research in the first place. If we find so little psychological meaning



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in a factor that it is impossible to develop parallel test forms for it, we probably should not consider the factor worth marking with reference tests.

#### Answer Sheets

Because of the many different needs that research workers have with regard to answer sheets for machine use or for hand-scoring, and because many of these tests do not adapt themselves to the use of answer sheets, nearly all of these tests are set up for scoring in the test booklet itself. However, with only minor changes in the directions, many of these tests could be used with an answer sheet. In general, the use of answer sheets should not disturb the factorial content of a test except for highly speeded tests where the time spent by a student in marking his answer sheet affects the number of items he can complete in the time allowed.

#### Copyrights and Permissions

All tests are copyrighted for the protection of their authors and publishers against the possibility of someone's adapting the tests for commercial use. The copyright is not intended to restrict use of the tests for research purposes. In fact, by means of test adaptation and through negotiation, much effort has been expended in making the tests as readily available as possible. The following conditions are to be observed according to the copyright noted in this manual for each test:

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Notes: 1. Reproduction of any tests should include the copyright.

2. When reporting on studies using these tests, it is permissible to describe the tests or to use sample items from the test directions, but do not reprint the tests themselves or any items from the body of the tests.

#### Information to be Found in the Manual

For each of the 24 factors covered in the Kit, the following information is supplied:

1. Factor symbol and name as agreed to by the committees. The factors appear in alphabetical order by symbol. The symbols

are usually those that have traditionally been used for the factor, but they have sometimes been changed to keep together factors that are psychologically similar.

2. Brief definition or psychological interpretation of the factor. The terminology used in these definitions implies the interpretation of factors as abilities, but this is done only for convenience; the work on this project revealed nothing either to favor or to deny the interpretation of factors as abilities.
3. One or more paragraphs further describing the factor, discussing its relationship to other factors, or discussing the evidence for its existence.
4. Identification of the factor in terms of the "Universal Index" number proposed by Cattell (11), the position in Guilford's "Structure of Intellect Model" (40), or Thurstone's letter symbol.
5. References to the studies in which the factor has been found.

For each of the selected tests, the following information is supplied:

- A. The name of the test. Where the test is an adaptation of a test discussed in the literature, the name is usually changed slightly so as to permit association between the two and yet to suggest that they are not the same test.
- B. A symbol for each test. The symbol for each test includes the symbol for the factor and a number. The numerical order of the tests within each factor has no significance.
- C. Acknowledgement to the originator of the test idea, brief description of the test, and holder of the copyright. (See above section on copyrights and permissions.)
- D. Length of the test in terms of number of items and time limit.

E. The grade levels recommended for the tests.

Note: Keys for all tests are contained in a separate section at the end of this manual.

## DESCRIPTIONS OF FACTORS AND TESTS

### Factor Cf: Flexibility of Closure

The ability to keep one or more definite configurations in mind so as to make identification in spite of perceptual distractions.

Tests of this factor require the subject to search in a perceptual field containing irrelevant or distracting material in order to find one or more given configurations. Flexibility of closure is believed to be related to Field-Independence, a dimension described by Witkin (74) and Witkin et al. (75). Guilford's Hidden Pictures and Penetration of Camouflage have appeared on this factor, but not as clearly. In those two tests the subject does not know the exact configurations for which to look.

Identification: Cattell's U.I. T2; Guilford's NFT; Thurstone's Closure 2.

References: Analysis Th. D. in 29, and in 9, 26, 58, 60, 64, and 70.

#### Selected Tests

##### Cf-1, Hidden Figures Test

An adaptation of the Gottschaldt Figures Test popularized by Thurstone (29). The task is to decide which of 5 geometrical figures

is embedded in a complex pattern. The difficulty level of this test is high. This particular form of the test was developed in connection with a project designed to study Field-Independence. The test has some variance on Factor S. Copyright ETS.

Length of each part: 16 items, 10 minutes

Suitable for grades 6-16

#### Cf-2, Hidden Patterns Test

A test suggested by Thurstone's Designs. Each item consists of a given geometrical pattern in some of which a single given configuration is embedded. The task is to mark each pattern in which the configuration occurs. These are easy items given under speeded conditions. Copyright ETS.

Length of each part: 200 patterns, 2 minutes

Suitable for grades 6-16

#### Cf-3, Copying Test

A test suggested by a sub-test of this name in MacQuarrie's Test for Mechanical Ability and by Thurstone's adaptation of it. Each item consists of a four-line geometrical figure and a square matrix of dots. The task is to copy the figure onto the dots. It is believed that the copying test requires Flexibility of Closure in the act of superimposing the particular configuration on a strong visual field consisting of the matrix of dots. Copyright ETS.

Length of each part: 32 figures, 3 minutes

Suitable for grades 6-16

### Factor Cs: Speed of Closure

The ability to unify an apparently disparate perceptual field into a single percept.

All of the elements in the presented field participate in a unified closure. One simple differentiation between this factor and Flexibility of Closure is that in Speed of Closure the subject does not know what he is looking for, whereas in Flexibility of Closure he looks for a given configuration within a distracting field. A third test of this factor called Four-Letter Words, in which the task is to pick words out of a continuous series of capital letters, was used as a marker for this factor in the earlier edition of this Kit, but is not recommended here because of a high loading on a possible factor called Verbal Closure appearing in (58) and (60). Verbal Closure also loaded Anagrams and Scrambled Words in (60). Concealed Words, test Cs-2, is also likely to have a loading on Verbal Closure.

Identification: Cattell's U.I. T3; Guilford's CFU; Thurstone's Closure 1.

References: 2 studies in 29 (KaC and ThD), and in 1, 9, 26, 27, 46, 58, 60, 64, 70, and 73.

#### Selected Tests

##### Cs-1, Gestalt Completion Test

A test suggested by the Street Gestalt Completion Test. Drawings are presented which are composed of black blotches representing parts of the objects being portrayed. The subject writes down the name of

the objects, being as specific about them as he can. Copyright ETS.

Length of each part: 10 pictures, 3 minutes

Suitable for grades 6-16

Cs-2, Concealed Words Test

A test suggested by Thurstone's Mutilated Words. Words are presented with parts of each letter missing. The subject is to write out the full word in an adjacent space. Copyright ETS.

Length of each part: 25 words, 3 minutes

Suitable for grades 6-16

Factor Fa: Associational Fluency

The ability to produce words from a restricted area of meaning.

This factor involves an awareness of some similarity in the meanings of words amid the differences. The more associations that the subject has that are tied to a word and the more he is willing or flexible enough to work at a crude level of analogy or similarity, the higher will be his score on tests of this factor. Because of the limited number of tests found to have consistent loadings on this factor, the tests Fa-1 and Fa-2 are more similar than is desirable.

Identification: Guilford's DMR.

References: 3 studies in 29 (Be, Fr, and ThB), and in 38, 41, 48, 49, 55, 56, 69, and 73.



### Selected Tests

#### Fa-1, Controlled Associations Test

A test adapted from Thurstone's test of this name. The task is to write as many synonyms as possible (up to 12) for each of 4 words. The score is the number of words written that are related to the stimulus word. Copyright ETS.

Length of each part: 4 given words, 6 minutes

Suitable for grades 6-16

#### Fa-2, Associational Fluency I

A test by Christensen and Guilford in which the subject is asked to write as many synonyms as possible for each of 2 words given in each part. The score is the number of words written that are reasonably similar in meaning to the stimulus word. Copyright Sheridan Supply Co.

Length of each part: 2 given words, 2 minutes

Suitable for grades 6-16

#### Fa-3, Associations IV

A test by J. P. Guilford. The task is to produce a word that is associated with both the 2 given words but which has a different meaning in its relationship to each of them. Copyright J. P. Guilford.

Length of each part: 15 items, 7 minutes

Suitable for grades 6-16

**Factor Fe: Expressional Fluency**

The ability to think rapidly of appropriate wording for ideas.

This factor concerns fluency in composing connected discourse as contrasted with fluency in producing single words. It also contrasts with Ideational Fluency in that the ideas are already given or are not central to the task. The emphasis in these tests is on facility in producing connected discourse that will fit restrictions imposed in terms of given ideas, words, or letters. In the earlier history of this factor these distinctions were not recognized as crucial to the factor.

Identification: Guilford's DMS.

References: Defined as above, the factor has been found in 2 studies (CJA and Ta) in 29, and in 28, 38, and 41.

**Selected Tests****Fe-1, Expressional Fluency**

A test developed in Guilford's project. The task is to write as many 4 word sentences as possible when the first letter of each word is given. This test is similar to Carroll's Letter - Star Test. Copyright Sheridan Supply Co.

Length: 4 parts consisting of a set of 4 letters, 2 minutes for each part

Suitable for grades 8-16

Fe-2, Simile Interpretations

A test developed in Guilford's project. Incomplete sentences of the form "A woman's beauty is like the autumn because..." are presented. The task is to complete the sentences in as many ways as possible by giving different explanations for the simile. Copyright J. P. Guilford.

Length of each part: 2 sentences, 2 minutes

Suitable for grades 8-16

Fe-3, Word Arrangements

A test developed in Guilford's project. The task is to write as many sentences as possible containing a set of 4 specified words. Copyright J. P. Guilford.

Length of each part: one set of 4 words, 4 minutes

Suitable for grades 8-16

Factor F1: Ideational Fluency

The facility to call up ideas wherein quantity and not quality of ideas is emphasized.

This factor is characterized by tasks requiring a writing down of ideas about a given topic as fast as possible. Emphasis in the scoring is on quantity. Quality enters the picture only as it must be satisfactory to the subject as he interprets the task to be performed. Since few subjects are able to produce ideas fast enough to write continually, actual motor speed in manipulating a pencil is not important. Since

quality of ideas or of language is not counted, variance on verbal skills is minimized. See Factor V for mention of this factor in a bilingual study.

Identification: Cattell's U.I. T6; Guilford's DMU.

References: 4 studies in 29 (Be, CJA, Jo, and Ta), and in 1, 4, 38, 42, 44, 48, 49, 55, 68, and 73.

#### Selected Tests

##### Fi-1, Topics Test

Adapted from Calvin Taylor's version of a test by R. B. Cattell. The task is to write as many ideas as possible about a given topic. The score is the number of separate ideas (phrases or sentences) written. Copyright ETS.

Length of each part: one topic, 4 minutes

Suitable for grades 8-16

##### Fi-2, Theme Test

Adapted from Taylor's version of a test by Cattell. The task is to write as much as possible about a given topic. The score is the number of words written. Copyright ETS.

Length of each part: one theme, 4 minutes

Suitable for grades 8-16

##### Fi-3, Thing Categories Test

Adapted from Taylor's Things Round, a version of a test by Cattell. The subject is asked to list the names of things that are alike in a

specified way. The score is the number of names of things listed.

Copyright ETS.

Length of each part: one category, 3 minutes

Suitable for grades 8-16

#### Factor Fw: Word Fluency

Facility in producing isolated words that contain one or more structural, essentially phonetic, restrictions, without reference to the meaning of the words.

This facility may largely be an effectiveness in the use of alphabetic phonetics in making a systematic search for words which will fit certain restrictions. For example, a word-fluent person, in his search for words, may mouth sounds, such as Ba, Be, Bo, etc. The tasks are limited to the speed of producing words that fit restrictions, which are broad enough to allow a relatively large pool of words, including many simple ones, to be appropriate. Of importance to the task may be the size of the person's pool of appropriate words, but probably of greater importance is the orthographic habit pattern or strength of the associations between letters or sets of letters and words. See Factor V for mention of this factor in a bilingual study.

Identification: Cattell's U.I. T15; Guilford's DSU; Thurstone's W.

References: 8 studies in 29, and in 1, 3, 9, 38, 39, 41, 42, 60, and 73.

Selected TestsFw-1, Word Endings Test

Similar to Thurstone's Suffixes. The task is to write as many words as possible ending with certain given letters. The score is the number of words written. Copyright ETS.

Length of each part: one set of letters, 3 minutes

Suitable for grades 6-16

Fw-2, Word Beginnings Test

Similar to Thurstone's Prefixes. The task is to write as many words as possible beginning with certain given letters. The score is the number of words written. Copyright ETS.

Length of each part: one set of letters, 3 minutes

Suitable for grades 6-16

Fw-3, Word Beginnings and Endings Test

Similar to Thurstone's First and Last Letters. The task is to write as many words as possible beginning with one given letter and ending with another. The score is the number of words written. Copyright ETS.

Length of each part: one pair of letters, 3 minutes

Suitable for grades 6-16

### Factor I: Induction

Associated abilities involved in the finding of general concepts that will fit sets of data, the forming and trying out of hypotheses.

Recent factor studies indicate the presence of several factors in this area and some disagreement among investigators. It does not seem possible to define satisfactorily the several distinct induction factors at this time. In place of this, a second-order factor is defined here and called Induction. The three tests may join separate factors when the battery contains many other tests of an inductive nature, but they have been found to correlate with each other and will define a factor representing induction when it is desired to separate inductive variance from factors in other areas. The three tests described below represent three content areas--letters, patterns, and numbers--and, in Guilford's terminology, two kinds of products--classes and systems.

Identification: Cattell's U.I. T5.

References: 9 studies in 29, and in 1 and 9. In Guilford's laboratory several sub-factors of induction have been found.

#### Selected Tests

##### I-1, Letter Sets Test

Suggested by Thurstone's Letter Grouping. Five sets of four letters each are presented. The task is to find the rule which relates four of the sets to each other and to mark the one which does not fit the rule. Copyright ETS.

Length of each part: 15 items, 7 minutes

Suitable for grades 8-16

I-2, Locations Test

Adapted from Thurstone's Marks. For each item, five rows of places and gaps are given. In each of the first four rows one place in each row is marked according to a rule. The task is to discover the rule and to mark one of 5 numbered places in the fifth row accordingly. Copyright ETS.

Length of each part: 14 items, 6 minutes

Suitable for grades 8-16

I-3, Figure Classification

This test is an adaptation of a North Carolina version of Thurstone's test of the same name. Each item presents 2 or 3 groups each containing 3 geometrical figures that are alike in accordance with some rule. The second row of each item contains 8 test figures. The task is to discover the rules and assign each test figure to one of the groups. Copyright ETS.

Length of each part: 14 items each with 8 test figures, 8 minutes

Suitable for grades 8-16



### Factor Le: Length Estimation

Ability to judge and compare visually perceived distances on paper.

Research has not progressed far enough to have explored the importance or generalizability of this factor; for example, the judgment of areas and volumes may not be factorially discriminable from the perception of distance. For the time being, Length Estimation should be considered to involve distance perception in two dimensions. Tests of this factor are likely to involve variance in proneness to optical illusions (see 64), but this may be a separate ability and will, therefore, be regarded as error in measuring Length Estimation.

References: 4 studies in 29 (AFI, AFL, AFN, and WoA), and in 35, 63, and 64.

#### Selected Tests

##### Le-1, Estimation of Length Test

Adapted from AAF Printed Classification Tests (34). Each item consists of lines  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches in length oriented in different directions. This is to be compared with a set of 5 pairs of companion lines at the center of the page. The test lines may be as long as or twice as long as the companion lines. This is a speeded test. Copyright ETS.

Length of each part: 40 items, 3 minutes

Suitable for grades 6-16

##### Le-2, Shortest Road Test

Adapted from AAF Printed Classification Tests. Each item consists of 2 points. Three curved or angular lines are drawn between these

22

2 points. The task of the examinee is to select the shortest of these lines. Copyright ETS.

Length of each part: 28 items, 2 minutes

Suitable for grades 6-16

Le-3, Nearer Point Test

Adapted from AAF Printed Classification Tests. Each item consists of 2 dots, a reference point, and some distracting lines and figures. The task is to select the dot that is nearer to the reference point. Copyright ETS.

Length of each part: 30 items, 2 minutes

Suitable for grades 6-16

Factor Ma: Associative (Rote) Memory

The ability to remember bits of unrelated material.

Although paired-associates tests usually have higher loadings on this factor than other rote memory tests such as recognition, the name Rote Memory might be preferable to Associative Memory. Tests requiring recall of items in isolation do not have a loading on this factor. It is possible, although there has been no clear demonstration yet, that this factor represents the ability to form and remember new associations quickly. For this reason and also to provide historical continuity in both name and symbol, the above title for the factor will be used.

Identification: Cattell's U.I. T7; Guilford's MSR; Thurstone's M.

References: 16 studies listed in 29, and in 3, 13, 15, 35, 42, 47, 76, and 78. Studies 1, 63, and 64 have factors that may be this one, but seem more visual in nature.

#### Selected Tests

##### Ma-1, Picture-Number Test

Adapted from a test by Anne Anastasi. The subject examines pictures of common objects, each paired with a 2-digit number. Later, when the pictures are presented to him in a different order, he writes the appropriate number under each. Copyright ETS.

Length of each part: 21 items, 4 minutes for memorizing, 3 minutes for testing

Suitable for grades 6-16

##### Ma-2, Object-Number Test

Adapted from Thurstone's Word-Number. The subject examines 20 word-number pairs. Later, when the words are presented to him in a different order, he writes the appropriate number beside each word. Copyright ETS.

Length of each part: 15 items, 3 minutes for memorizing, 2 minutes for testing.

Suitable for grades 6-16

##### Ma-3, First and Last Names Test

Adapted from Thurstone's First Names. The subject examines 20 full names, including first and last. Later, when the last names are

presented to him in a different order, he writes the appropriate first name in front of each last name. Copyright ETS.

Length of each part: 15 items, 3 minutes for memorizing, 2 minutes  
for testing

Suitable for grades 6-16

Factor Mk: Mechanical Knowledge

Knowledge of mechanical principles, devices, and tools, acquired through experience and training.

Although this factor differs from the others in this collection by being relatively more dependent upon special experience, it is included because of its importance in our culture and its prominence in the experimental literature of factor analysis. "Mechanical ability" is a concept that is often used in lay connections. In factorial terms, this popular concept appears to be a mixture of Mechanical Knowledge and Visualization. Therefore, it is well measured by two tests that load both factors Mk and Vz: Mechanical Movements, which emphasizes Visualization, and Mechanical Comprehension, which emphasizes Mechanical Knowledge. The three tests listed below have been found to be relatively pure measures of Mechanical Knowledge.

Identification: AAF's Mechanical Experience; Cattell's U.I. T9.

References: 17 studies listed in 29, and in 1, 3, 13, 23, 25, 28, 36, 63, and 77. Those making the distinction between Factors Mk and Vi are: 23, 25, 28, 36, and 63.

## Selected Tests

### Mk-1, Tool Knowledge Test

This test is patterned after Navy mechanical tests. Each item presents the picture of an object used in some mechanical operation along with the pictures of 3 tools or other objects. The task is to select the one of the 3 tools which is commonly used with the first object. Copyright ETS.

Length of each part: 15 items, 5 minutes

Suitable for grades 6-16

### Mk-2, Mechanical Information

This is a factual information test in practical, work-shop mechanics. Each item has 4 response choices usually consisting of the name of a tool or a part of some machine. Copyright ETS.

Length of each part: 15 items, 5 minutes

Suitable for grades 8-16

### Mk-3, Electrical Information

This is a factual information test in practical electrical and simple electronics problems of the kind that might be encountered in do-it-yourself repairs. Each item offers 4 alternative responses. Copyright ETS.

Length of each part: 15 items, 6 minutes

Suitable for grades 8-16

### Factor Ms: Memory Span

The ability to recall perfectly for immediate reproduction a series of items after only one presentation of the series.

This factor is not limited to digit and letter span tests, but these seem to provide by far the purest measures of the factor. The modality of presentation (visual or auditory) does not seriously affect factor loadings. Requiring responses in reverse order rather than in the same order as the presentation probably makes little difference to the factor loadings, but more extensive evidence on this point is needed.

Identification: Guilford's MSU and, possibly, MSS.

References: 2 studies listed in 29 (Ba2 and WoB), and in 6, 45, 46, 47, and 63.

#### Selected Tests

##### Ms-1, Auditory Number Span Test

Test developed by Kelley (47). This is a conventional digit-span test with digits in series of varying length being read at a speed of one second per digit. The examinees must not start writing until the series has been completed. The test is not divided into two parts, because each item is separately administered allowing parts of the test to be scored separately in any way that seems desirable.

Note: The test items to be read by the examiner are contained in the Key to this test at the end of this manual. Copyright ETS.

Length: 24 series, about 10 minutes.

Suitable for grades 6-16

Ms-2, Digit Span - Visual

Test developed by Kelley. The items in this test are parallel with those for Ms-1, but they are presented by having each digit printed on a large card, and by flipping over one card per second or otherwise exposing one digit per second for the examinees to see. It is important that the digits be large enough and so placed as to be clearly visible to all subjects.

Note: It will be necessary for users to produce their own digit cards. A suitable set of digits appears as the Key to this test at the end of this manual. Copyright ETS.

Length: 24 series, about 10 minutes

Suitable for grades 6-16

Ms-3, Letter Span - Auditory

Test developed by Kelley. This test is similar in manner of presentation and in length to Ms-1, except that letters are used instead of digits.

Note: The test items to be read by the examiner are contained in the Key to this test at the end of this manual. Copyright ETS.

Length: 24 series, about 10 minutes

Suitable for grades 6-16

### Factor N: Number Facility

The ability to manipulate numbers in arithmetical operations rapidly.

Tests involving memory for numbers, counting, plotting on numbered coordinates, and a host of others have a loading on this factor as well as on factors related to other aspects of these tasks. The tests of the four arithmetical operations are outstanding with respect to purity on the factor and size of loadings. There is a little evidence that certain kinds of manipulation of symbols other than numbers can load this factor. In particular, completely non-numerical tests having to do with coding have a moderate loading on Factor N (Th A in 29, 33, 35, 63, 78). Speed of reading is likely to have a loading on this factor also (La and Th A in 29), but this may be a result merely of Factor N's alignment with a second-order speed factor. Sometimes reading comprehension tests have a loading on Factor N, but this is usually where the "Factor N" may really be close to the General Reasoning dimension (AFO, Du 2, and M1A1 in 29).

This factor has been found in at least 50 published studies.

Identification: Cattell's U.I. T10; Guilford's NSI or, possibly, MSI.

#### Selected Tests

##### N-1, Addition Test

Adapted from numerous tests of this factor. This is a speed test of the addition of sets of three 1- or 2- digit numbers. Copyright ETS.

Length of each part: 60 items, 2 minutes

Suitable for grades 6-16



N-2, Division Test

Adapted from numerous tests of this factor. This is a speed test in dividing 2- or 3-digit numbers by single-digit numbers. Copyright ETS.

Length of each part: 60 items, 2 minutes

Suitable for grades 6-16

N-3, Subtraction and Multiplication Test

Adapted from numerous tests of this factor. This is a speed test alternating 10 items of subtracting 2-digit numbers from 2-digit numbers and 10 items of multiplying 2-digit numbers by single-digit numbers. Separate tests of subtraction and multiplication would work equally well. However, perseverational effects arising from alternating tasks have given no trouble for this particular 10-item alternation (28).

Copyright ETS.

Length of each part: 60 items, 2 minutes

Suitable for grades 6-16

**Factor O: Originality**

The ability to produce remotely associated, clever, or uncommon responses.

Several tests of each of three kinds of response production referred to in the definition above have been included in the same analysis (73) without pulling apart into sub-factors. This grouping, then, seems to be relatively stable. The factor has been found six times in Guilford's project but not at any other laboratory. Therefore, the tests selected for this factor are the ones selected by Guilford and Merrifield (40) from among tests developed at their laboratory.

References: 4, 38, 48, 49, 56, and 73.

Identification: Guilford's DMT.

**Selected Tests****O-1, Plot Titles (clever)**

The task is to write titles for story plots. The score is the number of clever titles written. Copyright Sheridan Supply Co. (pre-publication).

Length of each part: one story plot, 3 minutes

Suitable for grades 10-16

**O-2, Symbol Production**

The task is to produce symbols to represent given activities and objects. Copyright J. P. Guilford.

Length of each part: 31 or 30 items, 5 minutes

Suitable for grades 10-16

### 0-3, Consequences (remote)

The task is to list the consequences of certain hypothetical situations. The score is the number of indirect or remote consequences written. Copyright Sheridan Supply Co.

Length of each part: 2 minutes for each of 10 hypothetical situations  
Suitable for grades 10-16

### Factor P: Perceptual Speed

Speed in finding figures, making comparisons, and carrying out other very simple tasks involving visual perception.

The concept of Perceptual Speed being defined here can be considered to be the centroid of several sub-factors which have been separated (3), but which, for most purposes, are likely to be useful when considered as a unitary concept. The sub-factors have been named or defined as (a) speed of symbol discrimination, Cattell's U.I. T12, Guilford's ESU, (see test P-1), (b) speed of making comparisons as in many tests of "clerical aptitude" (see test P-2), (c) speed of form discrimination as in recognizing predetermined but novel configurations, Guilford's EFU, (see test P-3), (d) speed of classification of readily discriminable configurations into categories, and possibly others.

References: Only two studies (3 and 21) have actually separated any of the sub-factors of Perceptual Speed, in this case Form Discrimination and Symbol Discrimination. The Perceptual Speed factors seem psychologically distinct, although they tend to pull together into

a single factor when only one or two tests of each are included in the battery. In the last 10 years Making Comparisons and Form Discrimination have appeared on the same factor in eight studies (32, 43, 57, 63, 64, 73, 77, 79); Making Comparisons and Symbol Discrimination have appeared on the same factor in one study (28); and Symbol Discrimination and Form Discrimination have appeared on the same factor in one study (42). Form Discrimination appeared alone in (17, 33, 35, and 60); Symbol Discrimination in (50). Thirty-four other studies having Perceptual Speed factors are listed in (29).

#### Selected Tests

##### P-1, Finding A's Test

Adapted from Thurstone's Letter "A." In each column of 41 words, the task is to check the 5 words having the letter "a." The score is the number of words correctly checked. Copyright ETS.

Length of each part: 1,025 words, 2 minutes

Suitable for grades 6-16

##### P-2, Number Comparison Test

Adapted from the Minnesota Vocational Test for Clerical Workers. The subject inspects pairs of multi-digit numbers and indicates whether the two numbers in each pair are the same or different. Copyright ETS.

Length of each part: 48 items, 1½ minutes

Suitable for grades 6-16

##### P-3, Identical Pictures Test

Adapted from tests originally by Thurstone. For each item the subject is to check which of 5 numbered geometrical figures or pictures

in a row is identical to the given figure at the left end of the row.

Copyright ETS.

Length of each part: 48 rows,  $1\frac{1}{2}$  minutes

Suitable for grades 6-16

#### Factor R: General Reasoning

The ability to solve a broad range of reasoning problems including those of a mathematical nature.

While mathematical reasoning tests are the most widely used tests that load on this factor, numerous other tests of a problem solving kind also load on it. Ship Destination has consistently loaded on this factor in Guilford's studies. A clear explanation is still wanting for just what kind of reasoning process explains this association of mathematical and non-mathematical tests. The mathematical tests have the disadvantage that they have loadings on Factor N, occasionally even higher than the loadings on Factor R (4, 73, 79, and four times in 29).

Identification: Cattell's U.I. T34; Guilford's CMS.

References: 37 studies listed in 29 (under Deduction); in Guilford's laboratory: 4, 33, 36, 38, 39, 41, 44, 48, 55, 56, and 73; elsewhere 24, 60, 72, and 78.

Selected TestsR-1, Mathematics Aptitude Test

This consists of 5-choice word problems requiring arithmetic only. It is intended for younger subjects than is R-2, but there is a good deal of overlap in the item difficulties. For junior high school subjects it would be preferable to use the two parts of this test as separate variables than to use R-2, R-3, or R-4. However, adding other suitable arithmetic reasoning tests to the battery would be desirable. Copyright ETS.

Length of each part: 15 items, 10 minutes

Suitable for grades 6-12

R-2, Mathematics Aptitude Test

This consists of 5-choice word problems requiring arithmetic or very simple algebraic concepts only. It is intended for older students than is R-1, but overlaps R-1 in difficulty. Copyright ETS.

Length of each part: 15 items, 10 minutes

Suitable for grades 11-16

R-3, Ship Destination Test

A test was developed by P. R. Christensen and J. P. Guilford. The task is to use knowledge of the position of a ship with respect to a port, wind direction, ocean current, and direction of heading to compute effective distance to port following given rules. Copyright Sheridan Supply Co.

Length: 48 items, 15 minutes

Suitable for grades 11-16

#### R-4, Necessary Arithmetic Operations

A test adapted with permission from a similarly named test in Guilford's project. The task is to determine what numerical operations are required to solve arithmetic problems without actually having to carry out the computations. 4-choice items. Copyright ETS.

Length of each part: 15 items, 5 minutes

Suitable for grades 6-16

#### Factor Re: Semantic Redefinition

The ability to shift the function of an object or part of an object and use it in a new way.

This factor has been found only in Guilford's laboratory. However, there is some evidence that there are "redefinition" factors in the figural (30 and 64) and, perhaps, the symbolic areas as well as this one. "Hidden Figures" and "Camouflage" tests represent figural redefinition. This factor, on the other hand, offers unambiguous pictures or descriptions of objects. The task is to break conventional sets about the objects and think of new functions for them, an ability opposite to what has been called "functional fixedness."

Identification: Guilford's NMT.

References: 44 and 73.

Selected TestsRe-1, Gestalt Transformation

A test developed in Guilford's project. The task is to indicate which of five listed objects has a part that will serve a specified purpose. Copyright Sheridan Supply Co. (pre-publication).

Length of each part: 10 items, 5 minutes

Suitable for grades 10-16

Re-2, Object Synthesis

A test developed in Guilford's project. The task is to name an object that could be made by combining two specified objects. Copyright J. P. Guilford.

Length of each part: 12 items, 10 minutes

Suitable for grades 10-16

Re-3, Picture Gestalt

A test developed in Guilford's project. The task is to indicate which object in a photograph will serve a specified purpose. Copyright J. P. Guilford.

Length: 3 parts of 8 items each; total time 9 minutes

Suitable for grades 10-16



### Factor Rs: Syllogistic Reasoning

Ability to reason from stated premises to their necessary conclusions.

This is the factor originally called "Deduction" by Thurstone, one of his less clearly established factors. Guilford has called it "Logical Evaluation," the evaluation of semantic relations. Since the name Deduction may better describe another factor or factors and since the tests most consistently loading this factor are rather specific, it seemed most unambiguous to name it Syllogistic Reasoning.

Identification: Cattell's U.I. Th; probably EMR.

References: This factor was found, but not consistently identified as Deduction, in several of Thurstone's studies (29). Since then it has been found in 1, 4, 9, 33, 36, 44, 56, 76, and 78.

#### Selected Tests

##### Rs-1, Nonsense Syllogisms Test

Suggested by Thurstone's False Premises. The subjects are presented with formal syllogisms having nonsense words so that they cannot be solved by reference to past learning. Some of the stated conclusions follow correctly from the premises and some do not. The task is to indicate which conclusions are logically correct. Copyright ETS.

Length of each part: 15 items, 4 minutes

Suitable for grades 11-16

Rs-2, Logical Reasoning

A test developed in Guilford's project. This test consists of formal syllogisms for which the task is to choose the correct conclusion that can be drawn from two given statements. 4-choice items. Copyright Sheridan Supply Co.

Length of each part: 20 items, 10 minutes

Suitable for grades 11-16

Rs-3, Inference Test

A test adapted with permission from a similarly named test in Guilford's project. The task is to select the one of 5 conclusions that can be drawn from each given statement. Copyright ETS.

Length of each part: 10 items, 6 minutes

Suitable for grades 11-16

**Factor S: Spatial Orientation**

The ability to perceive spatial patterns or to maintain orientation with respect to objects in space.

Although the distinction between this factor and Visualization is often not clear because of tests having loadings on both and because the factors seem so similar psychologically, these two factors, or ones much like them, have appeared simultaneously in at least 20 studies. Two vs. three dimensionality is certainly not the distinguishing characteristic. The tests loading Spatial Orientation seem to involve perception of the position and configuration of objects in space, perhaps

best thought of as space with the observer himself as a reference point. With Visualization, on the other hand, the observer seems removed from the stimulus pattern in that he appears to manipulate and alter its image. A further distinction is seen in a characteristic of the test administration: Spatial Orientation tests are given under speeded conditions, whereas Visualization tests are relatively unspeeded.

Werdelin (1961), concurring with Thurstone's interpretation, emphasizes the importance of reacting to the figure as a whole for Factor S and breaking it into parts for factor Vz.

The three tests for this factor described below have not always defined a single tight factor. They should, perhaps, be considered representative of sub-factors which could be separated in an intensive study in the spatial area. A tight factor can be made by Thurstone's tests, Flags, Figures, and Cards, but such a factor seems to reflect too much of a specific testing method.

Identification: Cattell's U. I. T11; Guilford's CFS; Thurstone's S in his first study (Th A in 29).

References: A tight factor of Flags, Figures, and Cards appears in 29, studies Be, Co, Th B, and Th C; also in 1, 2, 3, 9, 35, 60, 63, and 79. Cubes, Flags, and Spatial Orientation appear in 29, study Mi B, and 57. Cubes and Flags appear together in 29, study Th A. Studies with Spatial Orientation and Flags, Figures, or Cards are 2, 35, 57, and 63. The apparatus test Complex Coordination and a test called Instrument Comprehension have defined a spatial factor in numerous Air Force and other studies in 29, and in 22, 23, 25, 64, and 79. Only

rather than evidence in AFM and AFN in 29 links this apparatus-test factor to the one described by Flags, Figures, and Cards. New tests cutting across some of these areas appear in 72.

### Selected Tests

#### S-1, Card Rotations Test

Suggested by Thurstone's Cards. Each item gives a drawing of a card cut into an irregular shape. To its right are six other drawings of the same card sometimes merely rotated by different amounts and sometimes turned over onto its other side. The subject indicates which ones show the card not turned over. Copyright ETS.

Length of each part: 14 items, 4 minutes

Suitable for grades 8-16

#### S-2, Cube Comparisons Test

Adapted from Thurstone's Cubes. Each item presents two drawings of a cube. Assuming no cube can have two faces alike, the subject is to indicate which items present drawings that can be of the same cube and which ones present drawings that cannot be of the same cube. Copyright ETS.

Length of each part: 21 items, 3 minutes

Suitable for grades 8-16

#### S-3, Spatial Orientation

This is Part V of the Guilford-Zimmerman Aptitude Survey. Each item presents two pictures of water and land scenery as seen looking out over the prow of a motor boat which has moved slightly between pictures. The task is to select the one of five dot and dash pairings

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in which the dot represents the old position of the prow and the dash the new position. Changes include any combination of tilt and of vertical and horizontal movement. Speed conditions are used. Copyright Sheridan Supply Co.

Length: 60 items, 10 minutes

Suitable for grades 10-16

#### Factor Sep: Sensitivity to Problems

The ability to recognize practical problems.

The appearance of this factor is entirely confined to Guilford's laboratory, but it has been isolated four times with reasonable clarity, each time with some overlapping tests. The tests described below are the ones selected by Guilford and Merrifield (40) for this factor.

Identification: Guilford's EMI.

References: 48, 49, 55, and 73.

#### Selected Tests

##### Sep-1, Apparatus Test

A test developed in Guilford's project. The subject is asked to suggest two improvements for each common appliance named. Copyright J. P. Guilford.

Length of each part: 10 appliances, 7 minutes

Suitable for grades 8-16

Sep-2, Seeing Problems

A test developed in Guilford's project. The subject is asked to list problems that might arise in connection with common objects. Copyright Sheridan Supply Co. (pre-publication).

Length: 4 parts each naming 3 objects; total time 12 minutes

Suitable for grades 8-16

Sep-3, Seeing Deficiencies

A test developed in Guilford's project. The subject is asked to point out the way in which a described plan or activity is faulty.

Copyright J. P. Guilford.

Length of each part: 10 items, 10 minutes

Suitable for grades 8-16

**Factor Ss: Spatial Scanning**

Speed in visually exploring a wide or complicated spatial field.

Finding one's way through a paper maze requires the ability to scan the field quickly for openings, following paths with the eye, and quickly rejecting false leads. Tests requiring merely the visual pursuit of a given line in a tangled pattern are related to this factor but not closely. Some of the tests which heavily load the factor have names that include the word "planning," and the factor has sometimes been interpreted as a planning function, but the level of planning required by the tests seems to be a simple willingness to find a correct

path visually before wasting time in marking the paper. In its own domain, this ability seems somewhat analogous to that required in rapidly scanning a printed page for comprehension.

Identification: Guilford's CFI.

References: Maze tracing factors appear in Th B (29) and in 24. A planning factor appears in 1. Factors combining planning and maze tests appear in 35 and 61.

Selected Tests

Ss-1, Maze Tracing Speed Test

The task is to find and mark an open path through a moderately complex series of paper mazes. Copyright ETS.

Length of each part: 4 scorable units, 3 minutes

Suitable for grades 6-16

Ss-2, Choosing a Path

Adapted from AAF Printed Classification Tests (34). Each item consists of a network of lines as in an electrical-circuit diagram having many intersecting and intermeshed wires with several sets of terminals. The task is to trace the lines and to determine for which pair of terminals, marked S (start) and F (finish), there is a complete circuit through a circle at the top. There is some orderliness in the layout to encourage comprehension of the pattern by scanning rather than simple visual pursuit of lines. Copyright ETS.

Length of each part: 15 items, 7 minutes

Suitable for grades 6-16

Ss-3, Map Planning Test

Adapted from AAF Printed Classification Tests. The examinee sees diagrammatic sections representing city maps. The streets are blocked at various points by barriers represented by circles. The examinee must plan routes between given points in such a way that no roadblocks need to be crossed. The task is to find the shortest available route as quickly as possible. Copyright ETS.

Length of each part: 2 maps each with 10 routes, 3 minutes

Suitable for grades 6-16

**Factor V: Verbal Comprehension**

The ability to understand the English language.

Individual differences are perhaps most clearly seen in the size of comprehension vocabularies, but they also exist with respect to tests demanding knowledge and understanding of grammatical patterns, sentences, idiomatic phrases, and other aspects of the English language. Factors similar to the English verbal factor have been found in studies involving native speakers of other languages. Guthrie (42) included "verbal" tests in both English and Tagalog in a study of subjects who spoke varying amounts of those two languages. Separate "verbal" factors appeared for both English and Tagalog. This confirms the specificity of "Verbal Comprehension" for the particular language. It contrasts with Ideational Fluency and Word Fluency, both of which loaded English and Tagalog tests together, suggesting that fluency is not specific to



a given language. The verbal factor, then, seems to be a specific language knowledge and comprehension factor which will be found in studies involving speakers of any given language, provided the tests are in that language. Since one could probably find numerous linearly-independent sub-factors in the verbal domain if one set out to test the specialized vocabularies of certain professions, occupations, or dialectal groups, reference tests of the verbal factor should be tests which sample the features of the English language very widely. Vocabulary tests are more desirable than tests of grammar and other language features, because they are easier to construct and administer; on the whole their loadings on Factor V are higher, and they are less likely to have loadings on other factors.

This factor has been found in at least 70 published studies.

Identification: Cattell's U.I. T13; Guilford's CMU.

#### Selected Tests

##### V-1, Vocabulary

Adapted from a test by J. B. Carroll. This is a 4-choice synonym test. Copyright ETS.

Length of each part: 18 items, 4 minutes

Suitable for grades 7-12

##### V-2, Vocabulary

Adapted from a Cooperative Vocabulary Test. This is a 5-choice synonym test. The format is intentionally left different from that of V-1 to reduce common variance of an artifactual nature. Copyright ETS.

Length of each part: 18 items, 4 minutes

Suitable for grades 7-12

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V-3, Wide Range Vocabulary Test

Adapted from a Cooperative Vocabulary Test. This is a 5-choice synonym test having items ranging from very easy to very difficult.

Copyright ETS.

Length of each part: 24 items, 6 minutes

Suitable for grades 7-16

V-4, Advanced Vocabulary

Adapted from a Cooperative Vocabulary Test. This is a 5-choice synonym test consisting mainly of difficult items. Copyright ETS.

Length of each part: 18 items, 4 minutes

Suitable for grades 11-16

V-5, Advanced Vocabulary

Adapted from a test by J. B. Carroll. This is a 4-choice synonym test consisting mainly of difficult items. Copyright ETS.

Length of each part: 18 items, 4 minutes

Suitable for grades 11-16

### Factor Vz: Visualization

The ability to manipulate or transform the image of spatial patterns into other visual arrangements.

Tests of this factor require the examinee to rotate, turn, fold, or invert the images of objects or parts of objects according to explicit directions and to make comparisons of the resulting manipulated images with drawings. The solution of the problem can be either to draw appropriate responses ( as in Thurstone's original Form Board and Punched Holes tests) or to select the appropriate response from given alternatives. Visualization is important to Mechanical Movement and Mechanical Comprehension tests, but both of these load the Mechanical Knowledge factor as well as Visualization. Visualization tests are given under relatively unspedded conditions, whereas Spatial Orientation tests are speeded.

Identification: Cattell's U.I. T14; Guilford's CFT.

References: 16 studies in 29, and in 1, 2, 4, 23, 25, 28, 33, 35, 42, 44, 49, 57, 63, 64, 72, 73, 78, and 79. Two or more of the selected tests appear in 28, 42, 57, and 78. There is confounding with Factor Mk (i.e., situations where mechanical tests appear on Factor Vz without the presence of Factor Mk to draw off Mechanical Knowledge variance) in 4, 44, 64, 73, and 79.

#### Selected Tests

##### Vz-1, Form Board Test

Each item presents 5 shaded drawings of pieces some or all of which can be put together to form a figure presented in outline form.

The task is to indicate which of the pieces when fitted together would form the outline. Copyright ETS.

Length of each part: 24 items, 8 minutes

Suitable for grades 9-16

Vz-2, Paper Folding Test

Suggested by Thurstone's Punched Holes. For each item successive drawings illustrate two or three folds made in a square sheet of paper. A drawing of the folded paper shows where a hole is punched in it. The subject selects one of 5 drawings to show how the sheet would appear when fully opened. Copyright ETS.

Length of each part: 10 items, 3 minutes

Suitable for grades 9-16

Vz-3, Surface Development Test

Adapted from Thurstone's Surface Development. In this test, drawings are presented of solid forms that could be made with paper or sheet metal. With each drawing there is a diagram showing how a piece of paper might be cut and folded so as to make the solid form. Dotted lines show where the paper is folded. One part of the diagram is marked to correspond to a marked surface in the drawing. The subject is to indicate which lettered edges in the drawing correspond to numbered edges or dotted lines in the diagram. Copyright ETS.

Length of each part: 5 items in each of 6 drawings, 6 minutes

Suitable for grades 9-16

### Factor Xa: Figural Adaptive Flexibility

The ability to change set in order to meet new requirements imposed by figural problems.

This factor has been found only in Guilford's project. Present research seems to indicate that it is limited to the figural content area. Although some tests having conceptual content at least in part, notably Insight Problems, have had high loadings (.30), the figural parts of these tests may be responsible for their loadings. This situation is analogous to the Closure factors which also seem limited to the figural or perceptual area.

Identification: Guilford's DFT.

References: 4, 30, 49, and 73.

#### Selected Tests

##### Xa-1, Match Problems II

A test developed in Guilford's project. The task is to indicate up to four different sets of a specified number of lines, representing matches, which may be taken away from a pattern of such lines in order to leave a certain number of squares or triangles. Copyright Sheridan Supply Co. (pre-publication). This has now been published.

Length of each part: 5 items, each with 4 sets, 7 minutes

Suitable for grades 11-16

##### Xa-2, Match Problems V

A test developed in Guilford's project. The task is to indicate several different patterns of matches that can be removed to leave a

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specified number of squares. Many set-breaking solutions are needed.

Copyright Sheridan Supply Co. (pre-publication).

Length of each part: 3 items, each with 6-8 scorable units,

5 minutes

Suitable for grades 11-16

Xa-3, Planning Air Maneuvers

Adapted from a test originally used in the AAF Psychology Program (34). Following certain rules, the examinee is required to select the most direct path in "skywriting" pairs of capital letters. Copyright J. P. Guilford.

Length of each part: 36 items, 8 minutes (Note: the directions call for pacing after 4 minutes)

Suitable for grades 11-16

Factor Xs: Semantic Spontaneous Flexibility

The ability to produce a diversity of verbally expressed ideas in a situation that is relatively unrestricted.

This factor has been found only in Guilford's project. In tests of Adaptive Flexibility the subject changes set in order to arrive at a particular answer, while, in tests of this factor, it pays him to change set in as many different ways as possible, although this is not essential so far as he knows (73). In this respect it approaches the fluency factors in nature, but the emphasis on change in kind of idea

as in test Xs-1, rather than sheer quantity of ideas, justifies the name Flexibility.

Identification: Guilford's DMG.

References: 30 and 73.

#### Selected Tests

##### Xs-1, Utility Test

A test developed in Guilford's project. The score in this test is the number of times the class of uses is changed as the subject lists different uses for a given object. Copyright Sheridan Supply Co. (pre-publication).

Length of each part: One object, 5 minutes

Suitable for grades 6-16

##### Xs-2, Alternate Uses

A test developed in Guilford's project. The task is to list different uses for common objects. Copyright Sheridan Supply Co.

Length of each of 3 parts: 3 objects, 4 minutes (a 12-item form is also available)

Suitable for grades 6-16

##### Xs-3, Object Naming

A test developed in Guilford's project. The task is to name as many objects as possible that belong to a certain class. The score is the number of types of objects named. Copyright J. P. Guilford.

Length of each part: one class, 2 minutes

Suitable for grades 6-16

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## TEST KEYS

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## Hidden Figures Test--Cf-1

Part 1

## Page 2

1-A, 2-B, 3-E,  
4-D, 5-B, 6-D,  
7-E, 8-A, 9-B,

## Page 3

10-D, 11-C, 12-A,  
13-E, 14-E,  
15-C, 16-C

Part 2

## Page 4

17-E, 18-C, 19-D,  
20-B, 21-A, 22-B,  
23-C, 24-B, 25-C,

## Page 5

26-E, 27-D, 28-A,  
29-D, 30-E,  
31-E, 32-A

## Hidden Patterns Test--Cf-2

Part 1

## Page 2

X, O, O, X, X, O, X, O, O, O,  
X, X, O, O, O, X, X, X, O, X,  
O, X, O, X, O, O, X, O, X, O,  
X, O, O, O, X, O, O, O, O, O,  
O, X, X, X, O, X, X, X, O, X,  
X, O, X, X, O, O, X, X, O, X,  
X, X, X, X, O, O, O, O, X, O,  
X, O, O, O, O, X, O, O, X, X,  
X, O, X, X, X, O, X, X, X, O,  
O, O, X, O, O, X, X, O, O, O,

## Page 3

X, O, O, O, X, O, X, O, X, X,  
X, O, O, X, X, O, O, X, O, X,  
O, X, X, O, O, X, O, X, X, O,  
X, O, O, X, O, X, O, X, O, X,  
O, O, O, X, X, O, X, O, O, X,  
X, X, O, X, O, X, O, X, O, X,  
O, O, O, O, X, O, X, O, X, O,  
X, O, X, X, O, X, O, X, X, X,  
X, O, X, O, O, X, X, O, O, O,  
X, X, O, O, X, X, O, X, X, O

Part 2

## Page 4

O, X, X, O, O, O, X, O, O, X,  
X, O, O, X, O, O, O, X, O, X,  
O, X, X, X, X, X, O, X, O, X,  
X, O, O, X, X, X, O, X, X, O,  
X, O, O, O, O, O, O, O, X, X,  
O, O, X, O, X, O, O, X, O, X,  
O, X, O, O, O, X, O, O, X, X,  
X, X, O, O, X, O, X, O, O, X,  
X, X, O, X, X, O, X, X, X, O,  
O, O, X, X, X, X, X, O, X, O,

## Page 5

O, O, X, X, X, O, O, X, O, X,  
X, X, O, X, O, X, X, O, X, X,  
O, X, X, O, X, X, X, O, X, X,  
X, O, O, X, O, O, O, O, X, O,  
O, O, X, O, O, X, X, O, O, O,  
X, O, X, O, X, X, O, X, O, X,  
O, X, O, O, X, O, X, O, X, X,  
O, X, X, X, X, X, O, X, O, X,  
X, X, O, X, O, O, O, X, O, O,  
O, O, X, O, X, X, X, X, X, O

Copying Test--Cf-3

Preparation of the key is left to the user.

Gestalt Completion Test--Cs-1

Part 1

Page 2

1-dog  
3-telephone  
5-house

2-car or automobile  
4-chicken or rooster  
6-camera

Page 3

7-hand or glove  
9-cart, wagon, or truck

8-gun or pistol  
10-shoe

Part 2

Page 4

11-man and woman dancing,  
dancers, man and woman  
13-steam shovel or derrick  
15-ice skate or skate

12-faucet, tap or spigot  
14-kite  
16-bird or bird in flight

Page 5

17-bowman or person shooting  
bow and arrow, archer  
19-cat

18-boat, ship or vessel  
20-woman or person talking on  
phone, or woman or person  
sitting in chair



## Concealed Words Test -- Cs-2

Part 1

## Page 2

- |            |             |
|------------|-------------|
| 1. think   | 8. help     |
| 2. date    | 9. money    |
| 3. early   | 10. tends   |
| 4. other   | 11. leading |
| 5. through | 12. seem    |
| 6. people  | 13. stock   |
| 7. meat    |             |

## Page 3

- |                |                  |
|----------------|------------------|
| 14. orange     | 20. nurses       |
| 15. women      | 21. secret       |
| 16. graduation | 22. moist        |
| 17. condition  | 23. prescription |
| 18. weight     | 24. achieve      |
| 19. make       | 25. summer       |

Part 2

## Page 4

- |                |             |
|----------------|-------------|
| 26. about      | 33. trouble |
| 27. answers    | 34. reasons |
| 28. positively | 35. beauty  |
| 29. needs      | 36. freedom |
| 30. right      | 37. what    |
| 31. valuable   | 38. save    |
| 32. looking    |             |

## Page 5

- |                |                 |
|----------------|-----------------|
| 39. afford     | 45. recommend   |
| 40. ball       | 46. considering |
| 41. tradition  | 47. carefree    |
| 42. suspicious | 48. suffers     |
| 43. luxury     | 49. nothing     |
| 44. finer      | 50. flower      |

## Controlled Association Test--Fa-1

## Scoring Guide: Examples of some acceptable words

Part 1

- clear: absolute, acquit, audible, bright, certain, cloudless, complete, diaphanous, distinct, empty, explicit, free, graphic, incisive, innocent, light, limpid, liquid, logical, lucid, luminous, net, obvious, open, orderly, pass, pellucid, perceptive, perspicuous, plain, positive, remove, resonant, rid, ringing, sheer, translucent, transparent, trenchant, unambiguous, unload, unmistakable
- dark: abstruse, ambiguous, brunet, cryptic, darkling, dim, dismal, dusk, dusky, enigmatic, equivocal, evil, gloomy, hidden, ignorant, lightless, murky, night, obscure, opaque, secrecy, shade, sinister, unenlightened, uninformed, vague
- strong: ardent, clear, cogent, decided, distinct, drastic, durable, energetic, firm, forceful, greatly, hale, healthy, hearty, intense, lusty, marked, passionate, persuasive, potent, powerful, pronounced, rank, robust, severely, sound, stalwart, stout, sturdy, tenacious, tough, vehement, vigorous, warm, zealous
- wild: angry, confusion, crazed, desolate, disorderly, dissipated, eager, enthusiastic, immoral, imprudent, primitive, reckless, savage, stormy, turbulent, unbridled, uncivilized, uninhabited, untilled, vexed, visionary, waste

Part 2

- company: association, band, battery, circle, clique, club, companion, coterie, crew, crowd, flight, group, guest, horde, mob, order, partners, party, set, society, throng, troop, troupe, visitor
- sharp: abrupt, acute, artful, attentive, beautiful, biting, brilliant, brisk, caustic, clear, clever, cold, crafty, cunning, cutting, designing, distinct, exactly, expert, handsome, impetuous, incisive, intense, keen, mordant, peaked, penetrating, piercing, precisely, probing, promptly, pungent, quick, scathing, severe, shrewd, shrill, sly, strong, trenchant, tricky, underhanded, vigorous, voiceless, wily
- tell: acquaint, announce, appraise, assure, betray, bewray, command, communicate, count, decide, direct, disclose, discover, discriminate, distinguish, divulge, enumerate, impart, inform, know, narrate, number, order, publish, recognize, recount, rehearse, relate, report, request, reveal, say, utter
- turn: act, affect, aim, apply, aptitude, avert, become, bend, bent, blunt, bout, change, circle, convert, convolution, curve, deflect, dement, derange, deviate, direct, distract, divert, drive, eddy, employ, fit, fold, gift, go, gyrate, invert, pass, pirouette, pivot, point, ponder, prejudice, reach, rebound, recoil, reel, refer, repel, resort, revolve, rotate, set, sheer, shift, spin, spell, subject, swirl, talent, tendency, tour, translate, trend, twirl, twist, upset, walk, wheel, whirl

## Associational Fluency I--Fa-2

A key for this test may be obtained by writing to the Sheridan Supply Company, Beverly Hills, California.

## Associations IV--Fa-3

There may be other words besides those listed in the key which can be considered correct. In order to be considered correct the response word must have a double meaning in its relation to each of the given words.

Part I

1. green
2. cast, reel, lines
3. deck, bridge
4. suit
5. conductor
6. pitch
7. sty
8. mail
9. poker
10. crook, fleece
11. sleeper, bear
12. bank
13. second
14. ash
15. sharp

Part II

16. sink
17. pen
18. fly, liner
19. bill
20. tube
21. scale
22. skirt
23. nail
24. charge, general
25. draft, rav
26. pass
27. picket
28. season
29. mint
30. count

## Expressional Fluency--Fe-1

A key for this test may be obtained by writing to the Sheridan Supply Company, Beverly Hills, California.

### Simile Interpretation--Fe-2

Each item should be scored for all examinees before the next item is scored. The total score is the number of acceptable responses. To be acceptable, the response must be clearly related to both parts of the given clause. It is not mandatory that the words added form a complete sentence, but the thought expressed should be fairly complete.

Slang, if relevant in its common meaning, is acceptable.

Some examinees have a tendency to repeat previous completions, using slightly different words. If two completions are quite similar, ideationally, they should be considered duplicates, and only one of them should be credited.

#### Examples

##### Part I

#### 1. Drinking is like skiing.

##### a. Acceptable

- 1) completions putting across these general ideas and similar ones:  
sport (if qualified by some adjective such as "social")  
smooth (goes quickly or takes time)  
slippery
- 2) specific examples:  
Once you start you accelerate.  
It's a long, hard climb back.  
Both are exhilarating.

##### b. Unacceptable

- 1) completions putting across these general ideas and similar ones:  
enjoy them  
fun
- 2) specific examples:  
Both are associated with battles.  
Neither are worthwhile.  
Both are fun.

#### 2. A baby is like tomorrow.

##### a. Acceptable

- 1) completions putting across these general ideas and similar ones:  
comes and goes  
grow old (or up) too soon (if reference was made to maturing rather than physical growth)
- 2) specific examples:  
It is unpredictable.  
It is full of promise.  
Its needs should be anticipated.

##### b. Unacceptable:

- 1) completions putting across these general ideas and similar ones:  
grows up too soon (reference to physical growth)  
always there  
here today, gone tomorrow  
may never come
- 2) specific examples:  
Both cry.  
It's always hungry.  
They are unhappy.

Part II

## 3. Life is like riding a tiger.

## a. Acceptable

## 1) completions putting across these general ideas and similar ones:

mysterious, strange, curious, unusual  
 frightening  
 can get bitten  
 short  
 go in circles  
 fun  
 eaten up  
 breath-taking  
 on your edges  
 risky

## 2) specific examples:

You should keep smiling.  
 It's full of uncertainty.  
 You have to keep your mind on it to succeed.  
 Both are frightening.

## b. Unacceptable

## 1) completions putting across these general ideas and similar ones:

mean  
 only comes once  
 rough, bumpy (only one of these should be accepted if they  
 appear on same paper)  
 rough, hard (only one is acceptable if appear on same paper;  
 bumpy and hard are not considered duplicates)

## 2) specific example:

One sometimes gets tired.

## 4. Experience is like playing cards.

## a. Acceptable

## 1) completions putting across these general ideas and similar ones:

you learn  
 fun  
 gamble  
 dangerous (in the sense of risky)  
 takes practice  
 takes skill  
 profit and lose  
 need to know how  
 never can win; always win; always lose

## 2) specific examples:

It's boring without a partner.  
 Both need shuffling occasionally.  
 Watch out for stacked decks.  
 Both are gambles.

## b. Unacceptable

## 1) completions putting across these general ideas and similar ones:

cheating (unless qualified further)  
 helps you play better (refers only to experience)

## 2) specific examples:

They're the best teachers.  
 They prepare you for life.

Word Arrangement--Fe-3

Scoring Guide

Underline each given word.

Score 1 point for each given word. Score is the number of given words that are listed in the responses.

Count duplicates only once. A duplicate occurs when the same two or more given words are used together identically.

Example: Given words: ALWAYS PULL BROTHER MONTH

- 1) I always pull my brother in the month of December.
- 2) I always pull sleds in the month of December with my brother.

In the first sentence - 1 point for each given work = 4 points.

In the second sentence - "I always pull" is a duplication = no additional points. "Month" and "brother" = 2 points.

Total of 6 points in the two sentences.

When in doubt be liberal.

Topics Test--Fi-1

The score is the number of separate ideas (phrases or sentences) written down.

Theme Test--Fi-2

The score is the number of words written.

Thing Categories Test--Fi-3

The score is the number of names of things listed.

68

Word Endings Test--Fw-1

The score is the number of correct words written.

Word Beginnings Test--Fw-2

The score is the number of correct words written.

Word Beginnings and Endings Test--Fw-3

The score is the number of correct words written.

Letters Sets Test--I-1

Part 1

1-QPPQ	9-STTS
2-FRST	10-KLHJ
3-FUZZ	11-BODQ
4-DTFL	12-CLXC
5-TVWU	13-TXLL
6-GFFG	14-VEBT
7-QQQR	15-GKHM
8-UVWZ	

Part 2

16-BFDB	24-XDBK
17-CUWH	25-MKJI
18-CGUZ	26-STWX
19-SVWX	27-WRFM
20-FWXQ	28-QQAR
21-EGFH	29-AOUI
22-QQBB	30-WOGD
23-OPQT	

Locations Test--I-2

Part 1

1-3	8-2
2-3	9-4
3-4	10-4
4-5	11-3
5-2	12-4
6-2	13-5
7-5	14-4

Part 2

15-3	22-2
16-3	23-3
17-4	24-2
18-4	25-4
19-1	26-3
20-5	27-2
21-2	28-1

## Figure Classification Test--I-3

Part 1

## Page 2

2, 1, 1, 2, 1, 2, 2, 2  
 2, 1, 2, 1, 2, 1, 2, 2  
 1, 2, 2, 1, 2, 2, 1, 2  
 2, 1, 1, 2, 2, 1, 2, 1

## Page 3

2, 1, 2, 1, 1, 2, 1, 1  
 2, 1, 2, 1, 1, 2, 2, 1  
 1, 2, 1, 2, 1, 2, 1, 1  
 1, 2, 2, 2, 1, 1, 2, 2

## Page 4

3, 2, 2, 1, 2, 1, 1, 3  
 1, 3, 1, 2, 3, 3, 2, 3  
 2, 3, 2, 1, 2, 1, 3, 3  
 2, 1, 2, 2, 1, 3, 1, 3

## Page 5

2, 2, 1, 3, 3, 1, 1, 1  
 3, 1, 2, 3, 1, 3, 2, 2

Part 2

## Page 6

2, 2, 1, 1, 2, 1, 2, 2  
 2, 1, 2, 1, 1, 2, 2, 1  
 1, 2, 1, 2, 2, 2, 1, 1  
 2, 1, 1, 2, 1, 1, 2, 1

## Page 7

1, 1, 1, 2, 2, 2, 1, 2  
 1, 2, 1, 2, 1, 2, 2, 1  
 1, 1, 1, 2, 1, 1, 2, 2  
 2, 1, 1, 1, 1, 2, 2, 1

## Page 8

2, 3, 2, 2, 1, 3, 1, 2  
 1, 2, 1, 1, 3, 3, 2, 1  
 2, 3, 1, 2, 1, 1, 3, 3  
 3, 1, 2, 1, 2, 2, 3, 2

## Page 9

1, 3, 2, 1, 2, 2, 1, 3  
 2, 3, 2, 2, 1, 1, 3, 1

## Estimation of Length--Le-1

Part 1

1-A, 2-D, 3-B, 4-C, 5-A,  
 6-B, 7-E, 8-A, 9-D, 10-D,  
 11-E, 12-B, 13-A, 14-D, 15-C,  
 16-C, 17-C, 18-E, 19-A, 20-B,  
 21-E, 22-B, 23-A, 24-B, 25-D,  
 26-C, 27-A, 28-C, 29-D, 30-B,  
 31-D, 32-E, 33-B, 34-B, 35-D,  
 36-C, 37-E, 38-A, 39-C, 40-A

Part 2

41-C, 42-E, 43-A, 44-D, 45-C,  
 46-B, 47-E, 48-A, 49-B, 50-A,  
 51-C, 52-E, 53-C, 54-C, 55-B,  
 56-A, 57-D, 58-B, 59-D, 60-E,  
 61-B, 62-D, 63-B, 64-A, 65-D,  
 66-D, 67-E, 68-B, 69-A, 70-B,  
 71-A, 72-E, 73-D, 74-C, 75-E,  
 76-C, 77-B, 78-A, 79-C, 80-D



## Shortest Road Test--Le-2

Part 1

1-H, 2-M, 3-H, 4-M,  
 5-M, 6-M, 7-H, 8-L,  
 9-M, 10-M, 11-M, 12-H,  
 13-H, 14-H, 15-H, 16-M,  
 17-M, 18-M, 19-H, 20-L,  
 21-H, 22-L, 23-M, 24-H,  
 25-M, 26-H, 27-M, 28-M

Part 2

29-M, 30-M, 31-H, 32-M,  
 33-M, 34-M, 35-H, 36-L,  
 37-M, 38-L, 39-M, 40-H,  
 41-M, 42-M, 43-M, 44-M,  
 45-H, 46-M, 47-M, 48-L,  
 49-M, 50-M, 51-H, 52-M,  
 53-M, 54-L, 55-H, 56-L

## Nearer Point Test--Le-3

Part 1

1-a, 2-a, 3-b, 4-a, 5-b,  
 6-b, 7-b, 8-b, 9-a, 10-b,  
 11-a, 12-b, 13-b, 14-b, 15-a,  
 16-b, 17-b, 18-b, 19-a, 20-b,  
 21-b, 22-b, 23-b, 24-u, 25-a,  
 26-a, 27-b, 28-a, 29-b, 30-b

Part 2

31-a, 32-b, 33-b, 34-b, 35-a,  
 36-b, 37-a, 38-a, 39-b, 40-a,  
 41-b, 42-b, 43-b, 44-b, 45-b,  
 46-b, 47-a, 48-b, 49-a, 50-b,  
 51-a, 52-b, 53-a, 54-a, 55-b,  
 56-a, 57-a, 58-a, 59-b, 60-a

## Picture-Number Test--Ma-1

Part 1

49	99	74
77	27	36
86	30	42
13	24	19
62	98	20
88	15	82
32	51	35

Part 2

76	25	64
39	53	17
56	43	47
40	31	37
84	79	33
87	29	93
48	52	61

Object-Number Test--Ma-2

Part 1

49  
65  
43  
29  
17  
40  
35  
22  
56  
62  
58  
33  
26  
36  
78

Part 2

31  
42  
13  
14  
82  
63  
44  
23  
77  
59  
37  
18  
91  
28  
54

First and Last Names Test--Ma-3

Part 1

Edward  
Eloise  
Kenneth  
Leon  
Carl  
John  
Claire  
Roger  
Donald  
Jean  
David  
Daniel  
Jack  
Blanche  
Joan

Part 2

Robert  
Barbara  
James  
Stanley  
Irene  
Walter  
Shirley  
Stella  
Bruce  
Susan  
Leo  
Priscilla  
Edith  
Judy  
Joseph

## Tool Knowledge Test--Mk-1

Part 1

## Page 2

1-B  
2-A  
3-A  
4-B  
5-A  
6-C  
7-A  
8-C

## Page 3

9-C  
10-B  
11-A  
12-B  
13-A  
14-C  
15-A

Part 2

## Page 4

16-B  
17-A  
18-C  
19-C  
20-B  
21-B  
22-B  
23-B

## Page 5

24-B  
25-A  
26-C  
27-B  
28-A  
29-A  
30-A

## Mechanical Information Test--Mk-2

Part 1

## Page 2

1-2  
2-3  
3-2  
4-4  
5-2  
6-1

## Page 3

7-3  
8-4  
9-2  
10-2  
11-3  
12-1

## Page 4

13-3  
14-4  
15-1

Part 2

## Page 5

16-1  
17-4  
18-3  
19-1  
20-4  
21-3

## Page 6

22-2  
23-2  
24-4  
25-3  
26-4  
27-3

## Page 7

28-1  
29-2  
30-1

## Electrical Information Test--Mk-3

Part 1

## Page 2

1-4  
2-1  
3-2  
4-3  
5-4

## Page 3

6-3  
7-2  
8-2  
9-2  
10-1

## Page 4

11-2  
12-4  
13-1  
14-2  
15-3

Part 2

## Page 5

16-1  
17-4  
18-3  
19-2  
20-2

## Page 6

21-1  
22-2  
23-3  
24-1  
25-4

## Page 7

26-2  
27-2  
28-4  
29-2  
30-1

## Auditory Number Span Test--Ms-1

- (1) 8, 1, 9, 5, 7, 2  
 (2) 4, 6, 2, 9  
 (3) 3, 7, 1, 4, 9, 2, 5, 8, 1, 6  
 (4) 9, 2, 6, 2, 8, 6  
 (5) 7, 9, 5, 3, 8  
 (6) 5, 2, 9, 4, 1, 6, 8, 3, 7  
 (7) 2, 6, 3, 1, 5  
 (8) 2, 4, 8, 5, 1  
 (9) 6, 8, 2, 4, 1, 3, 9, 7, 2, 5, 3  
 (10) 9, 2, 8, 5, 7, 1  
 (11) 7, 4, 2, 9, 3, 5, 8, 6  
 (12) 4, 3, 7, 2, 3, 9  
 (13) 5, 7, 3, 1, 6, 9, 4, 8, 5, 1, 7, 2  
 (14) 6, 2, 5, 9, 7, 1, 8, 3  
 (15) 4, 7, 9, 3, 6, 1, 5, 8, 4, 2, 7  
 (16) 5, 1, 8, 7, 2, 3, 1  
 (17) 8, 2, 6, 9, 1, 7, 3, 8, 5, 9, 6, 4  
 (18) 5, 1, 9, 2, 7, 4, 8, 3, 6  
 (19) 7, 5, 2, 6, 4, 9, 1  
 (20) 3, 2, 1, 8, 1, 4, 6, 5  
 (21) 3, 8, 1, 7  
 (22) 9, 4, 6, 3, 5, 1, 8  
 (23) 2, 8, 4, 9, 6, 2, 7, 5, 9, 3, 1  
 (24) 6, 2, 8, 7, 2, 3, 6, 1

## Digit Span -- Visual -- Ms-2

- (1) 4, 1, 5, 2, 3, 7
- (2) 7, 2, 5, 6
- (3) 8, 9, 6, 1, 3, 7, 2, 4, 5, 7
- (4) 1, 2, 5, 2, 7, 4
- (5) 2, 1, 6, 8, 5
- (6) 1, 2, 4, 9, 5, 6, 3, 8, 7
- (7) 2, 6, 5, 3, 4
- (8) 8, 5, 1, 2, 4
- (9) 4, 3, 7, 2, 1, 6, 8, 9, 7, 2, 5, 3
- (10) 9, 1, 8, 6, 4, 3
- (11) 5, 4, 8, 6, 7, 1, 3, 2
- (12) 9, 3, 2, 5, 3, 6
- (13) 5, 3, 9, 7, 1, 6, 8, 4, 2, 5, 7, 3, 2
- (14) 3, 6, 5, 4, 1, 9, 2, 8
- (15) 6, 1, 5, 8, 4, 9, 7, 3, 6, 2, 1
- (16) 3, 4, 7, 1, 8, 9, 5, 4
- (17) 1, 4, 7, 3, 5, 2, 8, 1, 9, 3, 7, 6
- (18) 3, 2, 8, 5, 6, 4, 7, 9, 1
- (19) 5, 1, 3, 2, 7, 6, 4
- (20) 2, 6, 5, 1, 3, 2, 7, 4
- (21) 2, 5, 1, 6
- (22) 8, 5, 1, 3, 7, 4, 2
- (23) 5, 6, 1, 9, 8, 5, 2, 7, 9, 4, 3
- (24) 8, 9, 7, 4, 2, 6, 3, 9

## Letter Span-Auditory--Ms-3

- (1) K, F, C
- (2) H, S, L, Y, G
- (3) P, F, R, C, W, S, G, K, Y
- (4) M, L, S, A, T, K, N, F, I, G
- (5) R, G, S
- (6) L, W, C, X, K, R, P
- (7) F, S, Y, L, C, H
- (8) S, A, F, I, W, L, M
- (9) Y, C, G, P, W, L, S, K, H, R, F
- (10) W, Y, S, C, L
- (11) P, G, L, F, H, K, Y, W, C, R
- (12) C, F, E, M, K, S, R, O, P
- (13) H, Y, R, W, S, P, K
- (14) S, F, L, H
- (15) C, P, R, K, H, S, W, F
- (16) S, F, V, G, P, O, N, M
- (17) K, W, G, Y, L, R
- (18) F, P, S, G, L, H, W, K, R, C
- (19) G, R, H, P, C, S, F, Y, W
- (20) X, A, V, S, P, R, E
- (21) R, P, F, K
- (22) L, G, K, S, Y, C, R, F, W, H, P
- (23) C, S, P, G, R, Y, H, L
- (24) F, C, A, I, L, M, S, N

## Addition Test--N-1

Part 1

18, 61, 107, 125, 214, 105, 116, 167, 159, 104,  
 54, 153, 111, 187, 105, 111, 211, 188, 130, 206,  
 133, 131, 110, 173, 102, 120, 73, 112, 131, 264,  
 89, 82, 170, 217, 108, 83, 158, 92, 149, 166,  
 93, 253, 157, 140, 199, 114, 152, 137, 103, 124,  
 141, 191, 122, 149, 196, 187, 177, 120, 129, 88

Part 2

185, 247, 118, 192, 145, 179, 101, 136, 184, 152,  
 73, 136, 145, 99, 182, 127, 145, 189, 162, 154,  
 105, 126, 190, 232, 147, 166, 117, 153, 224, 131,  
 186, 119, 124, 99, 156, 135, 117, 96, 196, 176,  
 97, 142, 176, 188, 166, 172, 158, 134, 185, 171,  
 159, 123, 106, 193, 128, 161, 140, 139, 145, 220

## Division Test--N-2

Part 1

19, 7, 20, 86, 31, 54, 97, 28, 47, 11,  
 79, 7, 14, 81, 84, 35, 27, 35, 33, 61,  
 24, 33, 39, 42, 23, 32, 38, 42, 21, 30,  
 69, 54, 82, 52, 63, 98, 43, 44, 99, 77,  
 37, 41, 19, 29, 37, 53, 90, 64, 78, 80,  
 83, 84, 31, 81, 79, 26, 97, 60, 76, 96

Part 2

55, 46, 67, 66, 48, 59, 49, 75, 91, 88,  
 68, 57, 71, 18, 62, 74, 92, 61, 95, 89,  
 70, 58, 50, 85, 73, 67, 51, 93, 94, 86,  
 39, 237, 156, 98, 35, 59, 312, 144, 282, 44,  
 105, 304, 94, 86, 123, 92, 44, 102, 114, 123,  
 124, 82, 203, 21, 210, 42, 12, 47, 130, 45

## Subtraction and Multiplication--N-3

Part 1

29, 4, 21, 23, 62, 7, 12, 26, 19, 21,  
 584, 205, 207, 261, 128, 504, 240, 208, 510, 252,  
 33, 68, 29, 11, 49, 34, 17, 34, 16, 14,  
 468, 294, 328, 114, 60, 98, 639, 240, 336, 405,  
 16, 24, 10, 17, 42, 27, 17, 16, 39, 70,  
 405, 192, 158, 296, 171, 312, 85, 94, 117, 546

Part 2

29, 11, 30, 19, 9, 24, 24, 79, 48, 51,  
 42, 304, 100, 720, 427, 364, 388, 504, 80, 294,  
 26, 14, 34, 24, 51, 27, 9, 41, 40, 5,  
 364, 142, 768, 282, 249, 128, 132, 400, 372, 195,  
 54, 34, 31, 35, 6, 28, 26, 40, 17, 4,  
 104, 272, 375, 536, 405, 658, 312, 581, 366, 486

### Plot Titles--0-1

There are two separate scores for Plot Titles: "high" and "low." The "high" score is recommended as a measure of the Originality factor. Responses should be judged "high" or "low" according to the level of their "cleverness" or "quality." In order to scale responses' "cleverness," the scorer may find it helpful to designate them as "descriptive" titles or as "commentary" titles. These two divisions may then be sub-divided into "high" and "low" groups. Classifying a response as descriptive or commentary does not affect its final score; its classification as high or low does. The former categories merely help to objectify the scorer's decision. Frequent reviews of the examples given in each category will help a scorer to place a response with its equivalents.

Low-quality "descriptive" titles have one or more of the following characteristics:

- 1) are bound by stimuli given in the plot
- 2) demonstrate a mere cognition of the plot
- 3) are too vague, irrelevant, too general, minimally relevant, or confined to one fragment of the plot.

SEE EXAMPLES

Low-quality "commentary" titles have one or more of the following characteristics:

- 1) are very common, too vague, too general, minimally relevant, confined to isolated aspects of plot.

SEE EXAMPLES

High-quality "descriptive" titles have one or more of the following characteristics:

- 1) demonstrate a moderate or marked refocusing of the given information
- 2) restructure the information given in the plot
- 3) transform a simple cognition of the plot into a succinct encapsulation of the plot.

SEE EXAMPLES

High-quality "commentary" titles have one or more of the following characteristics:

- 1) are fairly common comments re-interpreted to apply to plot
- 2) are uncommon or clever comments which are usually focused on the essence of the plot
- 3) are common comments that are transformed (i.e., uncommonly stated), or are stated with neat brevity.

SEE EXAMPLES



High-quality responses, many times, make use of information external to the plot and relate it to the given information. Examples of this in the Deaf Man plot are "Hear no evil, Speak no evil" and "Modern Dr. Jeckyl and Mrs. Hyde." A "clever" response does not always compass the whole plot. "Wifely Wonders," a response to the Deaf Man plot, is an example of a title which concerns itself more with a manipulation of words than with an encapsulation of the plot.

"Cleverness" can also be demonstrated by titles with possible double meanings ("The poor man") and those making use of tongue-in-cheek humor ("Martial bliss").

Responses which describe the husband in Part II as "happy," "clever," or "wise" are rated as "high" because it is common for examinees to think of him as stupid, but less common for them to consider him smart.

#### EXAMPLES

Low quality "descriptive" titles:

##### Part I

Rex  
 The grand prize  
 Big and small  
 A boy of Finland  
 The midget auto race  
 Winner by carrying  
 The winner  
 Car trouble  
 What he did when the car conked out  
 How I won the grand prize on foot  
 A close call  
 How Rex won the race  
 The important lap  
 Rex, the midget man  
 The last lap

##### Part II

The talking wife  
 Two operations  
 The neighbors  
 Swish goes the knife  
 Blab goes the bride  
 The earless man  
 Mouth to ear  
 Talking and hearing  
 Like, cut off my voice box  
 Peace of mind  
 Man vs. woman  
 Endless talk  
 Unwise husband  
 How to talk in one operation  
 Nice man  
 Big say - no ear  
 Mixed-up family

## Low quality "commentary" titles:

Part I

That's life  
 Don't fight a giant  
 Size isn't everything  
 Something went wrong  
 It's good to be wrong  
 What a time for a car to conk out  
 The lighter the weight, the better  
 He didn't know his own strength  
 What a finish  
 An advantage or disadvantage  
 What a way to win  
 It's a strange world  
 Try your best  
 Quick thinking comes in handy  
 We learn from experience  
 Never panic

Part II

Censored  
 What a world  
 Women talk too much  
 What have I done  
 The poor power of speech  
 It was good while it lasted  
 What a doctor  
 No more patient  
 You are lucky if you have a wife  
     who can't talk  
 Silence at last  
 Tough luck  
 That's life  
 Enough is enough  
 The doctor had his nerve  
 You can't win  
 Wrong move  
 Why did I do that?  
 One way out  
 No more problems  
 You aren't listening  
 The tragic part about my loving wife

## High quality "descriptive" titles:

Part I

A Finnish Finish  
 Shorty  
 A tall tale  
 King size victory  
 A comedy of errors  
 How Rex won the Grand Prix on foot  
 The odyssey  
 Superman  
 The race that was won by a flick of  
     the wrist  
 Rex, the strongman  
 Rex, the wonderman  
 Rex, the midget auto  
 Tall midget  
 An amazing Finish  
 Determination  
 Brains and Brawn  
 David and Goliath  
 The grand pickup

Part II

The sorry husband  
 Wifely Wonders  
 Doctor saves home  
 Nature's answer  
 Dumbell  
 My quiet wife  
 Human comedy  
 The woman who lost her speech  
 Why the husband doesn't want to hear  
 The matched couple  
 A wife that couldn't speak?  
 The mistake  
 The busy doctor  
 Medicine triumphs  
 The miracle  
 Being deaf can sometimes be an asset  
 A true story of love  
 The cold facts of life  
 Marital Bliss

## High quality "descriptive" titles: (con't.)

The man who carried a car  
The impossible finish

The search for happiness  
What a man did to stop his wife from  
chattering  
The power of speech  
The wonder world of science  
The happy husband  
A quiet home  
Miracle doctor  
What to do in case of a talkative  
wife  
The poor man

## High quality "commentary" titles:

Part I

Great comeback  
Fun for the money  
You don't have to drive to strive  
It pays to be tall  
It pays to be strong  
Takes more than a car to win a race  
Go to Vic Tanny's  
Never underestimate brain power  
Enjoy life with cars  
He won by a muscle  
It pays to be a misfit  
Get a horse  
Who's riding who  
Have strength, will travel  
Quick thinking

Part II

How to live better - surgically  
Waste of money  
Waste of energy  
Waste of time  
Better luck next time  
Grass is always greener on the other  
side of the fence  
Never satisfied  
A wise man  
Don't start something you can't finish  
The easy way out  
Be satisfied with what you have  
For better or worse  
Husbands never will win  
Hear no evil, speak no evil  
Silence is golden, eh?  
Using one's head

## Symbol Production--0-2

Scoring Guide


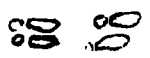

In this test the examinee must produce symbols to represent given activities and objects. The time given for each part is just sufficient for the examinee to respond to all the items provided he works without more than a few seconds hesitation on any one item.

The individual intending to score this test should first look through a number of test papers to get some idea of the range and kinds of symbols used. Generally, most symbols used will be acceptable. In the main, differences in scores arise from the varying number of symbols produced in the time allotted. Of course, there will be a few examinees who will disregard instructions and draw cartoon figures throughout the test, and there may be a few who draw rather complex lines for each item without regard for the word to be represented. The latter can be easily detected since the lines drawn for a series of items are usually very similar to each other.

Obviously, a wide variety of symbols or markings may be produced in the test. The scoring problem is principally that of symbol acceptability. Roughly, a response is judged as an acceptable symbol if some relation, however remote, can be seen between it and the object or action to be symbolized. There are a couple of notable exceptions to the above. Although the examinees are instructed not to draw cartoon figures or stick figures performing the acts, some examinees resort to these devices, especially in representing verbs. Cartoon or stick figures are not acceptable as symbols unless there is additional material that can stand alone as a proper symbol. For example, if the word to be symbolized is "build," a drawing of a cartoon figure in the stance of lifting something or reaching up would not be acceptable, but if the figure held a building tool or other object immediately connected with building, then the object representation would be considered as an acceptable symbol. The other exception is a repetition of symbols that have been given previously for other actions or objects. For example, if the words "pull" and "push" are both represented by an arrow pointing to the left, then credit is given only the first time it is used. However, if the arrow used the second time points in another direction, then it is not considered a repetition and is scored as an acceptable symbol.

Symbols for objects are generally easy to score; the outline of the object or some important part of the object is usually acceptable. In some cases an abstraction may be made of the object and is acceptable provided the relation does not become too ambiguous. For example, "structure" might be acceptably symbolized by a circle or a square, but a marking such as an arc would not be considered sufficiently meaningful in this case to be scored as correct. (An arc could be used correctly for a word such as "open.")






The verbs and adverbs are somewhat more difficult to score. The symbols for these word forms may be related to some object usually associated with the word, or they may represent the verbs directly. Both types of symbols are acceptable. For example, the work "walks" may be symbolized by a drawing such as this

 , or this  , or more abstractly by a line suggesting movement such as this .

Occasionally, responses will not be drawn in the correct square or symbols for two items may be combined in one square. It has been our practice to give credit for an acceptable symbol that is obviously misplaced, and to score combined symbols by giving credit to each part that can stand alone as a proper symbol for the word represented.

The following list contains some additional information with regard to the individual items. These are notations made by the individual scoring the test for the planning analysis. The notations are somewhat fragmentary in nature and are by no means intended to be exhaustive.

PART I - Acceptable unless otherwise noted

- |                    |  |
|--------------------|--|
| 1. airplane        | not a single straight line; propeller OK   |
| 2. takes off       | upward movement                             |
| 3. rowing          | oars, rowboat                               |
| 4. against current | must be more than single arrow; with waves; opposite must be indicated   |
| 5. pull            | hook or something attached to string; arrow if not a repetition  |
| 6. harbor          | an enclosure or a profile of harbor  |
| 7. sells           | money, cash register   |
| 8. art shop        | more than a picture and more than a shop   |
| 9. entire          | circle, rectangle  |
| 10. structure      | four-sided figure acceptable   |
| 11. disassembled   | scattered parts  |
| 12. put            | movement, arrow acceptable if not repeated   |
| 13. heater         | heat rays OK   |
| 14. floor          | single line OK if near bottom of answer space  |
| 15. push           | movement symbols   |
| 16. signal         | either a button or sound waves   |
| 17. elevator       | more than a square, double arrow OK, arrow up OK   |
| 18. assemble       | movement or direction essential  |
| 19. parts          | more than 3 or 4 lines required (unless previously formed a figure)  |
| 20. thunderstorm   | lightning, clouds, rain  |
| 21. damages        | damaged figure, crack  |
| 22. trips          | obstacle   |
| 23. throws         | action symbol                             |
| 24. rider          | one figure on another                     |
| 25. walks          | movement, but not arrow, footsteps, line  |
| 26. shore          | if only one line, must be well defined   |
| 27. search         | visual symbols   |
| 28. clue           | ? not OK   |
| 29. artist         | palette, brush   |
| 30. paints         | brush, picture, palette (if not a repetition)  |
| 31. memory         | diffuse object, not just a circle  |

## PART II

- |                     |  |
|---------------------|--|
| 1. unload           | must show movement (object in air, chute)  |
| 2. platform         | more than one horizontal line required, or single line with object on it         |
| 3. reject           | check mark, arrow ejecting   |
| 4. unsuitable       | not just an odd shape; broken object OK  |
| 5. weigh            | scales, balance  |
| 6. problem          | ψ, ? , x-y=10, not a geometrical figure  |
| 7. thoroughly       | circle, line from one side of square to the other                                |
| 8. takes            | must show movement, arrow acceptable if not later repeated                       |
| 9. prize            | rectangle, plain, not acceptable   |
| 10. guards          | if single lines -- must be more than one   |
| 11. fall out        | ∠, TT, // 7  |
| 12. falls asleep    | pillow, bed, sawing wood (snoring)   |
| 13. loses control   | spiral, zig-zag line   |
| 14. leaves          | picture not acceptable, door or door diagonal OK<br>Drawing of leaves not OK     |
| 15. feels depressed | descending slant, or gloomy cloud, a curve<br>such as: ∩                         |
| 16. compare         | a relationship between two figures must be shown                                 |
| 17. thickness       | difference in width  |
| 18. travels         | arrow not acceptable, single line not OK, unless clearly a path                  |
| 19. city            | skyline, buildings, one building not OK  |
| 20. back up         | movement must be indicated, single arrow not OK                                  |
| 21. curb            | single line not acceptable unless showing two levels                             |
| 22. descend         | movement or downward direction   |
| 23. basement        | single line acceptable if near base of square and not repeated from floor (I-14) |
| 24. musician        | long hair, §, ♪  |
| 25. plays           | jagged or wavy line acceptable   |
| 26. solo            | l, or dot, or thing apart  |
| 27. finish          | —  OK, period OK   |
| 28. eating          | mouth OK, spoon OK, dish with food OK, lips not OK                               |
| 29. steal           | hook OK, must differ from takes (8) and pull (I-5)                               |
| 30. affections      | heart, two figures touching X, lips  |

Consequences--0-3

A key for this test may be obtained by writing to the Sheridan Supply Company, Beverly Hills, California.

## Finding A's Test--P-1

Part 1

ladder	dismal	Page 2	quarrel	instead
spread	distant	durable	steam	readily
reward	race	leave	hear	grease
message	shawl	bread	boast	general
chalk	guard	fatigue	giant	happy
		regular		
		Page 3		
ocean	uproar	orange	board	saw
drawn	rural	great	meadow	hearing
machine	grab	signal	several	teacher
increase	forward	botany	oasis	coating
wash	ideal	breadth	instant	board
		Page 4		
faint	coral	wearing	cease	eagerly
custard	preface	tyrant	plural	sylvan
squeak	labor	leaves	woman	wander
earnest	hoarse	quarter	idea	vinegar
instead	caught	apple	ravine	fatten
		Page 5		
beggar	really	active	pasture	meanwhile
passkey	streak	chivalry	feather	floating
surface	depart	certain	plateau	gleam
eating	vocal	social	career	easier
unsteady	leave	breath	learning	human
		Page 6		
pleasing	lack	road	peace	blade
usual	eastern	reader	furnace	reveal
cordial	cottage	earnest	came	jaunty
dollar	loyal	leaf	reliance	senate
decrease	beacon	dollar	logical	leather

## Finding A's Test--P-1 (continued)

Part 2

		Page 7		
errand	balmy	lawn	because	pause
weak	disease	organ	constant	equal
crawl	quality	health	bang	quart
last	head	knead	earth	local
gleam	spark	walnut	dreary	car
		Page 8		
labor	defeat	beach	taught	thread
learn	collar	courage	certain	swamp
similar	feather	heartily	broader	part
ideal	formal	past	swallow	merchant
ease	pleasant	mental	praise	ready
		Page 9		
toast	vital	creamy	eagle	race
pauper	tenant	terrace	muskrat	lilacs
nearer	chagrin	steady	pecan	servant
strain	lyrical	climate	beaver	marine
company	search	eaves	initial	crawl
		Page 10		
sparkle	villain	beauty	coarse	chalk
enlarge	calmly	orchard	search	carpenter
squash	saw	last	private	teach
toward	orphan	early	reason	buffalo
crystal	orator	repeat	education	earth
		Page 11		
gambol	scarf	eagerness	scholar	player
endeavor	caution	certain	oration	wreath
important	stream	weather	clearly	usually
disagree	feature	chemical	leaflet	season
relative	bureau	visual	swamp	purchase



## Number Comparison Test--P-2

Part 1

O	X
X	O
X	O
O	X
O	O
O	X
X	X
X	O
O	O
O	O
X	X
O	X
X	X
X	X
X	X
O	X
X	O
X	X
X	X
O	O
O	O
O	X
X	X
X	X

Part 2

O	O
X	O
O	O
X	O
O	X
O	O
O	X
X	X
X	X
X	X
O	O
O	X
X	X
O	O
O	X
X	O
X	X
O	O
O	O
O	O
O	O
X	X
X	X

## Identical Pictures Test--P-3

Part 1

## Page 2

1-3	13-4
2-5	14-4
3-2	15-5
4-1	16-3
5-4	17-4
6-3	18-3
7-4	19-2
8-5	20-1
9-4	21-4
10-5	22-4
11-1	23-1
12-4	24-1

## Page 3

25-5	37-4
26-4	38-3
27-4	39-1
28-4	40-4
29-4	41-3
30-4	42-1
31-2	43-2
32-2	44-4
33-4	45-1
34-4	46-3
35-3	47-4
36-3	48-5

Part 2

## Page 4

49-4	61-3
50-2	62-5
51-3	63-3
52-5	64-2
53-4	65-5
54-1	66-1
55-4	67-3
56-2	68-3
57-5	69-1
58-4	70-4
59-1	71-2
60-1	72-5

## Page 5

73-3	85-3
74-4	86-1
75-1	87-3
76-2	88-2
77-1	89-1
78-3	90-4
79-3	91-2
80-3	92-5
81-1	93-3
82-5	94-2
83-4	95-5
84-3	96-2

## Mathematics Aptitude Test--R-1

Part 1

## Page 2

1-2, 2-5, 3-1, 4-4, 5-3,

## Page 3

6-2, 7-3, 8-4, 9-4, 10-1

## Page 4

11-2, 12-3, 13-5, 14-2, 15-1

Part 2

## Page 5

16-3, 17-1, 18-5, 19-4, 20-2

## Page 6

21-5, 22-1, 23-2, 24-3, 25-4,

## Page 7

26-2, 27-3, 28-2, 29-5, 30-4

## Mathematics Aptitude Test--R-2

Part 1

## Page 2

1-5, 2-1, 3-2, 4-3, 5-4

## Page 3

6-5, 7-2, 8-3, 9-1, 10-1

## Page 4

11-3, 12-5, 13-4, 14-3, 15-5

Part 2

## Page 5

16-5, 17-4, 18-3, 19-5, 20-1

## Page 6

21-3, 22-2, 23-2, 24-5, 25-1

## Page 7

26-2, 27-4, 28-2, 29-4, 30-3

## Ship Destination Test--R-3

A key for this test may be obtained by writing to the Sheridan Supply Company, Beverly Hills, California.

## Necessary Arithmetic Operations Test--R-4

Part 1

## Page 2

1-3, 2-1, 3-3, 4-4, 5-2,

## Page 3

6-1, 7-4, 8-2, 9-4, 10-3,

## Page 4

11-1, 12-2, 13-2, 14-4, 15-3

Part 2

## Page 5

16-2, 17-3, 18-2, 19-1, 20-4

## Page 6

21-4, 22-1, 23-4, 24-4, 25-2

## Page 7

26-3, 27-1, 28-3, 29-1, 30-2

## Gestalt Transformation--Re-1

Part 1Part 2

## Page 2

## Page 3

1 - C	6 - B
2 - E	7 - E
3 - D	8 - C
4 - A	9 - B
5 - E	10 - A

11 - A	16 - C
12 - C	17 - D
13 - E	18 - D
14 - B	19 - B
15 - D	20 - A

## Object Synthesis--Re-2

Key: General rules

1. Both objects should be necessary and used in making the new object.
2. The objects should be sufficient in themselves to make the new object.
3. Objects other than those given should not be necessary or used in the new object.

## A response is unacceptable:

1. If it is too general.
2. If the new object is inadequate or non-functional.
3. If the new object could not be made from the given objects.
4. If the new object is not different from the given objects in kind.

	Sample Acceptable Responses	Sample Non-Acceptable Responses
<u>Part 1</u>		
1.	envelope, pinholder, funnel, paper doll	kite, party favor, child's toy
2.	scarecrow, mop, flag	coat rack, sail, streetsweeper's uniform
3.	necklace, door knocker, castanets, wall decoration	musical instrument, earmuffs, souvenir, jewelry
4.	tag, peashooter, fan, bookmark	straw, small tent, picture, pocket protector
5.	kite, skirt, brush, basket, torch	padded coathanger, hat, sign
6.	hair decoration, necklace, sling shot, cigarette, corsage	plug, rubber ball, fan, toy
7.	gong, swing, leg iron	paperweight, elevator, club
8.	swab, ear muff, coaster, toy animal	pin cushion, powderpuff with handle, a signal
9.	dart, paper holder pick, spear	ice pick, thread winder, hook
10.	hammer, fishing pole holder, trail marker	weapon (unspecified), weight (unspecified), neck- lace
11.	bookend, bed warmer, pillow, floor polisher	bag, weapon (unspecified), sinker
12.	doorstop, glass washer, permanent blotter, foot wiper	pen cleaner, stationery sponge, pin cushion

	Sample Acceptable Responses	Sample Non-Acceptable Responses
<u>Part 2</u>		
13.	water plug, gunbarrel cleaner, small mop, black jack	tool kit, torch, paint mixer, plumb bob
14.	plumb bob, tension pulley vise, article retriever	black jack, tongs, tool you can't drop
15.	lamp, centerpiece, wax paper, artificial candy cane	fire, deodorizer, candleholder, waterproof bag
16.	ring, child's top, sink stopper, gunsight	bookmark, fastener, doll
17.	flag marker, whip, splint, small game, snare	pendulum, tie rack, swing, tourniquet
18.	fishline with hook, light cord, watch fob, needle and thread	plumb bob, leash, belt, toy
19.	child's swing, float or raft, drum, skis	floating barrel, football tackle dummy, icebox
20.	night stick, door catch, whip, balance	baton, cane, weapon (unspecified), toy
21.	fishing float, jack-in-the- box, doorstop, letterholder	corkscrew, vibration indicator, light switch
22.	swab, mask, "snowman"	first aid kit, artificial snow, chair padding, shawl
23.	mirror, knife, desk cover, picture	hot plate, display window blind, smooth tin foil
24.	wheel, noisemaker, door knob, paper punch	hook, bumper, mechanical machine

## Picture Gestalt--Re-3

The objective of this test is to measure the factor "convergent production of semantic transformations," or, in more historical terms, redefinition. There are three parts; the part score is the number of items in the part to which an acceptable response is made.

The list of acceptable responses includes all responses accepted in the scoring of a 10th-grade sample of more than 400. Additional acceptable responses may arise from other groups, and are permissible if they show evidence of reinterpretation or application of an object to a use for which it would presumably not have been intended.

Acceptable ResponsesPart I:

- |                             |  |
|-----------------------------|--|
| 1. napkin<br>tablecloth     | 6. butter<br>grease from poultry<br>gravy<br>candle wax<br>olive oil |
| 2. knife<br>utensil handles | 7. candle wick<br>turkey string<br>part of table cloth or napkins    |
| 3. butter<br>water          | 8. cup<br>glass  |
| 4. napkin<br>tablecloth     |  |
| 5. candle                   |  |

Part II:

- |  |  |
|--|--|
| 1. lamp base<br>mirror<br>mirror base<br>jar top<br>radio dial<br>finger disks for closet doors<br>picture | 5. bed<br>bed spread<br>blanket                                  |
| 2. picture<br>curtains<br>bed spread<br>paper inside dresser drawers                                       | 6. lamp pole<br>mirror stem                                      |
| 3. lamp shade  | 7. radio<br>cord and wire with weight<br>spring                  |
| 4. varieties of cosmetics<br>light<br>heat   | 8. rug<br>bed spread<br>blanket<br>curtains<br>canvas in picture |

Part III:

- |   |  |
|---|--|
| <p>1. mixer cover<br/>toaster cover</p> <p>2. string of shades<br/>coffee pot cord</p> <p>3. curtain trim or curtain<br/>mixer cover</p> <p>4. canisters</p> <p>5. canisters<br/>coffee pot</p> | <p>6. canister top<br/>mixing bowl<br/>coffee pot<br/>semi-circular shelf<br/>cord (blinds or coffee pot)</p> <p>7. Venetian blinds<br/>table<br/>chairs<br/>shelving<br/>drawers</p> <p>8. table<br/>cabinet doors<br/>window drame or screen<br/>gas stove top<br/>Venetian blinds<br/>chair<br/>drawers</p> |
|---|--|
- 

## Nonsense Syllogisms Test--Rs-1

Part 1

+  
-  
+  
+  
-  
+  
+  
-  
+  
+  
-  
-  
+  
-  
-

Part 2

+  
-  
+  
-  
+  
+  
-  
-  
+  
-  
-  
-  
+  
+  
-  
-



## Logical Reasoning--Rs-2

A key for this test may be obtained by writing to the Sheridan Supply Company, Beverly Hills, California.

## Inference Test--Rs-3

Part 1

## Page 2

1-3, 2-2, 3-4, 4-1,

## Page 3

5-3, 6-5, 7-1, 8-3,

## Page 4

9-2, 10-5

Part 2

## Page 5

11-1, 12-5, 13-4, 14-2,

## Page 6

15-2, 16-3, 17-1, 18-5,

## Page 7

19-2, 20-3

## Card Rotations Test--S-1

Part 1

- , + , + , - , - , + , - , + ,  
 + , + , + , - , + , + , + , + ,  
 + , - , - , - , + , + , + , - ,  
 + , + , - , + , - , - , - , + ,  
 - , + , - , - , + , + , - , + ,  
 + , - , + , + , + , + , - , - ,  
 + , - , + , - , - , + , + , + ,  
 - , - , + , + , - , + , - , - ,  
 - , - , + , + , - , + , + , - ,  
 + , - , - , + , - , - , + , + ,  
 + , + , + , - , - , - , + , + ,  
 + , - , + , + , + , - , - , + ,  
 + , - , + , + , + , - , - , - ,  
 + , - , + , + , - , - , - , + ,

Part 2

+ , + , - , - , + , + , - , - ,  
 + , - , - , - , + , + , + , + ,  
 - , - , + , + , + , + , + , - ,  
 + , - , + , + , - , - , - , + ,  
 + , + , + , - , - , - , + , + ,  
 - , + , + , - , + , - , - , - ,  
 + , + , - , - , - , - , - , + ,  
 + , + , + , + , - , - , + , + ,  
 + , + , - , - , - , - , - , + ,  
 + , + , + , + , + , + , - , - ,  
 + , + , - , - , + , - , + , + ,  
 - , - , + , + , + , + , - , - ,

## Cube Comparisons Test--S-2

Part 1

D, D, D,  
 S, D, S,  
 S, S, S,  
 D, D, S,  
 S, S, S,  
 S, S, D,  
 D, D, D,

Part 2

S, D, S,  
 S, D, S,  
 S, D, S,  
 D, D, S,  
 D, D, S,  
 D, D, D,  
 S, D, D

## Spatial Orientation--S-3

A key for this test may be obtained by writing to the Sheridan Supply Company, Beverly Hills, California.

## Apparatus Test--Sep-1

The basic scoring procedure is to allow one point for each stated improvement, when a measure of sensitivity to problems or, as it is currently described, evaluation of semantic implications, is desired. Since the test was originally designed (1951) many improvements on the objects given have been made. In scoring, the scorer should keep in mind the current status of the various objects, where "current status" refers to the commonly known or widely advertised, but not to very recent developments of which the scorer may have special knowledge.

In addition to the above guideposts for the criteria itself, the following restrictions apply.

Responses should not:

- 1) duplicate a previous response, although an extension of a concept is permitted, if it contains a new idea.
- 2) be absurd, although improvements should be allowed on any reasonable dimension, such as increased efficiency, esthetic appeal, or economy. That is, the improvement should be related to the usual function of the implement. An absurd response would include those responses that are in opposition to the desirable functions or attributes of the equipment, e.g., those which would reduce windshield visibility for the automobile driver.
- 3) be so incomplete that meaning of concept is unclear.

## Apparatus Test -- Scoring Instructions

This test has two types of scores. Although the scores are mutually exclusive, they may be combined to produce a composite score.

"D" or drastic score: Improvement suggesting a major revision in the structure, use, or operation of the given object. In general, these responses will be specific and the improvement elaborated somewhat, since some indication of how the given object would have to be revised is usually necessary to obtain the score. Do not be influenced by the feasibility of suggested improvements: most unfeasible responses will be "D" responses.

"M" or minor score: Improvement suggesting a minor revision in the given object or any improvement that is widely recognized to be already adopted. (One way to determine if an improvement has been adopted is to look at advertisements for the objects concerned. Any improvement used on an object offered commercially would receive an "M" score.) Also included in this category and obtaining a score of "M" is the very popular response suggesting that some present attribute or process will be improved with no further elaboration. (E.g., "better blades" or "quicker, safer shaves.")

Unacceptable responses are scored "O" and include only revisions that are too vague (e.g., "should be better," "must be changed"), absurd (e.g., "vacuum cleaner that makes the beds"), or would lead to an effect opposite to that intended by the given object (e.g., "colored windshield wipers"). This category should be used sparingly, since it has been found that, unless the examinee has misunderstood the instructions, "O" responses are usually really "D" responses that are not feasible.

A list of examples of "D" and "M" responses for each item is included.

Total "D" score is the sum of "D" responses for all items; total "M" score is the sum of "M" responses for all items.

---

**ITEM: Toaster**

"D" responses (drastic)	"M" responses (minor revisions)
butters toast	runs on batteries
slices toast	turns itself off if toast is burning
places toast on plate	holds more bread
wider to hold rolls	smaller in size
cold on outside	buzzer that warns before toast pops
transparent so you can see the toast	bell that sounds when toast is done
keeps toast warm without burning in toaster	

---

ITEM: Refrigerator

"D" responses (drastic)	"M" responses (minor revisions)
transparent door	slide out shelves
regulates its own temperature	lighter weight
electric eye to open door and shut it	revolving shelves
roll up door	noiseless
run on atomic capsule	larger freezing area
door opens automatically	movable compartments instead of shelves
push button shelves	thinner walls for added space
	plastic ice trays
	foot control

ITEM: Vacuum Cleaner

"D" responses (drastic)	"M" responses (minor revisions)
shampoos rug	picks up loose threads on stuffed furniture
sort out usable items such as hairpins, coins, etc.	silent
flexible heads for getting into hard to reach corners	battery type for cars
gasoline engines	no cord
works automatically; remote control	smaller for storage
	easier method of pulling
	disposes of dirt
	picks up all the dust
	smaller handle for easier grip

ITEM: Windshield Wiper

"D" responses (drastic)	"M" responses (minor revisions)
washes bugs off	wipes off snow too
starts automatically when water hits it	heat resistant
liquid which dissolves grease on windshield	covers entire windshield
transparent for better visibility	go sidewise
Automatically regulates to speed of car	operate without noise
Heats up and melts snow and ice	washes windows too

ITEM: Doorbell"D" responses (drastic)

tells who is ringing  
 louder when you sleep  
 starts musical recording  
 automatically locks the front door  
 automatically opens door for  
 visitor  
 that replies if no one is home  
 light - not sound  
 electric eye that sounds bell  
 when person nears door

"M" responses (minor revisions)

more pleasant sounding  
 foot operating  
 devise so you can shut it off as soon  
 as it is heard  
 Lever instead of a button

ITEM: Safety razor"D" responses (drastic)

inflammable blade to burn when used  
 lather applicator  
 built in after shave lotion  
 a built in honing device  
 blades that cut only whiskers  
 blades that adapt to size of  
 whiskers

"M" responses (minor revisions)

permanent blades  
 shave as close as "straight"  
 self-sharpening blades  
 longer handle  
 aluminum blades

ITEM: Automatic pencil"D" responses (drastic)

built in finger placings  
 collapse like a telescope  
 automatic erasure of mistakes  
 writes when you dictate

"M" responses (minor revisions)

adjustable eraser  
 a device to keep lead from breaking  
 unbreakable lead  
 does not need refilling  
 erases without smearing

ITEM: Clock"D" responses (drastic)

numbers painted so that they can be  
 seen from all angles  
 announces the time verbally when you  
 ask it  
 switches automatically to spring out  
 when electricity is off

"M" responses (minor revisions)

rubber cups to stick on bulkhead  
 no winding  
 automatic winding  
 no tick sound  
 music instead of buzzing alarm

ITEM: Typewriter"D" responses (drastic)

words instead of letters  
 a shorthand typewriter  
 bell rings when paper is almost out  
 run from thought impulses  
 hyphenates words automatically at  
 ends of column  
 add and subtract too  
 keys for one syllable words  
 erase button  
 automatic margin setter for # of  
 words/page

"M" responses (minor revisions)

permanent ribbon  
 battery operated  
 autocarriage return  
 power keys

ITEM: Cigarette lighter"D" responses (drastic)

opens & closes by itself  
 device to open the cigarette pack

"M" responses (minor revisions)

permanent fluid  
 windproof  
 thin so can be worn in shirt  
 doesn't need fuel so often  
 longer wicks  
 directional fire  
 smaller  
 carries extra flints  
 come with cigarettes  
 permanent wicks  
 never needs flint

ITEM: Coffee Maker"D" responses (drastic)

device for self washing  
 strengthens the taste of coffee  
 automatic measuring of water and  
 coffee

"M" responses (minor revisions)

stops when coffee made to taste  
 more easily cleanable  
 part to give more perked odor  
 makes many cups on one small  
 cartridge  
 make it noiseless

ITEM: Gas Range

## "D" responses (drastic)

way to light it remotely  
 way to reduce all cooking time  
 turns off when foods properly  
 cooked  
 collapsible in size

## "M" responses (minor revisions)

revolving shelves  
 cheap disposable broiler liner  
 way to remove fumes and smoke  
 quick-heat oven  
 pilot light stays on always  
 smoother tops  
 made to require less gas  
 make automatic temperature controls  
 lower for small people  
 color gas for safety

ITEM: Lawn Mower

## "D" responses (drastic)

unable to cut animals or flowers  
 pulls up weeds automatically  
 pulverizes rocks  
 seeds bare spots in lawn

## "M" responses (minor revisions)

pick up cut grass  
 put power on all mowers  
 better fuel systems  
 no cord  
 larger gas tanks  
 noiseless

ITEM: Window Locks

## "D" responses (drastic)

remotely controllable  
 to give alarm in case of burglary

## "M" response (minor revisions)

strong, yet light  
 made so top window can be lowered

ITEM: Lawn Sprinkler

## "D" responses (drastic)

sprinkles odd-shaped lawns  
 stops when children come near  
 dissolves fertilizers and spreads  
 them on lawn

## "M" responses (minor revisions)

one to soak better than rain  
 one to spray dry ice on clouds  
 larger capacity  
 allows less evaporation  
 built with time control

ITEM: Fountain Pen

"D" responses (drastic)	"M" responses (minor revisions)
always spell right	no blot ink
spill ink when used in forgeries	make all ink waterproof
erasable ink	once-a-year filling
	hold more ink
	filters ink

ITEM: Bathroom Scale

"D" responses (drastic)	"M" responses (minor revisions)
speaks out weight for fat people who can't see down	more consistent accuracy
tells your fortune	built in front of shower or tub
will let husband see how much wife weighs	one you can't stub your toe on
comes out when refrig. door opens	doesn't have to be reset so often
colored light in dial: red for overweight	weighs anything
full length mirror pops up if over or under-weight	
electric shock if over-weight	
if over, lock refrig. until light-weight	

ITEM: Pencil Sharpener

"D" responses (drastic)	"M" responses (minor revisions)
one attached to each pencil	automatic
dissolves shavings	make electric
chemical - just place pencil in and it sharpens	waste less graphite

ITEM: Fire Extinguisher

"D" responses (drastic)	"M" responses (minor revisions)
notifies fire department if fire is too big	use something better than water
finds and puts out fires all by itself	stores enough fluid to put out large fires
replaces burnt article	made smaller and lighter
wakes people	adaptable for sprinkling or tree spraying
detects small amounts of smoke	make more automatic



## Seeing Problems -- Sep-2

For the purposes of this test, a "problem" is defined as either a difficulty or an uncertainty in regard to the form, material, use, or operation of the object given. These criteria are narrowed further by the requirements of specificity, relevance, and, in the case of "uncertainty" (one kind of "uncertainty" is scientific curiosity), whether the answer is difficult to determine.

Each item should be scored for all examinees before the next item is scored. Only the first five responses to any item should be considered. Of course, if one of the first five responses has been crossed out, it is treated as if it were not there. One point should be given for each acceptable answer. The maximum score is 15 points for each of the four parts. Acceptable responses should deal with the form, material, use, or operation of the given object.

Generally, problems based on "curiosity" (e.g., Why do we call it a tree?), where the answer is not obvious, should be accepted. However, when a "curiosity" response is encountered, the scorer should scan all items in that part and credit only one such response for the entire part. This rule does not apply from one part to another. (Such "curiosity" responses are borderline answers, necessitating this special treatment.)

Responses are considered duplicates (and only the first such response is given credit) when they state the same thing for the same item. For example, an examinee who gave the following two responses to the item "Sun" would get credit only for the first:

- 1) burns you
- 2) gives you blisters

The following types of response are not acceptable. (Exceptions are noted in the list of sample acceptable responses):

- 1) Those dealing with acquisition or disposal of object.

Examples:

Where to find it  
How much to pay for it

How to get rid of it  
Whether to sell it

- 2) Those that merely ask a question when no actual "problem" would arise in answering it.

Examples:

How big is it  
How heavy is it  
Who owns it  
What color is it  
How long is it

How long is it  
What kind of container is it in  
Is it inexpensive  
Where was it made  
How was it made

## 3) Those which are too vague.

## Examples:

Is it any good  
 What is it made of  
 How to use it

What to do with it  
 What kind is it  
 What is it

Examples of Acceptable ResponsesPart I

<u>tree:</u>	how to make it grow what to do with leaves how to cut it down how often to water it why is it growing	*how big will it grow will it fall over how old is it what limb to hang swing from *when to get it
<u>hammer:</u>	how long you can use it how to keep from hitting yourself why does it work will it break will head fall off will handle break	how to hold it how to keep children away how hard to hit how to use it correctly how to prevent rust
<u>wind:</u>	How to protect myself from it what to wear in it how to stop things from blowing all over which direction it blows in where is it coming from why is it blowing is it a strong wind	how cold is it what is causing it *how to use it *how big is it *what color is it *where can I find it *what is it *what does it look like

\* - Although some of these responses may seem too vague to be acceptable, they pose a specific problem in the item for which they are acceptable. For example, in the "tree" item, "How large is it?" and "How tall is it?" are not acceptable, but "How big will it grow?" is acceptable because this could be necessary knowledge for a person planting a tree near a house, etc. "How to use it" is unacceptable for most items, but in the case of "wind," it refers to the harnessing of wind for useful purposes. As can be seen, many other responses which would be considered too general if given for other items, are accepted for "wind" because it is far less tangible.

Part II

<u>paint</u> :	how to keep from burning how to keep from spilling what color to use *how did they make it how to get it off of you	how to apply it mixing it is it wet *what color does it come in *what color is it
<u>box</u> :	where to put it *what can it be used for what to put in it	could I trip over it is it strong enough to stand on tearing it
<u>pond</u> :	what to put in it keep kids away *what to use it for	how to keep it clean how to change water *how big is it

\* - These responses, which might be considered too general, pose specific problems in the items in which they are accepted. (For example, the size of a pond can determine whether it can be used as a fish pond, a wading pool, or a swimming pool. "What it can be used for" which is accepted as a response to the item "box," suggests the question of the uses to which the box can be put, whereas the unacceptable "How to use it" is too vague.)

Part III

<u>envelope</u> :	how to seal it how to address it how to open it how to mail it	will it stick does paste taste bad will letter fit in it tears easily *is it the right color
<u>rug</u> :	how to clean it where to put it keep from tripping over it laying the rug	how fast will it wear out *is it right color and fabric will it take in stains how do you keep moths away
<u>sun</u> :	to keep it from burning you to keep it from fading anything keep it from starting fires why is it there how far away is it how to control its power	what to do if it burns out can we land on it *how big is it *what color is it *how was it made

\* - These "vague" responses are specific in the context of the item in which they are given. Like "wind" in Part I, there are more responses demonstrating "curiosity" for the item "sun" than for the other two items. "Wind" and "sun" are less familiar phenomena, and, therefore, a wider variety of responses is acceptable for these two items. In the "envelope" item, "what color are you going to use" is not acceptable since it does not state a problem.

Part IV

<u>glue:</u>	keep it from spilling is it sticky enough will it come out easily	will it show through paper how to get off hands
<u>rope:</u>	how to cut it unravels how do you tie it	is it strong is it flexible keep it from fraying
<u>tomato:</u>	what to do with skin how to eat it when to pick it how to grow it squirts	stains spoil easily is it ripe enough to eat how come it is red *what color is it

\* - This response is obviously different from the usual "general" response since knowledge of a tomato's color is necessary to determine its ripeness.

**Seeing Deficiencies--Sep-3**

One point for each acceptable response.

**Part I**

1. The students at the beginning of the alphabetical list will get more questions.
2. The left turning traffic would interfere with the opposing through traffic and thus slow it up.
3. Table service takes longer and will decrease rate of customer turnover.
4. Engine may stop at an inconvenient time.
5. People who want seats together may not be able to get them.
6. Market potential for the new tractors would be decreased because farmers will already have old-type tractors.
7. Bob will have to work two shifts or 16 hours without a break when shift change is made from evening to early morning.
8. The regular increase in population will make for an additional million people the next year and the food surplus will again be insufficient. Anything indicating problem is not 1,000,000.
9. It is inefficient to move the car from man to man, especially when it is partially dismantled.
10. Difficult to ascertain which people will be involved in accidents and give tests before the accidents occur.

**Part II**

11. The fields will still be too muddy for trucks to operate at that time.
12. Motorists are going too fast to read the street signs or will not get sufficient warning if they wish to turn off in the street.
13. The evaluation of the cases should not be made by a junior law assistant who does not have the necessary knowledge and experience.
14. Cars going one way may have to wait a long time if not enough cars go by on the other street.
15. The rinse water now becomes too dirty or soapy.
16. No market to warrant such an increase in production.

17. People with few purchases will still have to wait for check cashers.
18. More than one person may enter at a time and only one unit will be counted.
19. The houses planned are too high in cost for an industrial area. Any indication that price inconsistent with area.
20. Stability of the ship will be affected.

#### Maze Tracing Speed Test--Ss-1

Preparation of the key is left to the user.

#### Scoring Guide

In general, count a maze as correct if the path was completed without any serious errors.

Ignore the following:

1. Lifting the pencil for a new start.
2. Retracing a path.
3. Accidentally crossing a line when turning a corner.
4. Accidentally slipping across the printed lines at the sides of the path being taken.

## Choosing a Path--Ss-2

Part 1

## Page 3

1-C  
2-D  
3-E  
4-C  
5-A  
6-B  
7-E  
8-B

## Page 4

9-A  
10-C  
11-A  
12-B  
13-A  
14-B  
15-D  
16-A

Part 2

## Page 5

17-C  
18-A  
19-E  
20-B  
21-B  
22-D  
23-C  
24-B

## Page 6

25-C  
26-B  
27-D  
28-C  
29-D  
30-C  
31-C  
32-D

## Map Planning Test--Ss-3

Part 1

1-8  
2-1  
3-7  
4-2  
5-3  
6-5  
7-4  
8-10  
9-9  
10-4

11-3  
12-7  
13-2  
14-10  
15-6  
16-1  
17-4  
18-5  
19-3  
20-8

Part 2

21-10  
22-4  
23-8  
24-5  
25-3  
26-2  
27-10  
28-7  
29-6  
30-9

31-1  
32-2  
33-5  
34-9  
35-7  
36-4  
37-6  
38-10  
39-8  
40-4

## Vocabulary Test--V-1

Part 1

1-3	7-3	13-2
2-4	8-1	14-2
3-2	9-2	15-3
4-4	10-1	16-2
5-1	11-4	17-4
6-3	12-4	18-1

Part 2

19-3	25-3	31-2
20-1	26-4	32-2
21-4	27-3	33-4
22-2	28-1	34-1
23-3	29-4	35-3
24-4	30-2	36-1

## Vocabulary Test--V-2

Part 1

1-4	7-3	13-4
2-5	8-3	14-3
3-2	9-1	15-3
4-4	10-3	16-4
5-3	11-3	17-1
6-2	12-2	18-1

Part 2

19-2	25-3	31-2
20-5	26-4	32-2
21-5	27-2	33-5
22-5	28-3	34-2
23-4	29-5	35-4
24-1	30-5	36-1

## Wide Range Vocabulary Test--V-3

Part 1

1-5	7-5	13-5	19-3
2-4	8-5	14-2	20-4
3-3	9-4	15-2	21-3
4-5	10-3	16-5	22-1
5-3	11-2	17-4	23-3
6-1	12-4	18-2	24-1

Part 2

25-2	31-4	37-3	43-5
26-5	32-3	38-5	44-4
27-5	33-4	39-1	45-1
28-4	34-3	40-1	46-2
29-1	35-5	41-1	47-3
30-4	36-3	42-2	48-4



## Advanced Vocabulary Test--V-4

Part 1

1-1	7-1	13-1
2-2	8-1	14-3
3-2	9-4	15-5
4-4	10-5	16-4
5-1	11-3	17-3
6-3	12-4	18-5

Part 2

19-4	25-5	31-1
20-3	26-1	32-4
21-4	27-2	33-4
22-2	28-1	34-5
23-5	29-1	35-4
24-4	30-5	36-2

## Vocabulary Test--V-5

Part 1

1-3	7-2	13-4
2-4	8-2	14-4
3-3	9-3	15-1
4-2	10-4	16-2
5-1	11-3	17-3
6-2	12-3	18-2

Part 2

19-3	25-3	31-1
20-1	26-1	32-3
21-4	27-4	33-2
22-4	28-3	34-1
23-3	29-3	35-4
24-1	30-2	36-2

## Form Board Test--Vz-1

Part 1

## Page 2

1. +, -, +, -, +  
 2. +, -, +, +, -  
 3. +, +, +, +, +  
 4. -, +, +, +, +  
 5. +, -, +, +, +  
 6. -, +, +, -, +  
 7. +, +, +, +, -  
 8. +, +, +, -, -  
 9. +, -, -, -, +  
 10. +, +, +, -, +  
 11. +, +, +, +, +  
 12. +, +, +, +, +

## Page 3

13. +, -, +, -, +  
 14. +, +, -, +, -  
 15. +, +, -, +, -  
 16. +, -, +, +, +  
 17. +, +, +, +, +  
 18. +, +, -, +, +  
 19. +, +, +, -, +  
 20. -, +, +, +, +  
 21. -, -, -, +, +  
 22. +, +, -, +, +  
 23. +, +, -, +, +  
 24. +, +, +, +, +

Part 2

## Page 4

25. +, -, +, +, +  
 26. +, +, +, +, +  
 27. -, +, +, -, +  
 28. +, +, -, -, +  
 29. +, +, +, +, +  
 30. +, +, -, -, +  
 31. +, -, +, +, +  
 32. +, +, +, +, -  
 33. +, +, -, +, +  
 34. +, +, +, +, +  
 35. +, +, +, +, +  
 36. +, +, +, +, +

## Page 5

37. +, +, -, +, +  
 38. +, +, +, +, +  
 39. -, +, -, +, +  
 40. +, +, -, -, +  
 41. +, +, +, +, +  
 42. -, +, +, -, +  
 43. +, +, +, +, -  
 44. -, +, +, -, -  
 45. -, +, +, +, +  
 46. +, +, +, +, -  
 47. +, +, +, +, +  
 48. -, +, +, -, +

## Paper Folding Test--Vz-2

Part 1

1-A  
 2-D  
 3-B  
 4-D  
 5-B  
 6-E  
 7-A  
 8-C  
 9-E  
 10-E

Part 2

11-C  
 12-B  
 13-A  
 14-E  
 15-B  
 16-A  
 17-E  
 18-D  
 19-D  
 20-C

## Surface Development Test--Vz-3

Part 1

## Page 2

1-B, A, A, E, B  
2-E, D, A, F, A  
3-A, B, A, B, E

## Page 3

4-A, C, G, H, A  
5-F, E, C, D, B  
6-A, A, D, C, E

Part 2

## Page 4

7-C, B, E, A, B  
8-A, D, H, C, B  
9-D, B, A, F, G

## Page 5

10-F, C, D, G, E  
11-C, H, B, D, F  
12-C, G, D, F, H

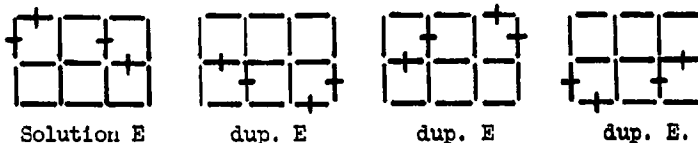
## Match Problems II--Xa-1

Although the kit copy of this test was printed by ETS, Sheridan Supply has now published it. A key for this test may be obtained by writing to the Sheridan Supply Company, Beverly Hills, California.

## Match Problem V--Xa-2

Each item should be scored for all examinees before the next item is scored. The total score is the number of acceptable solutions. A scoring key is provided. If a response corresponds to one of the correct solutions, the letter of this solution should be noted beside the response. The following are important criteria:

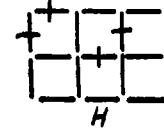
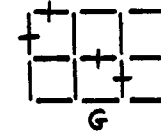
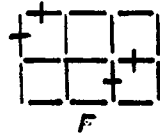
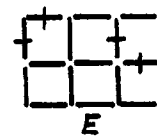
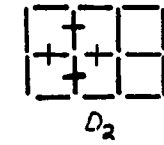
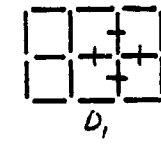
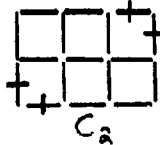
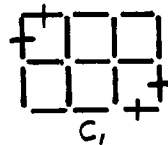
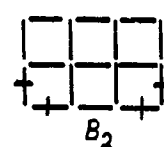
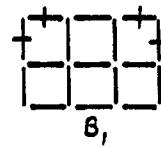
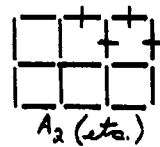
- 1) The correct number of matches must be crossed out.
- 2) All matches left must be part of a square.
- 3) The remaining squares do not have to be the same size.
- 4) The remaining squares may overlap, or one may be superimposed upon the other.
- 5) Keyed solutions which have the same letter and different subscripts are considered duplicates of one another. Therefore, if an examinee responds with more than one solution which has the same letter on the key, only the first occurrence receives credit. The others are duplicates and are not accepted.
- 6) Symmetrical items (1, 2, and 4) are scored for the use of new principles (or configurations) in the solution. In these three items, "rotations" or "inversions" of a correct solution are not accepted. Asymmetrical items (3, 5, and 6) are scored on the basis of the final result. Manipulations, rotations, or inversions of an existing principle are acceptable as long as the final solution is different. The principles involved in the more difficult asymmetrical problems are probably not readily apparent in the testing situation, and are, therefore, probably not involved in these responses to the degree that they are in the symmetrical items.
- 7) In #1 of Part I, a "rotation" or "inversion" of E, F, G, or H is considered a duplicate and is not given credit. For example, solution E may be "rotated" or "inverted" in these ways:



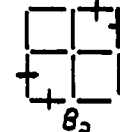
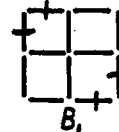
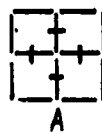
Solutions D, E, F, and G of #4 in Part II may be duplicated in the same way. Only the first occurrence of the listed solution or one of its duplicates should be credited.

## PART I

1. CROSS OUT 4 MATCHES.  
 LEAVE ANY NUMBER OF SQUARES.  
 EVERY MATCH LEFT MUST BE PART OF SOME SQUARE.

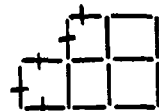


2. CROSS OUT 4 MATCHES.  
 LEAVE ANY NUMBER OF SQUARES.  
 EVERY MATCH LEFT MUST BE PART OF SOME SQUARE.



## PART I (Continued)

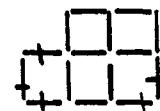
3. CROSS OUT 5 MATCHES.  
 LEAVE ANY NUMBER OF SQUARES.  
 EVERY MATCH LEFT MUST BE PART OF SOME SQUARE.



A



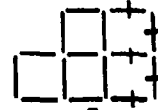
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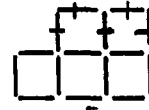
C



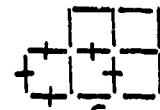
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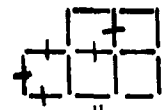
E



F



G



H



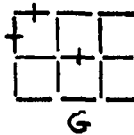
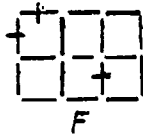
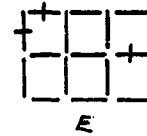
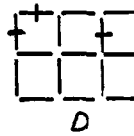
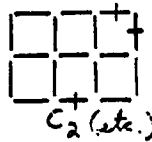
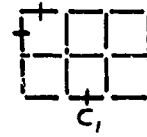
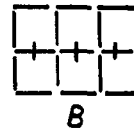
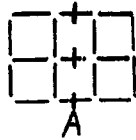
I



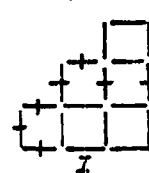
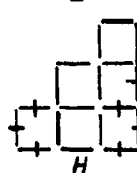
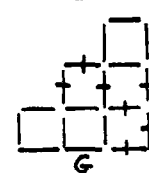
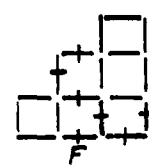
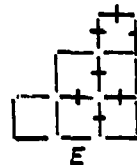
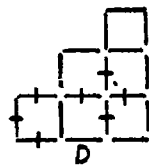
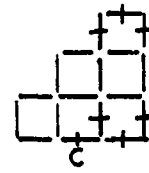
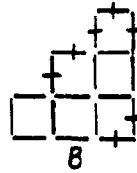
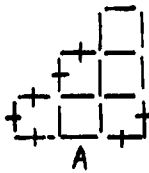
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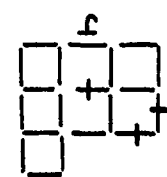
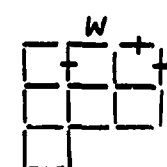
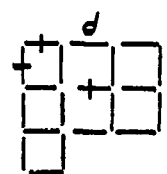
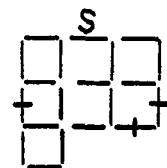
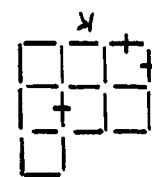
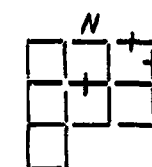
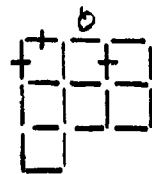
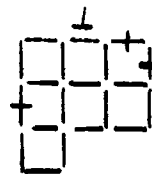
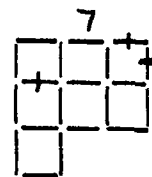
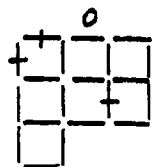
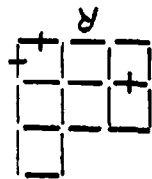
## PART II

4. CROSS OUT 3 MATCHES.  
LEAVE ANY NUMBER OF SQUARES.  
EVERY MATCH LEFT MUST BE PART OF SOME SQUARE.



5. CROSS OUT 7 MATCHES.  
LEAVE ANY NUMBER OF SQUARES.  
EVERY MATCH LEFT MUST BE PART OF SOME SQUARE.

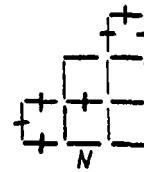
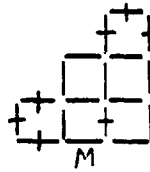
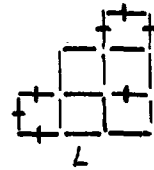
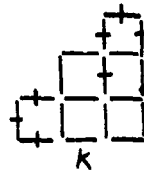
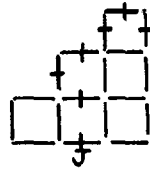




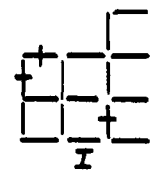
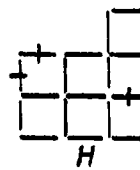
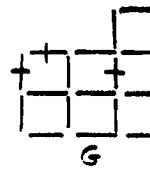
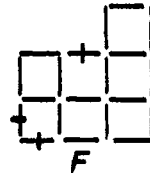
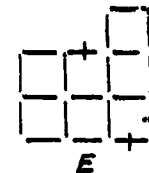
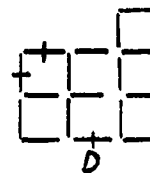
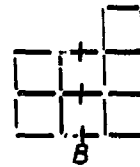
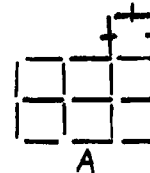
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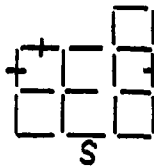
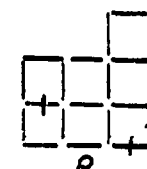
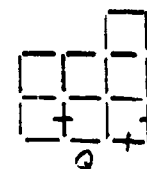
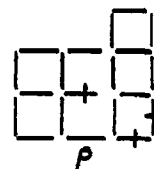
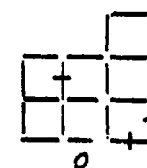
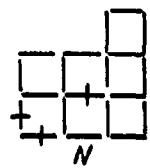
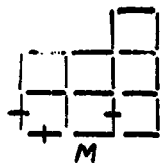
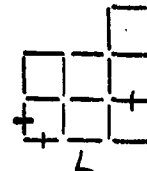
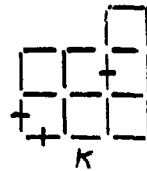
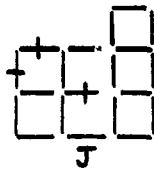
PART II (Continued)



6. CROSS OUT 3 MATCHES.  
 LEAVE ANY NUMBER OF SQUARES.  
 EVERY MATCH LEFT MUST BE PART OF SOME SQUARE.



## PART II (Continued)



## Planning Air Maneuvers--Xa-3

Part 1

14-A  
15-A  
16-B  
17-B  
18-A  
19-B  
20-A  
21-B  
22-A  
23-B  
24-B  
25-B  
26-A  
27-B  
28-B  
29-A  
30-B  
31-B  
32-A  
33-B  
34-B  
35-A  
36-B  
37-B  
38-A  
39-B  
40-B  
41-A  
42-B  
43-A  
44-B  
45-B  
46-B  
47-B  
48-A  
49-A

Part 2

50-B  
51-A  
52-B  
53-B  
54-B  
55-B  
56-Either A or B  
57-B  
58-A  
59-B  
60-A  
61-B  
62-A  
63-B  
64-B  
65-A  
66-A  
67-B  
68-B  
69-B  
70-A  
71-A  
72-B  
73-A  
74-A  
75-B  
76-A  
77-B  
78-A  
79-B  
80-B  
81-A  
82-B  
83-A  
84-B  
85-A

## Utility Test -- Xs-1

The score for this test is "shift score." Responses are scored, not for fluency or the total number of categories used, but for the number of shifts in thinking demonstrated throughout the test. Therefore, every response is scored in relation to the responses before it. If a response shows an approach to the use of the object which differs from that of the preceding answer, it is given a score of one, as evidence of the shift.

Example I:

write a letter  
draw a picture  
do written homework  
sketch something  
  
n (SHIFT SCORE OF 0)

Example II:

as a means of writing  
experimentation with wood ✓  
experimentation with carbon ✓  
as a lever ✓  
a holder for something ✓  
to wrap people on knuckles ✓  
for carving soft substances ✓  
for marking things ✓

(SHIFT SCORE OF 6)

In each response given credit in the preceding example, the examinee has taken a different quality of the object into consideration than he did in the preceding response. "Marking things" is given credit because it is separated by more than one response from "means of writing." If, as in Example III, only one answer is interposed, another point is not given.

Example III:

write answers on a test  
make a fire ✓  
do English  
do social studies

(SHIFT SCORE OF 1)

The following categories are listed to provide the scorer with a general idea of the various ways in which the examinee may have approached the given object.

Part I

construction  
weights  
tools  
togs or recreation  
decoration  
demonstrations and examples  
brick products  
support  
business  
weapon  
cleaning  
furniture  
occupy space

Part II

tool  
pointed  
writing  
material  
commercial  
psychological outlet  
toy

## Alternate Uses--Xs-2

A key for this test may be obtained by writing to the Sheridan Supply Company, Beverly Hills, California.

## Object Naming--Xs-3

For the ability called semantic spontaneous flexibility a shift score is used. The objective here is to differentiate examinees who persevere within a category, tending to exhaust it, from those who range over many categories. The scorer should avoid imposing upon an examinee's list too "fine-grain" a system of categories, as this will lead to confounding the score with fluency and/or specific knowledge. Rather the scorer should judge where the examinee has paused in his "train of thought" or associative chain, and then resumed in another direction. Each change in direction is counted as a shift. The score is the number of shifts in the list. The examinee may return to a previously entered category without penalty, except of course where the objects are named in the same words as before. In the examples below, the √ indicates the first word in a new direction, so the score is the number of √'s. Notice that smaller categories are possible, but were not scored as shifts, because of the strong associative connections between words like coke-beer.

## Examples of shift scoring

## Part I - fluids

milk  
water  
coke  
beer  
wine  
whiskey  
oil √  
gas  
medicine √  
blood √  
sweat  
tears  
tea √  
coffee

Shifts: 4

## Part II - plants

grass  
tree  
bush  
clover √  
oats  
alfalfa  
wheat  
corn  
beets √  
peas  
carrots  
potato  
tomato  
geranium √  
tulip

Shifts: 3

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