



Manual for Kit of Factor-Referenced Cognitive Tests

1976

Ruth B. Ekstrom

John W. French

Harry H. Harman

with Diran Dermen

The tests described in this manual are distributed for research use only. They should not be used for counseling or other operational purposes.

Office of Naval Research Contract N00014-71-C-0117

Project Designation NR 150 329

Harry H. Harman, Principal Investigator

Educational Testing Service
Princeton, New Jersey

August 1976

Listening.

Learning.

Leading.

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Ruth B. Ekstrom
John W. French

INTRODUCTION

The purpose of this Kit of 72 factor-referenced cognitive tests for 23 factors is to provide research workers with a means of identifying certain aptitude factors in factor-analytic studies. It is intended that use of these tests will facilitate interpretation and the confident comparison of one factor study with another. Except for the replication of studies within a given laboratory, it has usually been necessary to cross-identify the factors in two studies by means of psychological interpretation alone, often without any tests common to the two studies. However, in many kinds of investigations the process of identification of comparable factors across studies can be made more objective by including marker tests for factors that are expected to appear or for factors that a researcher wants to isolate from other domains of interest.

There are several techniques for objectively comparing a factor found in one analysis with that found in another (Harman, 1976). However, all methods of this kind require either a set of tests or a group of subjects that are common to the two studies. Use of tests such as those in this Kit should provide researchers with sets of common tests, and at the same time, provide linkages to the findings in many different laboratories.

While use of these tests should help clarify factorial descriptions, it must be recognized that over-dependence on them might be counter-productive. It is not our intent to inhibit an investigator who might be led by inspiration or hunch to use alternate measures that could produce creative results. However, in such cases it might still be useful to include factor-referenced measures to help clarify the contribution of such newly-created measures. Thus, these tests, and others like them, have been found useful in generating theories of intellect by researchers like the following: Guilford (1967) and his students in developing a "structure of intellect" model; Royce (1973) in the development of a conceptual framework for a multi-factor theory of individuality; and Carroll's (1974) new structure of intellect approach.

Research Basis for 1976 Kit

The research work that provides the underpinnings for this Kit of tests was conducted over a four-year period under the sponsorship of the Office of Naval Research. An overall summary of the study is presented in the Final Report (Harman, 1975). Research results are presented in the following eight Technical Reports:

- TR 1. Toward the establishment of noncognitive factors through literature search and interpretation (John W. French, 1973).
- TR 2. Cognitive factors: Some recent literature (Ruth B. Ekstrom, 1973).
- TR 3. Proceedings: Toward the development of more comprehensive sets of personality measures (Harry H. Harman, Editor, 1973).
- TR 4. Psychometric tests as cognitive tasks: A new "structure of intellect" (John B. Carroll, 1974).
- TR 5. Problems of replication of seven divergent production factors (Ruth B. Ekstrom, John W. French, and Harry H. Harman, 1974).
- TR 6. Verification of self-report temperament factors (Diran Dermen, John W. French, and Harry H. Harman, 1974).
- TR 7. Seeking markers for temperament factors among positive and negative poles of temperament scales (John W. French and Diran Dermen, 1974).
- TR 8. An attempt to confirm five recently identified cognitive factors (Ruth B. Ekstrom, John W. French, and Harry H. Harman, 1975).

It should be noted, of course, that the current research study was broader than the updating and improvement leading to the Kit of Factor-Referenced Cognitive Tests. A parallel effort in the noncognitive domain was initiated with the study, as some of the reports indicate, and a Guide to Factor-Referenced Temperament Scales is being released as a companion document to this Kit.

Development of the Kit

This Kit follows two earlier editions: French (1954) and French, Ekstrom, and Price (1963). An important difference between this and the earlier Kits is that much more experimental work and field tryouts were involved in the development of the present edition. As a first step, a thorough literature search (see TR 2) disclosed the present status of the factors listed in the 1963 Kit and pointed to some half-dozen factors that have appeared since then. An aptitude factor was considered "established" if the construct underlying it had been found in at least three factor analyses performed in at least two different laboratories or by two different investigators.

The work of updating, modifying, and extending the 1963 Kit of cognitive tests involved the following three activities:

- (1) Development of new divergent production tests;
- (2) Review and modification of other tests of the 1963 Kit to be included in the new Kit;
- (3) Development of new marker tests for factors that have been established in the literature since 1963.

After the modification and development of the new tests, the empirical verification of their usefulness in marking the putative factors was carried out by means of two field experiments.

The result of the field tests--the extent to which the postulated factors held up and the utility of the tests as markers for the factors --are presented in two reports (TR 5 and TR 8). In an additional theoretical paper (TR 4), a detailed analysis is made of the cognitive processes involved in some factor-referenced tests. From these studies the conclusion is drawn that cognitive tasks are complex and that cognitive factors resist classification by any rigid taxonomy such as Guilford's Structure of Intellect model. There are probably no such things as truly "pure" factors. Thus, a study of individual differences in abilities can profit greatly if it is closely tied to the experimental analysis of particular cognitive tasks, as has been done by researchers

Table 1
MARKER TESTS FOR 23 APTITUDE FACTORS

CF Closure, Flexibility of	MV Memory, Visual
1. Hidden Figures Test 2. Hidden Patterns Test 3. Copying Test	1. Shape Memory Test 2. Building Memory 3. Map Memory
CS Closure, Speed of	N Number
1. Gestalt Completion Test 2. Concealed Words Test 3. Snowy Pictures	1. Addition Test 2. Division Test 3. Subtraction & Multiplication Test 4. Addition & Subtraction Correction
CV Closure, Verbal	P Perceptual Speed
1. Scrambled Words 2. Hidden Words 3. Incomplete Words	1. Finding A's Test 2. Number Comparison Test 3. Identical Pictures Test
FA Fluency, Associational	RG Reasoning, General
1. Controlled Associations Test 2. Opposites Test 3. Figures of Speech	1. Arithmetic Aptitude Test 2. Mathematics Aptitude Test 3. Necessary Arithmetic Operations Test
FE Fluency, Expressional	RL Reasoning, Logical
1. Making Sentences 2. Arranging Words 3. Rewriting	1. Nonsense Syllogisms Test 2. Diagramming Relationships 3. Inference Test 4. Deciphering Languages
FF Fluency, Figural	S Spatial Orientation
1. Ornamentation Test 2. Elaboration Test 3. Symbols Test	1. Card Rotations Test 2. Cube Comparisons Test
FI Fluency, Ideational	SS Spatial Scanning
1. Topics Test 2. Theme Test 3. Thing Categories Test	1. Maze Tracing Speed Test 2. Choosing A Path 3. Map Planning Test
FW Fluency, Word	V Verbal Comprehension
1. Word Endings Test 2. Word Beginnings Test 3. Word Beginnings and Endings Test	1. Vocabulary Test I 2. Vocabulary Test II 3. Extended Range Vocabulary Test 4. Advanced Vocabulary Test I 5. Advanced Vocabulary Test II
I Induction	VZ Visualization
1. Letter Sets Test 2. Locations Test 3. Figure Classification	1. Form Board Test 2. Paper Folding Test 3. Surface Development Test
IP Integrative Processes	XF Flexibility, Figural
1. Calendar Test 2. Following Directions	1. Toothpicks Test 2. Planning Patterns 3. Storage Test
MA Memory, Associative	XU Flexibility of Use
1. Picture-Number Test 2. Object-Number Test 3. First & Last Names Test	1. Combining Objects 2. Substitute Uses 3. Making Groups 4. Different Uses
MS Memory Span	
1. Auditory Number Span Test 2. Visual Number Span Test 3. Auditory Letter Span Test	

such as Hunt, Lunneborg, and their co-workers (1973, 1975) and by the Harrises (1973).

On the basis of the research findings, together with a thorough review of the 1963 Kit, a set of 72 marker tests are now recommended for 23 cognitive factors. These are listed in Table 1. This list differs somewhat from that presented in the 1963 edition. New factors now considered to be established are Verbal Closure, Figural Fluency, Flexibility of Use, Integrative Processes, and Visual Memory. Four previous factors have been dropped both because other research had failed to confirm them and because recent efforts by ETS to develop markers for them were not successful and seemed to cast some doubt on their existence as separate factors. These are Semantic Originality, Semantic Redefinition, Sensitivity to Problems, and Semantic Spontaneous Flexibility. Parts of these factors are now thought to be represented by the Expressional Fluency and Flexibility of Use factors. An additional factor, Concept Attainment, has been reported in the literature. However, an attempt to replicate this factor has failed (see TR 8), and hence there are no recommendations of marker tests for it. Two other factors, Length Estimation and Mechanical Knowledge, were dropped because they seem to refer to achieved skills rather than to what are normally called aptitudes. Also to be noted are two factor name changes: Syllogistic Reasoning to Logical Reasoning; and Figural Adaptive Flexibility to Figural Flexibility. These reflect some change in the conceived nature of these factors.

Preparation of the two earlier editions of the Kit, as well as the initiation of the present study, was preceded by a conference of persons interested in multiple factor analysis. Thus, an effort has been made to truly represent the past research of many factor analysts. In the first Kit, broad representativeness in the sense of accurate factor marking was assured by including (with author and publisher permission) the actual tests that were found to generate specified factors. In the second Kit, many of these original markers were replaced by new tests adapted by

ETS as the factorial equivalents of the original ones. This change served to overcome some copyright problems that arose when users wanted to reproduce the materials for their own investigations. At the conference of March 1971 (see Acknowledgement for list of participants), which initiated the research and development leading to the third edition of the Kit, it was generally agreed that ETS should provide all the tests recommended for factor markers.

General Information about the Tests

The 72 cognitive tests offered in the new Kit and described in this Manual are intended as markers for the 23 aptitude factors to which they are referenced. It is strongly recommended that researchers use more than one of these tests in any exploratory endeavor that aims at identifying a factor. These tests are not offered for use in any program of selection or assignment of people for educational or work purposes, or for any type of individual prediction. Excluding such inappropriate uses, researchers may obtain any number of copies from ETS at nominal cost, or enter into a licensing arrangement with ETS. The tests are available for any combination in research batteries, with reasonably uniform instructions.

The exclusive use of ETS-developed tests places on the publisher more than ever the responsibility for offering adequate research to support the recommended uses of these measures. For this purpose, some basic test statistics and factorial results have been collected from some users over the past years to supplement the empirical results (see TR 5 and TR 8) that have been obtained through tryouts at the Navy Training Center, San Diego, California. The summary test statistics are shown in Table 2.

Changes were made in a number of the tests after the field tryouts and some of these undoubtedly affect the test difficulties. Results from two administrations of our original version of the Toothpicks Test and of the Storage Test present an example of the kinds of score changes that can occur due to test modification and/or to differences in the populations

being tested. When these tests were administered to naval recruits in 1972, the total score means (two parts) were 6.1 for the Toothpicks Test and 1.3 for the Storage Test. After making some minor changes in the directions, one part of each of these tests was administered to similar, but probably slightly less able, naval recruits in 1974. The means for these single parts only were 4.1 and 2.0; obviously a major change in test difficulty (apparently the revised directions made these tests much simpler).

Since similar minor changes have been made in a number of the new tests as a result of problems observed in the field tryouts, the means reported from these tryouts may not be comparable to the performance of similar subjects on the revised tests. Consequently, the user is cautioned not to interpret the means from the field studies as normative data. Table 2 indicates which tests have been revised since the field tryout. Differences in apparent test difficulty can occur as a result of modifications in the directions or content of the tests, and certainly when the population being studied is different from the experimental group.

The references to factorial studies are intended to allow the user to evaluate the likelihood that the named factor will appear if the tests are included in a factor analysis. Studies that support this constitute the construct validation of the tests. However, particular conditions of the testing, special characteristics of the subjects, the mix of variables included in the study, the number of tests relevant to a given factor, and the statistical methodology may sometimes prevent a factor from separating as expected. As may be seen by examining Table 2 and Technical Reports 2, 4, 5, and 8, the tests recommended in this Manual necessarily vary with respect both to their stability as measures and to their factorial purity.

The data cited for the establishment of the factors and for the selection of marker tests--both from the literature and from the field experiments in the current research project--are based on the use of normal adolescent or adult subjects. Researchers as far back as Thurstone have recognized that the factorial structure associated with younger persons is different from that of adults, usually being more simple or

general in form. A part of this difference may be caused by difficulty in reading or fully understanding the test directions and items. Therefore, all of the tests offered in this Kit should be considered suitable for persons who have reached ninth grade or higher. However, except for tests that are verbally complex or dependent on reading, it is possible that many of these tests can be used with younger children by having the examiner read the directions aloud. (See Gotts, 1971, for an example of such usage.)

Organization of the Manual

Since the cognitive tests are referenced to particular ability factors, the listing of the recommended tests is preceded, in each instance, by some information about the factor. Thus, the body of the Manual is organized into 23 sections, one for each factor, starting with the following information:

- The factor symbol and name are in a form that is convenient and consistent with usage in the literature and with the interpretation made in this Kit. The factors are placed in alphabetical order by symbol. The symbols consist of the first one or two letters in the factor name, except that the letters denoting the specifying adjectives in the name are placed second in order to bring together factors that are psychologically similar. For example, Span Memory (MS) and Visual Memory (VM) come together.
- A brief definition or psychological interpretation of the factor. The terminology used in these definitions implies the interpretation of factors as human abilities rather than merely as statistical constructs. However, this is done only for convenience; the work on this project reveals nothing either to favor or to refute the interpretation of factors as human abilities. Each interpretation includes one or more paragraphs further describing the factor, discussing the relationship to other factors, or giving data to support its existence.
- Identification of the factor in terms of some of the well known efforts to standardize the nomenclature: Cattell's "Universal Index" (1953 and elsewhere), Guilford's "Structure of Intellect" (1960 and elsewhere), and Thurstone's original letter symbols.
- References to studies that support the factor.

After the foregoing information about the factor is presented in each section, the following descriptions of the cognitive tests are given:

- The name of the test. Where the test is similar to a test discussed in the literature, the author of the original test is credited; usually the name is changed slightly to make it clear that they are not the same test while calling attention to their similarity. Rev. following the name of a test means that this is a test from the 1963 edition of the Kit which has been substantially revised for this new edition; these revisions include changes in test directions, item order, and/or item content. Not every revised test, however, bears the Rev. notation. Table 3 indicates the status of all new and revised tests.
- An alpha number designation for each test, which includes the symbol for the factor and a number. The numerical order of tests for each factor has no significance.
- Length of test in terms of number of items and time limit. All tests except the Memory Span tests are presented in two parts. This enables the researcher to compute reliabilities like those reported in Table 2. While administration of both parts is recommended for most situations, the user may sometimes want to shorten testing time by using only one part at the sacrifice of some reliability.
- Grade levels for which the test is suitable.

Following these brief descriptions of the tests, the actual cover pages of the test booklets are reproduced. These contain the test-administration directions and sample practice items. Finally, given at the end of each section are the scoring instructions and keys for the tests referenced to that factor. A number of the tests can be adapted to machine scoring. In order to save time and expense, it would seem reasonable for any large-scale study to use answer sheets that fit the kind of scoring machinery available to the researcher. However, for a few highly speeded measures, the answers should probably be made directly in the booklet, because the time for the subject to mark an answer sheet would materially affect the score and alter the factorial composition of the test. For those tests that call for open-ended responses, the answer spaces are provided directly in the test booklet.

A reference list of the works cited in support of the established factors is given at the end of the Manual.

Table 2 Some Statistics on Factor-Referenced Cognitive Tests

Factor & Tests	Mean	S.D.	Rel.	Mean	S.D.	Rel.	Mean	S.D.	Rel.	Mean	S.D.	Rel.	Sample
FE													
1 Making Sentences	10.1	3.7	.80										
2 Arranging Words	5.1	2.3	.68										
3 Rewriting	5.5	2.9	.62										
FF													
1 Ornamentation				21.9	10.0	.85							
2 Elaboration				24.2	9.0	.86							
3 Symbols				9.1	3.8	(data on Part 1 only)							
FL													
1 Topics Test							19.5	6.3	.81				
2 Theme Test							134.4	31.6	.80				
3 Thing Categories							14.7	4.8	.70				
FW							6.6	3.0	.59				
1 Word Endings										30.2	3.2	.70	181 college students
2 Word Beginnings										22.3	---	.86	86 Army enlistees
3 Word Beginnings and Endings										19.0	6.2	.68	181 college students
I													
1 Letter Sets										17.5	5.4	.77	males
										18.7	4.8	.74	females
2 Locations													119 9th grade males
3 Figure Classi- fication													119 9th grade males
IP													
1 Calendar Test										8.8	3.8	.75	
2 Following Directions										10.4	3.8	.76	

Factor & Tests	Mean	S.D.	Rel.	Mean	S.D.	Rel.	Sample	Mean	S.D.	Rel.	Sample
MA											
1 Picture-Number				26.8	.9.4	.83	males	14.2	6.2	.81	104 6th graders
2 Object-Number				28.2	8.2	.83	females	24.4	8.7	.86	181 college students
3 First and Last Names				19.1	7.5	.86	males	8.1	4.1	.69	104 6th graders
				23.2	5.7	.79	females	13.3	6.0	.76	119 9th grade males
							males	11.3	5.4	.75	294 6th graders
							females	17.2	6.9	.81	119 9th grade males
MS											
1 Auditory Number Span								4.9	2.6	.74	294 6th graders
2 Visual Number Span								8.3	3.2	.63	181 college students
3 Auditory Letter Span								3.9	2.1	.65	294 6th graders
MV											
1 Shape Memory	21.4	4.3	.68								
2 Building Memory	10.9	4.7	.80								
3 Map Memory	17.1	3.9	.77								
N											
1 Addition								33.9	10.1	.93	119 9th grade males
2 Division								39.1	13.7	.94	119 9th grade males
3 Subtraction and Multiplication	(19.3	9.1	data on Part 1 only)					34.1	12.1	.92	294 6th graders
4 Addition and Subtraction Correction	42.7	14.3	.86					45.5	14.8	.92	119 9th grade males
P											
1 Finding A's				47.0	14.9	.73	males	35.1	7.8	---	145 college males
2 Number Comparison				54.3	14.9	.74	females	34.6	9.9	.82	249 6th graders
3 Identical Pictures							males	26.6	4.8	.82	145 college males
							females	13.7	4.7	.70	294 6th graders
							males	68.6	---	.82	83 Army enlistees
							females	49.6	9.8	.85	294 6th graders

Table 3

Relations of Current Tests to 1963 Kit Tests

CF		
1.	Hidden Figures	(Time limit shortened. Some items revised)
2.	Hidden Patterns	(Time limit increased. Items rearranged)
3.	Copying Test	(Unchanged or minor change)
CS		
1.	Gestalt Completion	(Test shortened. Items revised)
2.	Concealed Words	(Items rearranged)
3.	Snowy Pictures	(New)
CV		
1.	Scrambled Words	(New)
2.	Hidden Words	(New)
3.	Incomplete Words	(New)
FA		
1.	Controlled Associations	(Unchanged or minor change)
2.	Opposites	(New)
3.	Figures of Speech	(New)
FE		
1.	Making Sentences	(New)
2.	Arranging Words	(New)
3.	Rewriting	(New)
FF		
1.	Ornamentation	(New)
2.	Elaboration	(New)
3.	Symbols	(New)
FI		
1.	Topics Test	(Unchanged or minor change)
2.	Theme Test	(Unchanged or minor change)
3.	Thing Categories	(Unchanged or minor change)
FW		
1.	Word Endings	(New)
2.	Word Beginnings	(New)
3.	Word Beginnings and Endings	(New)

I

1. Letter Sets (Unchanged or minor change)
2. Locations Test (Unchanged or minor change)
3. Figure Classification (Unchanged or minor change)

IP

1. Calendar Test (New)
2. Following Directions (New)

MA

1. Picture-Number (Unchanged or minor change)
2. Object-Number (Unchanged or minor change)
3. First and Last Names (Unchanged or minor change)

MS

1. Auditory Number Span (Unchanged or minor change)
2. Visual Number Span (Unchanged or minor change)
3. Auditory Letter Span (Unchanged or minor change)

MV

1. Shape Memory (New)
2. Building Memory (New)
3. Map Memory (New)

N

1. Addition (Unchanged or minor change)
2. Division (Unchanged or minor change)
3. Subtraction & Multiplication (Unchanged or minor change)
4. Addition & Subtraction
Correction (New)

P

1. Finding A's (Test shortened)
2. Number Comparison (Unchanged or minor change)
3. Identical Pictures (Unchanged or minor change)

RG (formerly R)

1. Arithmetic Aptitude (Items updated)
2. Mathematics Aptitude (Items updated)
3. Necessary Arithmetic
Operations (formerly R-4) (Items updated)

RL (formerly Rs)

- | | |
|------------------------------|-----------------------------|
| 1. Nonsense Syllogisms | (Unchanged or minor change) |
| 2. Diagramming Relationships | (New) |
| 3. Inference Test | (Unchanged or minor change) |
| 4. Deciphering Language | (New) |

S

- | | |
|--------------------|---|
| 1. Card Rotations | (Test shortened. Response format changed) |
| 2. Cube Comparison | (Instructions revised) |

SS

- | | |
|-----------------------|-----------------------------|
| 1. Maze Tracing Speed | (Unchanged or minor change) |
| 2. Choosing A Path | (Unchanged or minor change) |
| 3. Map Planning | (Unchanged or minor change) |

V

- | | |
|------------------------------|-----------------------------|
| 1. Vocabulary I | (Unchanged or minor change) |
| 2. Vocabulary II | (Unchanged or minor change) |
| 3. Extended Range Vocabulary | (Unchanged or minor change) |
| 4. Advanced Vocabulary I | (Unchanged or minor change) |
| 5. Advanced Vocabulary II | (Unchanged or minor change) |

VZ

- | | |
|------------------------|-----------------------------|
| 1. Form Board Test | (Unchanged or minor change) |
| 2. Paper Folding Test | (Unchanged or minor change) |
| 3. Surface Development | (Unchanged or minor change) |

XF

- | | |
|----------------------|-------|
| 1. Toothpicks Test | (New) |
| 2. Planning Patterns | (New) |
| 3. Storage Test | (New) |

XU

- | | |
|----------------------|-------|
| 1. Combining Objects | (New) |
| 2. Substitute Uses | (New) |
| 3. Making Groups | (New) |
| 4. Different Uses | (New) |

CF CLOSURE, FLEXIBILITY OF

Factor

The ability to hold a given visual percept or configuration in mind so as to disembed it from other well defined perceptual material

Tests of this factor require the subject to search a distracting perceptual field in order to find a given configuration. Tests which are the best markers present the subject with the exact model.

Flexibility of closure appears to be related to the cognitive style called "field independence." However, there is no evidence to suggest that these are identical constructs. Researchers wishing an established marker for field independence are advised to use the Embedded Figures Test published by Consulting Psychologists Press. Witkin et al. (1971) state that both Thurstone's flexibility of closure factor and Guilford's adaptive flexibility are similar to field independence. Royce (1973) hypothesizes that the flexibility of closure factor combines with others into a second-order field articulation factor, and Hettema (1968) suggests that field dependence may be a separate factor lying conceptually between flexibility of closure and speed of closure. However, Wardell (1973) suggests that flexibility of closure and figural adaptive flexibility may be identical.

This factor is also somewhat similar to perceptual speed. Both require the subject to make a visual match but disembedding is required in flexibility of closure while mere location is required in perceptual speed tests.

According to Carroll (1974), flexibility of closure "involves a process occurring in short-term memory whereby a figure is imaged in relation to a surrounding visual-representational field."

Cattell (1971) calls this factor "restructuring closure" and considers it an aptitude component of the personality trait, "critical practicality."

Identification: Cattell, UI-T2; Guilford, NFT; Thurstone, Closure 2.

References: 4, 9, 14, 20, 21, 51, 52, 62, 67, 97, 104, 114, 140, 146, 147, 151, 158, 162, 165, 168, 180, 181, 183, 190, 191, and 192.

TestsHidden Figures Test -- CF-1 (Rev.)

An adaptation of the Gottschaldt Figures type test popularized by Thurstone. 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 modified from an earlier test developed in connection with a project designed to study field independence. The test has some variance on Factors S and VZ.

Length of each part: 16 items, 12 minutes

Suitable for grades 8-16

Hidden Patterns Test -- CF-2 (Rev.)

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, for each pattern, whether or not the configuration occurs. These are easy items given under speeded conditions.

Length of each part: 200 patterns, 3 minutes

Suitable for grades 6-16

Copying Test -- CF-3

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 configuration and a square matrix of dots. The task is to copy the figure onto the dots. It is believed that this requires flexibility of closure in the act of superimposing the particular configuration on a strong visual field.

Length of each part: 32 figures, 3 minutes

Suitable for grades 6-16

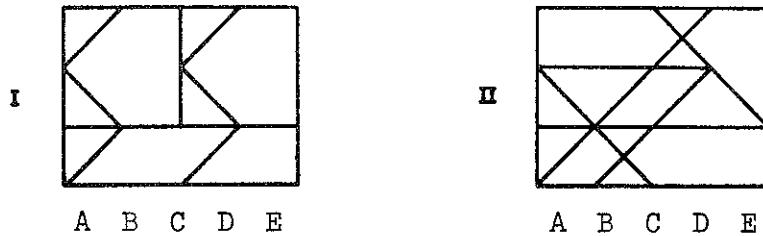
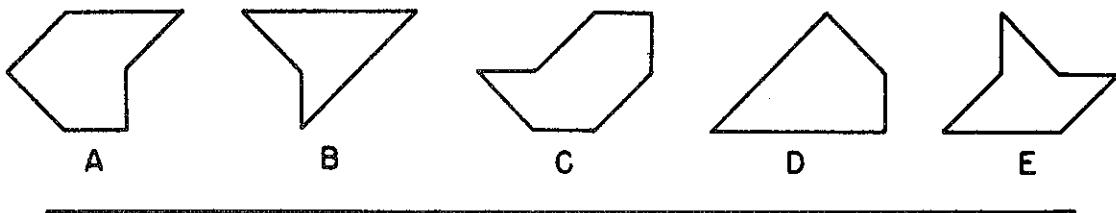
Cover Pages

HIDDEN FIGURES TEST — CF-1 (Rev.)

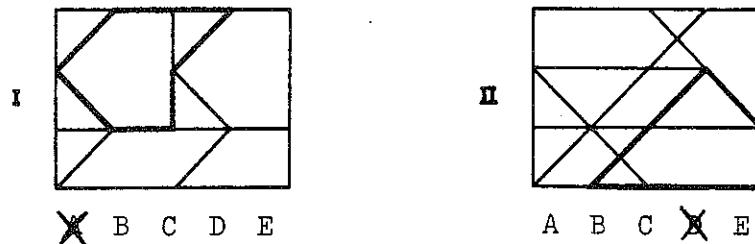
This is a test of your ability to tell which one of five simple figures can be found in a more complex pattern. At the top of each page in this test are five simple figures lettered A, B, C, D, and E. Beneath each row of figures is a row of patterns. Each pattern has a row of letters beneath it. Indicate your answer by putting an X through the letter of the figure which you find in the pattern.

NOTE: There is only one of these figures in each pattern, and this figure will always be right side up and exactly the same size as one of the five lettered figures.

Now try these 2 examples.



The figures below show how the figures are included in the problems. Figure A is in the first problem and figure D in the second.



Your score on this test will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 12 minutes for each of the two parts of this test. Each part has 2 pages. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

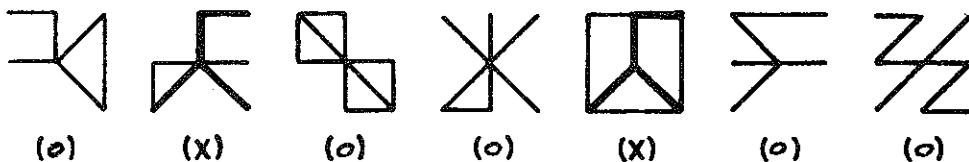
HIDDEN PATTERNS TEST -- CF-2 (Rev.)

How quickly can you recognize a figure that is hidden among other lines? This test contains many rows of patterns. In each pattern you are to look for the model shown below:

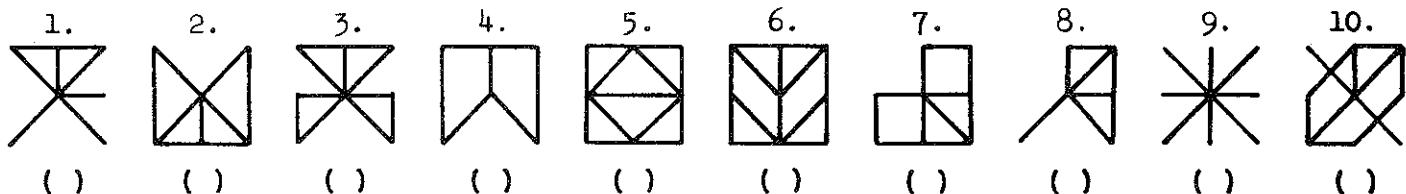


The model must always be in this position, not on its side or upside down.

In the next row, when the model appears, it is shown by heavy lines:



Your task will be to place an X in the space below each pattern in which the model appears and an O below the pattern where the model does not appear. Now, try this row:



You should have marked an X below patterns 1, 3, 4, 8, and 10, because they contain the model. You should have marked an O below patterns 2, 5, 6, 7, and 9 because they do not contain the model.

Your score on this test will be the number marked correctly minus the number marked incorrectly. Work as quickly as you can without sacrificing accuracy.

You will have 3 minutes for each of the two parts of this test. Each part has two pages. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

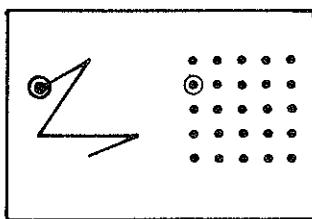
DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

COPYING TEST — CF-3

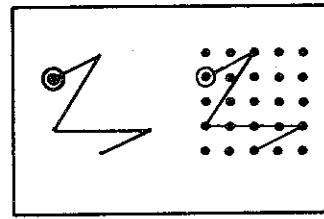
This is a test of your ability to keep in mind a pattern so that you can quickly find it in a square of dots.

Here is a sample item. It is solved by copying the pattern on the dots.

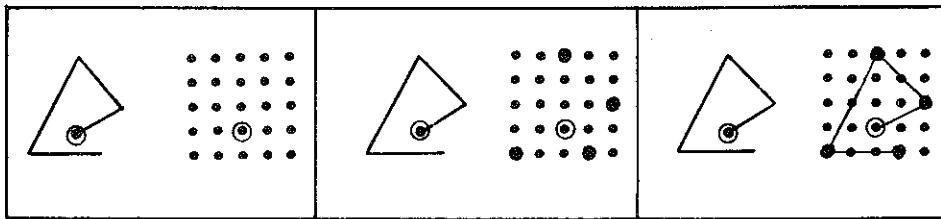
Problem



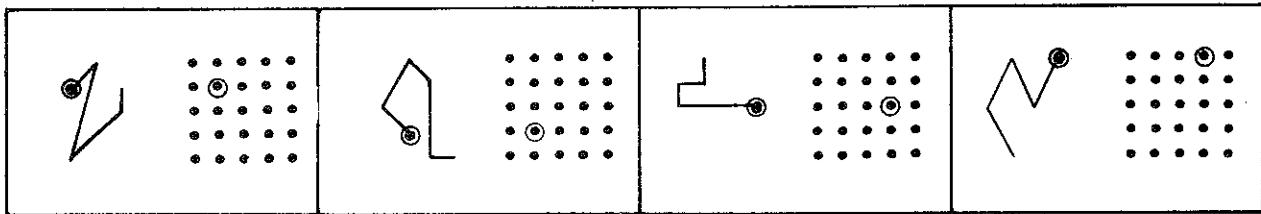
Answer



The copied pattern must start with the circled dot, and every corner must come at one of the dots. When you are finished, it must look exactly like the original pattern. If you think it will help you, try blackening the correct dots first, like this:



Practice on the following items:



Your score will be the number of patterns correctly copied. Work as rapidly as you can without sacrificing accuracy.

You will have 3 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysHidden Figures Test -- CF-1 (Rev.)

<u>Part 1</u>		<u>Part 2</u>	
1. A	9. E	17. E	25. C
2. B	10. D	18. A	26. C
3. A	11. A	19. B	27. B
4. E	12. C	20. C	28. E
5. B	13. D	21. D	29. A
6. C	14. E	22. B	30. E
7. D	15. C	23. D	31. E
8. B	16. E	24. A	32. D

Hidden Patterns Test -- CF-2 (Rev.)Part 1Part 2Page 2Page 4

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, 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

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

Part 1 (continued)Part 2 (continued)Page 3Page 5

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,
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 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

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

Copying Test -- CF-3

Preparation of the key is left to the user.

CS CLOSURE, SPEED OF

Factor

The ability to unite an apparently disparate perceptual field into a single concept

All of the elements in the presented field participate in a unified closure. The difference between this factor and flexibility of closure is that the subject sees no obvious closure to start with and does not know what to look for, whereas in flexibility of closure the subject knows what the required configuration is, but must disembed it from a more complex figure.

Speed of closure is positively identified with the ability to recognize ambiguous visual stimuli. This ability is related to the early identification of out-of-focus pictures (Fredericksen 1967) and to the identification of close-up pictures (Hoffman et al, 1968).

According to Carroll (1974), speed of closure "requires a search of a long-term memory visual-representational memory store for a match for a partially degraded stimulus cue." Strategies employed may include utilizing hypotheses from associations in long-term memory or restructuring the stimulus perception.

Cattell (1971) considers that speed of closure is an aptitude component of the personality factor, restraint-timidity. Wardell (1973) suggests that speed of closure may be a component of a cognitive style related to extensiveness of scanning. Other studies (Roff 1953, Thurstone 1944) also suggest that this factor may be relevant in establishing cognitive-affective linkages.

There is some evidence (Adcock and Martin, 1971; Messick and French, 1975) that there may be both semantic and perceptual speed of closure factors.

Identification: Cattell, UI-T3; Guilford, CFU; Thurstone, Closure 1.

References: 1, 2, 3, 9, 20, 23, 51, 52, 55, 59, 62, 67, 97, 100, 101, 104, 108, 114, 117, 126, 131, 140, 146, 147, 158, 164, 174, 180, 181, 183, and 200.

TestsGestalt Completion Test -- CS-1

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 possible.

Length of each part: 10 pictures, 2 minutes

Suitable for grades 6-16

Concealed Words Test -- CS-2

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. This test has some variance on Factor CV.

Length of each part: 25 words, 4 minutes

Suitable for grades 6-16

Snowy Pictures -- CS-3

The subject is asked to identify objects which are partly obliterated by snow-like spatters.

Length of each part: 12 pictures, 3 minutes

Suitable for grades 6-16

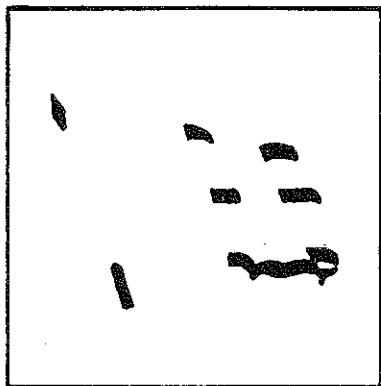
Cover Pages

GESTALT COMPLETION TEST -- CS-1

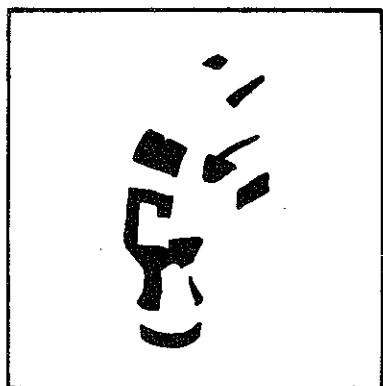
This is a test of your ability to see a whole picture even though it is not completely drawn. You are to use your imagination to fill in the missing parts.

Look at each incomplete picture and try to see what it is. On the line under each picture, write a word or two to describe it.

Try the sample pictures below:



1. _____



2. _____

Picture 1 is a flag and picture 2 is a hammer head.

Your score on this test will be the number of pictures identified correctly. Even if you are not sure of the correct identification, it will be to your advantage to guess. Work as rapidly as you can without sacrificing accuracy.

You will have 2 minutes for each of the two parts of this test. Each part has two pages. When you have finished Part 1 (pages 2 and 3), STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

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CONCEALED WORDS TEST -- CS-2

This is a test of your ability to read a word when parts of the word have been erased. Look at the words printed below. The word north has been completely printed the first time; the second time parts of the letters have been erased.

north

north

Now look at the sample items below. Parts of each word have been erased. Try to read what each word is. Write your answers on the lines provided. All the words used in this test will be at least four letters long. No word will contain any capital letters.

1. parents _____

2. easy _____

3. giant _____

Did you recognize the words as 1. parents, 2. easy, and 3. giant?

Your score on this test will be the number of correct answers that you write. Work as quickly as you can without sacrificing accuracy. If some words are difficult, skip them, and return to them later if you have time.

You will have 4 minutes for each of the two parts of this test. Each part has 25 items on two pages. Be sure to do the items on both pages if you have time. When you finish Part 1 (pages 2 and 3), STOP. Do not go on to Part 2 until asked to do so.

DO NOT GO ON TO THE NEXT PAGE UNTIL ASKED TO DO SO.

SNOWY PICTURES -- CS-3

It is helpful to be able to see objects quickly in spite of their being partially concealed by snow, rain, haze, darkness, or other visual obstructions. In this test you will be asked to recognize hard-to-see objects.

Look at the picture below. What object do you see?

Sample Item 1:



1. Anchor

By looking carefully at this sample you will see an anchor. The word anchor has been written on the line under the picture.

Now try another sample. Write the name of the object on the line provided.

Sample Item 2:



2. _____

The picture shows a small boat sitting in the water. Boat, rowboat, or other similar words would be correct answers.

Your score on this test will be the number of objects that you name correctly. Work as quickly as you can without sacrificing accuracy. If some pictures are difficult, skip them and return to them later if you have time.

You will have 3 minutes for each of the two parts of this test. Each part has one page with 12 objects to identify. When you have finished Part 1, STOP. Do not go on to Part 2 until asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysGestalt Completion Test -- CS-1Part 1

1. ship (sailboat, clipper)
2. hand (glove)
3. chicken (rooster, hen)
4. dog (setter, pointer)
5. lamp (light)
6. house (cottage)
7. cart (wagon, truck)
8. faucet (water tap, spigot, etc.)
9. bicycle
10. telephone

Part 2

11. shoe
12. windmill, weathervane
13. ship, boat
14. kite
15. (man) shooting bow and arrow
16. bird
17. skate
18. cat
19. steam shovel
20. (folding) chair

Concealed Words Test -- CS-2Part 1

1. think
2. through
3. looking
4. people
5. other
6. money
7. tends
8. weight
9. stock
10. answers
11. leading
12. summer
13. nurses
14. seem
15. suffers
16. meat
17. luxury
18. finer
19. prescription
20. achieve
21. women
22. orange
23. carefree
24. tradition
25. considering

Concealed Words Test -- CS-2 (cont'd.)Part 2

- | | |
|----------------|----------------|
| 26. date | 39. save |
| 27. early | 40. positively |
| 28. about | 41. beauty |
| 29. help | 42. right |
| 30. freedom | 43. condition |
| 31. needs | 44. nothing |
| 32. valuable | 45. ball |
| 33. what | 46. afford |
| 34. make | 47. suspicious |
| 35. trouble | 48. moist |
| 36. secret | 49. recommend |
| 37. graduation | 50. flower |
| 38. reasons | |

Snowy Pictures -- CS-3Part 1

1. ship, sailboat, boat
2. lamp
3. horse, pony
4. tent
5. hand, glove
6. knife
7. typewriter
8. dog
9. table, coffee table, bench
10. fish
11. chair
12. bridge

Part 2

13. guitar
14. iron, flatiron
15. bird
16. football
17. flashlight
18. umbrella
19. duck
20. eye
21. fly, bug, bee
22. monkey (in tree)
23. scissors
24. planet (Saturn) satellite

CV CLOSURE, VERBAL

Factor

The ability to solve problems requiring the identification of visually presented words when some of the letters are missing, scrambled, or embedded among other letters

Tests which have been used for this factor require the subject to rearrange the letters of one word to form another, to fill in the missing letters of common words, to locate four-letter words in a line of letters, and to unscramble four-letter nonsense words to make common words.

Messick and French (1975) have suggested that there may be separate subfactors for speed of verbal closure and for flexibility of verbal closure. Three analytic studies of the cloze technique (Carver et al, 1971; Ohnamcht et al, 1970; Weaver and Kingston, 1963) suggest that this procedure, which calls for supplying the missing words in a sentence, is probably related to verbal closure. Ekstrom, French, and Harman (1975) have demonstrated that this factor may be separated from speed of closure.

An auditory, as well as a visual, form of this factor may exist.

Identification: Guilford, CSU

References: 2, 55, 76, 100, 106, 107, 140, 146, 158, 179, 184, and 207.

Tests

Scrambled Words -- CV-1

For each item the subject is asked to write a common English word from a group of scrambled letters.

Length of each part: 25 words, 5 minutes

Suitable for grades 8-16

Hidden Words -- CV-2

The subject is asked to find and circle one or more four-letter words in apparently random lines of letters.

Length of each part: 20 lines, 4 minutes

Suitable for grades 8-16

Incomplete Words -- CV-3

The subject is asked to provide one or more letters to complete common words.

Length of each part: 18 words, 3 minutes

Suitable for grades 8-16

Cover Pages

SCRAMBLED WORDS -- CV-1

This is a test of your ability to unscramble a group of letters and make a word out of them.

Look at the groups of letters below. If they are unscrambled, each group will spell a common English word.

- I. mtri
- II. nwti
- III. ltfa

The first group spells trim when it is unscrambled. The second group spells twin; and the third group spells flat.

Now try the practice items below. Print or write clearly the word that can be made by unscrambling the letters. Remember that you must use all of the letters of the scrambled word.

- IV. ievg _____
- V. yeah _____
- VI. dkse _____
- VII. birc _____

You could have written give for IV; have for V; desk for VI; and crib for VII.

Your score on this test will be the number of words that you unscramble correctly. Therefore, it will not be to your advantage to spend a lot of time on a hard word. Remember that all of the unscrambled words are common English words; proper names (of people and places) are not used.

You will have 5 minutes for each of the two parts of this test. Each part has one page with 25 words. When you have finished Part 1, STOP. Do not go on to Part 2 until asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

HIDDEN WORDS -- CV-2

In this test you will be asked to find words that are hidden in a line of letters.

Look at the example below:

E P N Z O **(F O U R)** E Q W **(L O C K)** I C Z K E T **(M I N D)** I M U F Y
I R T N U Y **(S H I P)** I M S A F Y V **(P U L L)** O T **(F I V E)** B E L T

A circle has been drawn around each group of four consecutive letters that spells a common English word. The same letter can be used in only one word; that is, the words cannot overlap. Only four-letter words are used in this test. There may be one, two, three, four, or five words in a line.

Read each row from left to right. Draw a circle around each group of four letters that spells a common English word. Now try the practice items below.

1. D O O R L O D E I D X U J Q Z V H E A D I P L C A G M I N E K
2. L T R E Q A B I R D P Q A W A N T O T F O U S A I D Z R O V L

You should have found the words DOOR, LODE, HEAD, MINE in the first line and BIRD, WANT, SAID in the second line.

Your score on this test will be the number of four-letter words which you find. Proper names(of people and places)will not be used.

You will have 4 minutes for each of the two parts of this test. Each part has one page with 20 lines of letters. When you have finished Part 1, STOP. Please do not go on to Part 2 until asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

INCOMPLETE WORDS -- CV-3

This is a test of your ability to complete words when some of the letters are missing.

Look at the example below:

sum__ary

You could put the letter "m" in the blank and make the word summary. Now look at this example which has two letters missing:

h__gh__ay

You can make the word highway by putting an "i" in the first blank and a "w" in the second blank.

Sometimes it might be possible to use any one of several different letters to complete a word. For example:

d__mp

could be completed by adding a "u" to make the word dump, or an "a" to make the word damp.

Now try these practice items. In each blank, write one letter. When a word has more than one blank, each blank has its own number.

f__ce
1

oys__er
4

w__th
2

b__rge
5

f__lder
3

te__eph__ne
6 7

You could have made the following words: 1. face; 2. with; 3. folder; 4. oyster; 5. barge; and 6 and 7, telephone.

Your score on this test will be the number of words that you complete correctly.

You will have 3 minutes for each of the two parts of this test. Each part has one page with 18 words to complete. Do not spend too much time on any one word. When you have finished Part 1, STOP. Please do not go on to Part 2 until asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Scoring KeysScrambled Words -- CV-1

Words in parentheses are obscure but correct answers

<u>Part 1</u>	<u>Part 2</u>
1. tree (rete)	26. help
2. boat	27. move
3. coin (icon)	28. foot
4. book	29. cash
5. calm or clam	30. sock
6. sled	31. hill
7. line or lien	32. corn
8. fish	33. barn or bran
9. love (vole)	34. hate or heat (haet, eath)
10. mind	35. take or teak
11. mill	36. burn
12. work	37. word
13. gone	38. slim or mils
14. bulb	39. idea or aide
15. play (paly)	40. look
16. bill	41. beet
17. memo (mome)	42. know
18. pail (pial)	43. that
19. cart	44. hair
20. bait	45. belt
21. seed	46. tell
22. pond	47. pile
23. suit (situ)	48. hand
24. roof	49. tire, tier, or rite
25. year (yare, aery)	50. city

Hidden Words -- CV-2Part 1

1. SLOW, NECK
2. REAR, DECK, LEAD, ABLE
3. GAME
4. BANK, HAND, BOAT, PASS
5. RISE, VICE, AUNT, THAT
6. ZONE, YOLK, LOST
7. LATE, LAST
8. NEXT, EVEN, PULL
9. SOME, THIN
10. GONE, CUTE
11. WENT, HARD, PINK
12. NOSE, PLOT, ROPE, GIRL
13. BULL, BULB, SNOW, LIVE, NOSE
14. LOVE, FLEW
15. PART, HORN, WORK
16. DOWN, EVEN
17. PLAY, HEAT, RISE
18. SOLO
19. POOR, QUIZ, TOWN, MAKE, NAVY
20. THAT
21. WHAT
22. FOUR, KNEE
23. HEAT, LOUD, TROT
24. WEST, BEST
25. EDGE, PUSH, SHOP
26. THEY, EACH, SOME, PLOT
27. FOOT, NEXT, SOUP, HELP
28. LACK, FLEW, TAXI
29. MORE, CALF, HAVE, WAVE
30. COME, PART
31. HATE, DIME
32. POND, SLOW, ALSO, TWIN
33. HIDE, BANK, DISH
34. ANTI, CARD
35. TOOK
36. CALL, THEY, COAT
37. GIRL, CALL, EVIL
38. YOUR, ROMP, WOLF, SALT, GRIN
39. HIGH
40. MOST, COST, PAIR

Part 2

Incomplete Words -- CV-3Part 1

stamp
equality
arithmetic
airplane
program
liberty
suitcase
pleasant or elephant
personality
administration
college
handkerchief
benefit
encyclopedia
library
helpful
attitude
garbage or barrage

Part 2

education
coffee
teacher, leather, heather,
learner, yearner
submarine
disposition or dissolution
triangle
volunteer
flashlight
doorway
holiday
choice
memory
performance
behavior
statue
student
reduction, deduction, seduction
technique

FA FLUENCY, ASSOCIATIONAL

Factor

The ability to produce rapidly words which share a given area of meaning or some other common semantic property

This factor involves the association of words, either because of their meaning or because they are often found in the same context. Separate subfactors have been found for associations of antonyms, synonyms, and objects frequently seen together (Nunnally and Hodges, 1965).

Carroll (1974) points out that associational fluency "entails search of a major portion of a long-term memory lexicosemantic store, with special attention to its semantic and associational aspects." Strategies may involve searching long-term memory for different meanings of the stimulus word.

It seems likely that subjects will score higher on these tests if they have more associations tied to a word and more flexibility in interpreting similarity. Bereiter (1960) found evidence to support this in a factor combining tests of associational fluency and spontaneous semantic flexibility which he suggested could be a personality factor arising from "differences in looseness or rigor with which Ss interpret the given restrictions."

Cattell (1971) points out that this, like other fluency factors, is related to temperament factors such as exuberance. He also points out the relationship between fluency and memory factors, since "ease of retrieval" plays a significant role in fluency.

Identification: Guilford, DMR

References: 2, 10, 34, 54, 72, 84, 87, 92, 106, 120, 121, 138, 139, 178, and 200.

TestsControlled Associations Test -- FA-1

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.

Length of each part: 4 given words, 6 minutes

Suitable for grades 6-16

Opposites Test -- FA-2

The subject is asked to write up to six antonyms for each of 4 words.

Length of each part: 4 given words, 5 minutes

Suitable for grades 6-16

Figures of Speech -- FA-3

The subject is asked to provide up to three words or phrases to complete each of five figures of speech.

Length of each part: 5 items, 5 minutes

Suitable for grades 9-16

Cover Pages

CONTROLLED ASSOCIATIONS TEST -- FA-1

When you are writing, it is often necessary to think of several different words having the same meaning or similar meanings, so that you do not have to repeat one word again and again. In this test you will be asked to think of words having meanings which are the same as or similar to a given word. The given words will be ones that are well known to you.

For example, if the word were short, you would write at least some of the words written below:

short:	<u>brief</u>	<u>abbreviated</u>	<u>concise</u>	<u>momentary</u>
	<u>little</u>	<u>limited</u>	<u>deficient</u>	<u>abrupt</u>
	<u>petite</u>	<u>crisp</u>	<u>compact</u>	<u>curtailed</u>

Now try this one. You probably will not be able to fill in all the spaces, but write as many words as you can think of.

weak:

Your score will be the number of correct words that you write.

You will have 6 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

OPPOSITES TEST -- FA-2

In this test you will be asked to think of words which are the opposite or nearly the opposite in meaning to a given word.

For example, if the word were EASY, you might think of some of the words written below.

EASY:

<u>hard</u>	<u>arduous</u>
<u>difficult</u>	<u>exacting</u>
<u>complicated</u>	<u>burdensome</u>

Now try to think of some words which mean about the opposite of the word given below. You may not be able to fill in all of the spaces, but write as many words as you can (up to six) which are opposite in meaning to the word given.

ACCEPT:

Some of the words which you might have written are decline, deny, disregard, neglect, reject, and refuse.

Your score on this test will be the number of correct words that you write.

You will have 5 minutes for each of the two parts of this test. Each part has one page with four given words. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

FIGURES OF SPEECH -- FA-3

In this test you will be asked to think of words or phrases that could be used in making figures of speech which compare one object with another. For example:

She was as pale as:

death

(a) sheet

(a) wax doll

Now try to think of some words or phrases that could complete the figure of speech given below. You may not be able to fill in all of the spaces, but write as many words as you can. The word a or an can be used in addition to the comparison word whenever you think it is necessary.

The jewels sparkled like:

You might have chosen words like fireflys, twinkling stars, or dew drops in the sun to complete this figure of speech.

Your score on this test will be the number of correct words or phrases which you write.

You will have 5 minutes for each of the two parts of this test. Each part has one page with five sentences to complete. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Scoring KeysControlled Associations Test -- FA-1

The following are examples of 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, uninhibited, 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

Opposites Test -- FA-2

The following are examples of acceptable words:

Part 1

- calm: agitated, angry, anxious, busy, convulsed, discomposed, disturbed, excited, frantic, frenzied, irritable, itchy (slang usage), jumpy, nervous, noisy, perturbed, restless, rocked, rough, seething, shaken, stormy, tense, unease, untamed, upset, up-tight (slang usage), wild
- wrong: acceptable, accurate, alright, appropriate, correct, exact, fair, fit, good, legal, moral, o.k., perfect, precise, proper, right, suitable
- fair: biased, cheating, crafty, fool, ill-favored, inequitable, intolerant, partial, prejudice, prepossess, sly, swindle tricky, unfair, ugly, unjust, unscrupulous
- awkward: adept, adroit, agile, balanced, coordinated, deft, dexterous, easy, effortless, facile, graceful, handy, proficient, simple, skillful, smooth, stumbling

Part 2

- loyal: faithless, false, perfidious, treacherous
- fearful: bold, brave, courageous, enduring, fearless, gallant, heroic, resolute, valorous
- gentle: barbarous, bluff, boisterous, boorish, brutish, churlish, clownish, coarse, gross, harsh, ill-mannered, rough, rude, stormy, uncouth, uncultured, unpolished, vulgar, wild
- ugly: appealing, attractive, beautiful, blooming, captivating, charming, comely, dainty, dazzling, delicate, elegant, fair, fascinating, gorgeous, graceful, grand, handsome, lovely, neat, nice, pretty, radiant, refined, sleek, splendid, trim

Figures of Speech -- FA-3Part 1

1. The pans were shiny as:

Acceptable answers include any object or material which might reflect or emit light, e.g., gold, silver, polished chrome or brass, the sun, freshly washed crystal, reflections off a mirror, a dime, a lake, a new car, etc.

2. The car went as fast as:

Acceptable answers include any object or animal which moves rapidly, e.g., a rocket, a comet, a flash, a bullet, lightning, sound, a jet, a cheetah, the wind, a streak, an arrow, etc. Do not credit slow moving objects or animals (e.g., a turtle).

3. The sky looked like:

Acceptable answers include anything that is typically blue, gray, black, (perhaps other colors) anything clear, and anything which might be a covering, e.g., a blue blanket, the sea, a giant roof, glass, a lake full of cotton, a gray ocean, smoke, an overturned bowl, etc. Do not credit heaven.

4. The roar of the cannon was as loud as:

Acceptable answers include any noisy object or occurrence, e.g., sonic boom, explosion, thunder, train, a rocket blasting off, fireworks, a bomb exploding, a head-on collision, a Chinese gong, the roar of a lion, an engine backfiring, etc. Do not credit a gun.

5. The smell of fresh bread was like:

Acceptable answers include anything which typically has a pleasant fragrance or has other pleasurable associations, e.g., spring, perfume, burnt leaves, roses, being back home, morning air, the beginning of a new day, a reminder of friends, ecstasy to the nose, the taste of good wine, a bouquet of flowers, an old memory, etc. Do not credit a bakery.

Figures of Speech -- FA-3 (cont'd.)Part 2

6. The flowers smell as sweet as:

Acceptable answers include anything which typically has a pleasant fragrance, e.g., perfume, candy, honey, spring, etc. Do not credit the names of specific flowers.

7. The fur was as soft as:

Acceptable answers include any object or material which does not have a harsh texture, e.g., silk, a feather, a cloud, a fresh marshmallow, baby's skin, velvet, etc. Do not credit a fur-bearing animal.

8. The taste of the fruit was like:

Acceptable answers include anything typically sweet, tart, or sour, e.g., fine wine, honey, acid, bitter medicine, ambrosia, nectar, etc. Do not credit the names of specific fruits.

9. The silence of the forest was like:

Acceptable answers include anything that is not noisy or which has quiet associations, e.g., the end of the world, death, a library, a morgue, a cemetery, a church, an undisturbed sleep, etc.

10. The voice of the sea was like:

Acceptable answers include any object, person, or situation which is rhythmic or produces noise, e.g., thunder, the crash of a falling tree, the whisper of a lover, the roar of a crowd, a never-ending drumbeat, a caress, a crying child, a hammer, music, etc.

FE FLUENCY, EXPRESSIONAL

Factor

The ability to think rapidly of word groups or phrases

The factor involves fluency in composing connected discourse and manipulating syntactical constructions as contrasted with associational fluency which focuses on the production of single words. Expressional fluency also contrasts with ideational fluency in that the production of new ideas is not part of the task.

The emphasis in the expressional fluency tests is on producing connected discourse that will fit restrictions imposed in terms of letters, words, or ideas. Ekstrom, French, and Harman (1974) were unable to separate this factor from semantic originality.

Like associational fluency, expressional fluency also involves a search of lexicosemantic memory but, as Carroll (1974) points out, "with special attention to the grammatical features of lexical items and different syntactical patterns of phrases and sentences." Strategies may involve the use of "grammatical mnemonics" such as considering grammatical classification in the search for words.

Identification: Guilford, DMS

References: 12, 24, 34, 54, 69, 84, 89, 92, 106, 125, 133, 149, 166, 171, 177, and 178.

Tests

Making Sentences -- FE-1

The subject is asked to make sentences of a specified length when the initial letter of some of the words is provided.

Length of each part: 10 items, 5 minutes

Suitable for grades 6-16

Arranging Words -- FE-2

The subject is asked to write up to twenty different sentences using the same four words.

Length of each part: 4 given words, 5 minutes

Suitable for grades 6-16

Rewriting -- FE-3

The subject is asked to rewrite each of three sentences in two different ways.

Length of each part: 3 sentences, 5 minutes

Suitable for grades 6-16

Cover Pages

MAKING SENTENCES -- FE-1

In this test you will be asked to write sentences containing words that begin with specified letters. You will also be told what the length of the sentence is to be. The sentences can be either sensible or foolish but they must be understandable and not just a group of unrelated words.

Each item will consist of a group of asterisks and letters followed by blanks. When you write the sentence you must begin a word with each of the letters that is given; where there is an asterisk you may use any word you wish. Each sentence must use the letters and asterisks in the order that they are given. For example:

E _____ * _____ R _____ T _____ * _____.

E very * boy R ead T he * look .

You are to look at each group of letters and asterisks and write down whatever sentence you think of first. There are no restrictions on the words you may use or on their length except that proper names, such as the names of people or places, may not be used. Abbreviations may not be used either but you may use contractions such as aren't or we'll.

Now try this sample:

T _____ * _____ W _____ W _____ * _____.

Sentences like "This is what we need." or "Termites eat wooden watches frequently." are correct. A sentence like "This is Wanda Witch's birthday." is not correct because it uses a proper name.

Your score will be the number of acceptable sentences which you write.

You will have 5 minutes for each of the two parts of this test. Each part has one page with 10 sentences. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

ARRANGING WORDS -- FE-2

In this test you will be asked to write as many sentences as you can using four specified words.

For example:

TAKE FEW LAND LITTLE

1. Few crops take little land
2. A few little boats take supplies to land.
3. Take a few little boys with you to see the plane land.

All four words are used in each sentence. The words must be used in the form that is given; for example, you cannot use "taking" or "took" instead of take. Notice that the sentences may be any length. All sentences must differ from one another by more than merely one or two changed words, such as different pronouns or adjectives.

Now try this example. Remember to number each new sentence as was done in the example above.

WRITE WORDS LONG OFTEN

Your score will be the number of different sentences that you write.

You will have 5 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

REWRITING -- FE-3

It is often necessary when writing to say the same thing in different ways. This is done by rephrasing the original sentence. In this test you will be given sentences and asked to rewrite them so that they say the same thing in a different way.

For example:

"In response to the teacher's question, a forest of hands shot up."
might be rewritten as:

- a) "When the teacher asked the question, almost every hand was raised to answer it."

Can you think of another way to say the same thing?

- b) _____

Each of the items in this test will consist of a sentence which you are to rewrite. Try to write two new sentences for each sentence given. You should try to use different words and different sentence constructions, but do not change the meaning of the original sentence.

Your score will be the number of acceptable sentences which you write.

You will have 5 minutes for each of the two parts of this test. Each part has one page with three sentences. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Scoring KeysMaking Sentences -- FE-1

Credit a sentence or phrase; do not credit other sentence fragments. Allow any words except proper names of people and places or abbreviations. Disregard incorrect spellings unless they involve the use of an incorrect initial letter (e.g., do not credit "intertained" instead of "entertained" when a word must begin with "I").

Part 1

1. L _____ * _____ * _____ F _____

Examples of acceptable responses are: Looks like he fainted, Large but not fat, Lately we have failed, Life is a friend, Look at that face, Light can travel fast, Laughing is not funny, Life is really fantastic, Letters were mailed Friday, Large animals eat food, Land animals are furry, etc.

2. T _____ * _____ * _____ H _____

Examples of acceptable responses are: Thin but not huge, Tear down the house, The man was hated, The store was hospitable, They tried too hard, The girls are home, The boy ran home, Tomorrow I go home, Time can make hours, etc.

3. S _____ * _____ A _____ * _____

Examples of acceptable responses are: Shoot that awful animal, Some were already there, She ran away crying, Stop and ask her, She left after dinner, Someone is awful tired, She will arrive tomorrow, Silky girls are nice, Saturday is always fun, etc.

4. * _____ F _____ W _____ * _____

T _____

Examples of acceptable responses are: This father was very thin-His frequent worries have terminated, His father went to town, Why fly with her tonight, My father went out Thursday, Leaves fall with autumn times, A fat watermelon ripened tonight, etc.

5. S _____ * _____ * _____ E _____

* _____

Examples of acceptable responses are: She was going east today, She sold all except two, She was hardly ever there, Send me some envelopes quick, Send a boy every day, So who really even cares, Sugar pie is everybody's favorite, Stop before you enter buildings, etc.

6. * _____ E _____ * _____ * _____

E _____

Examples of acceptable responses are: The eels swam around everywhere, The extra pay was enjoyed, She's even got an ear, Don't eat any wooden elephants, She enters my mind eventually, An earlybird spread an epidemic, Ten elephants ate twelve ears, etc.

7. T _____ * _____ D _____ * _____
 * _____ G _____

Examples of acceptable responses are: Taking the dogs out seemed great, The boy's dog was almost grown, The weird dog has a gown, They went dashing towards the gate, To drink drinks is to guzzle, Tonight we'll dance again sweet girls, etc.

8. * _____ F _____ L _____ * _____
 G _____ P _____

Examples of acceptable responses are: His friend loved the green pen, The first little man got paranoid, I feel like a guarded prisoner, A frank lie shows good personality, To find lost people get policemen, etc.

9. E _____ * _____ D _____ * _____
 * _____ R _____

Examples of acceptable responses are: Every other day we went riding, Early one day I gathered roses, Each man doesn't have a rifle, Electric energy derives from atomic research, Elegant evening dresses are becoming rare, etc.

10. * _____ G _____ * _____ B _____
 * _____ B _____

Examples of acceptable responses are: The girl and boy were bad, The garden was breathtaking and beautiful, When going out buy some bread, Every glad event brings memories back, etc.

Part 2

11. W _____ * _____ * _____ G _____

Examples of acceptable responses are: Was it the ground, We all wore gloves, We believe in ghosts, Where did he go, Why don't you go, What was the gain, Wooden turkeys taste good, Welcome to the gang, We left the gym, With help from God, etc.

12. * _____ P _____ * _____ P _____

Examples of acceptable responses are: He picked up peaches, He photographed the planetarium, The pig was plump, His pride was painting, I paid my parents, My parents are people, Does practice make perfect, I protest all protests, etc.

13. T _____ * _____ D _____ * _____

Examples of acceptable responses are: That was done yesterday, Three small deer leapt, Tigers have deadly claws, Take the dog out, Time is dead now, Tomorrow I die alive, Tomorrow is doing fine, the cat died once, To hold damage down, etc.

14. T _____ * _____ I _____ * _____
 * _____

Examples of acceptable responses are: That night's illusion came today, That is inspected every day, The old Indian was sad, Ten men in a boat, Take the idea to him, They ran inside the house, Today we indicated our choice, Today I insist we march, etc.

15. S _____ L _____ * _____ * _____
 L _____

Examples of acceptable responses are: She lost all her laundry, Some lions are very lazy, She loved to be lively, She looked at the lamp, She lent me some lipstick, So long my good lover, Soldiers live very short lives, Saturday's lunch is always late, etc.

16. I _____ * _____ * _____ G _____
 C _____

Examples of acceptable responses are: Interviews were not granted customarily, Interesting stories make good conversation, It was ever growing colder, Important people keep gracious company, If someone shouts get clear, Independence is the government's constitution, etc.

17. T _____ * _____ * _____ G _____
 M _____ * _____

Examples of acceptable responses are: The old and grateful man died, The alligator will grow much more, Take out the garbage my dear, They met some girls Monday night, Tomorrow I will go marching again, Tomorrow there's a grand Majong tournament, etc.

18. A _____ * _____ R _____ * _____
 * _____ S _____

Examples of acceptable responses are: Ants will readily eat any sweets, A bomb was rigged to explode secretly, Always take rich aunts pleasant surprises, Aren't you ready to go swimming, etc.

19. T _____ O _____ * _____ W _____
 * _____ E _____

Examples of acceptable responses are: The other group went due east, Telephone operators often will wear earphones, The other day we rose early, Thin otters swim well and energetically, etc.

20. Y _____ * _____ * _____ V _____
 S _____ * _____

Examples of acceptable responses are: Your flowers smell very sweet today, Young children are very short usually, You're on the varsity school team, You should be very successful today, etc.

Arranging Words -- FE-2

First go through the sentences in each part to make sure that each of the specified words is used. It is probably easiest to do this by underlining the required words. Then count the number of correct sentences.

Do not credit sentences which are alike except for one or two minor words (e.g., This year my sister will never catch a man. Next year my sister will never catch a man).

Do not credit sentences which use a different form of one of the specified words than is given (e.g., caught instead of catch).

Rewriting -- FE-3

Preparation of the key is left to the user.

FF FLUENCY, FIGURAL

Factor

The ability to draw quickly a number of examples, elaborations, or restructurings based on a given visual or descriptive stimulus.

This is probably a figural form of the ideational fluency factor. As is the case with ideational fluency, the emphasis is on the number of responses produced, not on the quality or unusualness of the drawings produced.

Tests which have been used for this factor require the subject to sketch an elaboration on an object or design, to produce a number of sketches in response to a given stimulus, or to produce new figures from a given set of elements.

There may be several subfactors related to this aptitude. Guilford describes related factors of figural elaboration, divergent production of figural implications, and divergent production of figural systems. Bereiter (1960) hypothesized separate factors for figural and structural forms of ideational fluency.

Identification: Guilford, DFU, DFI, and DFS

References: 12, 21, 55, 76, 89, 106, and 108.

Tests

Ornamentation Test -- FF-1

The subject is asked to make as many different decorations as possible on common objects.

Length of each part: 24 objects, 2 minutes

Suitable for grades 6-16

Elaboration Test -- FF-2

The subject is asked to add to the existing decoration, as many different decorations as possible.

Length of each part: 20 objects, 2 minutes

Suitable for grades 6-16

Symbols Test -- FF-3

The subject is asked to draw up to five different symbols for each of several words or phrases.

Length of each part: 5 items, 5 minutes

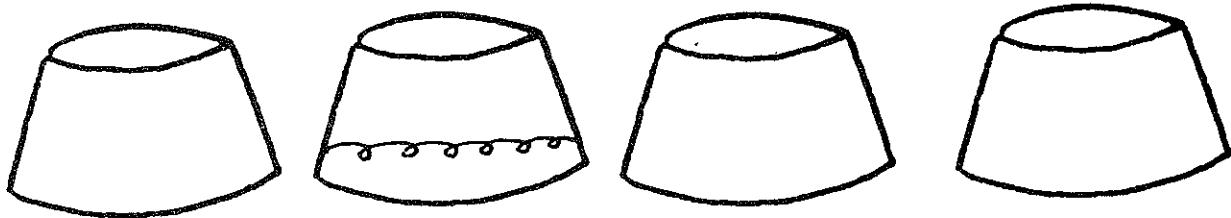
Suitable for grades 9-16

Cover Pages

ORNAMENTATION TEST — FF-1

This is a test of your ability to think of as many different ways as possible to decorate an object.

Look at the sample below. The first picture shows a plain lampshade. The second shows the same lampshade after a design has been added to it. Can you think of two more designs for the other two lampshades?



The decorations you put on objects in this test can be of any type, but each must be different. Random marks or scribbles will not be considered as designs. Each decoration can be as simple or as complicated as you choose. However, your score, on this test will be the number of different designs you make. Therefore, it will not be to your advantage to spend too much time on any one design.

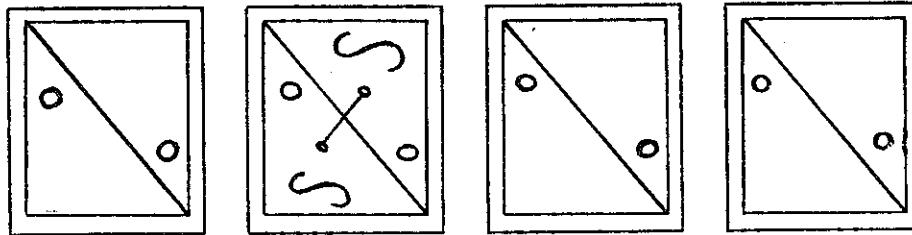
You will have 2 minutes for each of the two parts of the test. Each part has one page with 24 objects for you to ornament. When you have finished Part 1, STOP. Do not go on to Part 2 until asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

ELABORATION TEST -- FF-2

This is a test of your ability to think of a number of different ways to add details to a design.

Look at the sample below. The first picture shows the original design on a playing card. The second picture shows one possible way to add to that design. Can you think of some others? Put them on the last two cards.



The material you add to each design can be whatever you wish, but each must be different. Random marks or scribbles will not be considered designs.

Each decoration can be as complicated as you choose. However, your score on this test will be the number of different designs to which you have added something. Therefore, it will not be to your advantage to spend too much time on any one design.

You will have 2 minutes for each of the two parts of this test. In each part there is one page with 20 objects for you to design. When you have finished Part 1, STOP. Do not go on to Part 2 until asked to do so.

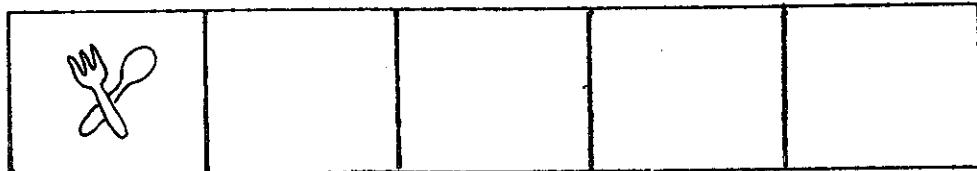
DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

SYMBOLS TEST -- FF-3

This is a test of your ability to think up a number of different symbols that could be used to stand for certain words or ideas.

Look at the example below. The word is food. A sketch has been made to represent a fork and spoon. Can you think of other symbols that could represent food? Draw them in the boxes.

Food:



Each drawing can be as complicated as you choose. However, your score on this test will be the number of different symbols you draw. Therefore, you should not spend too much time on any one symbol or set of symbols.

This test has two parts of one page each. Each part asks you to think of five symbols for each of five words or ideas. You will have 5 minutes for each part. When you have finished Part 1, STOP. Do not go on to Part 2 until asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Scoring Keys

Ornamentation Test -- FF-1

Part 1

Count the number of handles decorated (minus duplicates).

Part 2

Count the number of flower pots decorated (minus duplicates).

Elaboration Test -- FF-2

Part 1

Count the number of cups decorated (minus duplicates).

Part 2

Count the number of neckties decorated (minus duplicates).

Symbols Test -- FF-3

Parts 1 and 2

Count the number of different symbols drawn (the same symbol may be used for different items, but it cannot be repeated in the same item).

FI FLUENCY, IDEATIONAL

Factor

The facility to write a number of ideas about a given topic or exemplars of a given class of objects

The quantity of ideas produced within broad constraints rather than the quality of the ideas is emphasized in this factor.

Ideational fluency differs from the semantic originality factor which has been found in Guilford's laboratory in that unusualness or cleverness of the responses are not important. It also differs from semantic flexibility factors which require the changing of sets or subgroups within the sequence of responses.

Guilford has suggested that some of the confusion between ideational fluency and other fluency factors is due to restrictiveness in the stimulus material; the more restrictive the stimulus, he hypothesizes, the greater the loading on associational instead of ideational fluency.

Carroll (1974) describes the similarity of ideational fluency, originality, and semantic redefinition. All three factors involve memory search in an "experiential" store, or episodic memory. However, ideational fluency permits a rather wide spectrum search while special constraints of unusualness or set breaking are added for the other two factors.

Identification: Cattell, UI-T6; Guilford, DMU

References: 2, 3, 4, 10, 12, 13, 15, 24, 34, 38, 67, 71, 84, 87, 89, 93, 97, 100, 102, 103, 106, 108, 115, 120, 121, 125, 129, 131, 133, 134, 138, 140, 155, 162, 163, 166, 171, 176, 177, 178, and 200.

Tests

Topics Test -- FI-1

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.
Length of each part: one topic, 4 minutes
Suitable for grades 8-16

Theme Test -- FI-2

Adapted from Taylor's version of a test by Cattell. The task is
to write as much as possible about a given theme.
Length of each part: one theme, 4 minutes
Suitable for grades 8-16

Thing Categories Test -- FI-3

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.
Length of each part: one category, 3 minutes
Suitable for grades 8-16

Cover Pages

TOPICS TEST -- FI-1

This is a test to see how many ideas you can think of about a topic. Be sure to list all the ideas you can about a topic whether or not they seem important to you. You are not limited to one word. Instead you may use a word or a phrase to express each idea.

Here is a sample topic, "A train journey." Two examples are given below of ideas about the topic. Look at these examples. Now go ahead and fill in the blanks with more ideas about this topic.

number of miles
catching the train

Your score will be the number of appropriate ideas that you write.

You will have 4 minutes for each of the two parts in this test. Each part has one page with one topic. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

THEME TEST -- FI-2

In this test you are to write a few paragraphs about two given themes. You are to write all you can about each theme. Use any idea whether or not it seems very closely related to the theme. Expand on any idea as much as you like, and be sure you write as much as you can.

For example, if the theme is "a tree," you might write a paragraph like the following:

It was a big maple tree. It had stood beside the farm house for over one hundred years. It shaded the farm house on hot summer days. The children had a swing tied to one branch of the tree.

Can you think of some other ideas?

Your score on this test will be related to the amount of appropriate material that you write.

You will have 4 minutes for each of the parts in this test. Each part has one page with one theme. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

THING CATEGORIES TEST -- FI-3

This is a test to see how many things you can think of that are alike in some way.

Below are two examples of things that are always red or that are red more often than any other color. Look at these examples. Then go ahead and write in the blanks more things that are always red or that are red more often than any other color. You may use one word or several words to describe each thing.

tomatoes

bricks

Your score will be the number of correct things that you write.

You will have 3 minutes for each of the two parts of this test. Each part has one page with one category. When you have finished Part 1. STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Scoring Keys

Topics Test -- FI-1

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

Theme Test -- FI-2

The score is the amount of appropriate material written.

Thing Categories Test -- FI-3

The score is the number of names of things listed.

FW FLUENCY, WORD

Factor

The facility to produce words that fit one or more structural, phonetic or orthographic restrictions that are not relevant to the meaning of the words

This factor may be differentiated from associational fluency where the restrictions are based on the meaning of the word. The use of alphabetic phonetics in making a systematic search for words which will fit the restrictions is effective in tests for this ability. While the size of the subject's vocabulary may have some relevance to the task, orthographic habit patterns or strength of associations between letters and words or phonemes are more important.

The process involved in word fluency, according to Carroll (1974), is a search of a "lexicographemic" portion of long-term memory for instances fitting the orthographic requirements. Strategies may include the use of an alphabetical mnemonic to systematically search the memory.

It is not known if a similar factor might appear from aural stimuli.

Identification: Cattell, UI-T15; Guilford, DSU; Thurstone, W.

References: 3, 10, 11, 12, 20, 24, 34, 46, 51, 72, 84, 89, 92, 93, 97, 101, 106, 125, 131, 158, 177, 178, 185, 187, and 200.

TestsWord Endings Test -- FW-1

Similar to Thurstone's Suffixes. The task is to write as many words as possible ending with certain given letters.

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

Suitable for grades 6-16

Word Beginnings Test -- FW-2

Similar to Thurstone's Prefixes. The task is to write as many words as possible beginning with certain given letters.

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

Suitable for grades 6-16

Word Beginnings and Endings Test -- FW-3

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.

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

Suitable for grades 6-16

Cover Pages

WORD ENDINGS TEST — FW-1

This is a test of your ability to think rapidly of as many words as you can that have the same ending.

The words in the following list all end with ATE.

mate
crate
irritate
resonate

Now try thinking of some more words ending in ATE. Write them on the lines below. Names of people or places are not allowed.

For each part of this test, you will be asked to write as many words as possible ending with new sets of letters. Please remember that names of people or places are not allowed. Your score will be the number of correct words that you write.

You will have 3 minutes for each of the two parts of this test. Each part has one page with one set of letters. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

WORD BEGINNINGS TEST — FW-2

This is a test of your ability to think rapidly of as many words as you can that begin with certain letters.

The words in the following list all begin with RE.

red
rent
reduce
reconsider

Now try thinking of some more words beginning with RE. Write them on the lines below. Names of people or places are not allowed.

For each part of this test, you will be asked to write as many words as possible beginning with new sets of letters. Please remember that names of people or places are not allowed. Your score on this test will be the number of correct words that you write.

You will have 3 minutes for each of the two parts of this test. Each part has one page with one set of letters. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

WORD BEGINNINGS AND ENDINGS TEST — FW-3

This is a test of your ability to think rapidly of as many words as you can that begin with one letter and end with another.

The words in the following list all begin with S and end with N.

sun
spin
stain
solution

Now try thinking of some more words beginning with S and ending with N. Write them on the lines below. Names of people or places are not allowed.

For each part of this test, you will be asked to write as many words as possible with new sets of first and last letters. Please remember that names of people or places are not allowed. Your score on this test will be the number of correct words that you write.

You will have 3 minutes for each of the two parts of this test. Each part has one page with one pair of letters. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring Keys

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.

I INDUCTION

Factor

This factor identifies the kinds of reasoning abilities involved in forming and trying out hypotheses that will fit a set of data

Induction appears to be a two-step process requiring both concept formation and hypothesis testing. According to Wardell (1973), induction is largely a synthesizing or unifying process. Inductive ability is probably involved in concept learning tasks. Tests for this factor have been limited to those which do not have semantic content.

There is considerable research evidence to suggest that there are a number of subfactors related to induction. Of these, figure classification seems to be the most distinct. The Harrises (1971) present evidence of two comparable common factors involving classification as well as an induction factor. Guilford claims that there are 16 kinds of inductive ability represented in his structure of intellect model. Dye and Very (1968) report separate factors of inductive reasoning and symbolic-inductive reasoning.

However, both Cattell (1971) and Pawlick (1966) have concluded that induction and general reasoning are probably not separate factors, although Cattell thinks that there may be a separate figural reasoning factor.

Carroll (1974) states that induction involves searching long-term memory for relevant hypotheses in a "general logic store." He concludes that success is dependent on whether or not the contents of this store are adequate to yield the solution. Serial operations to construct new hypotheses may be a useful strategy.

Identification: Cattell, UI-T5; Guilford, CSC, CSS, CFC and perhaps others.

References: 3, 5, 19, 20, 22, 32, 37, 48, 49, 65, 77, 91, 95, 97, 101, 111, 136, 177, 182, and 187.

TestsLetter Sets Test -- I-1

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.

Length of each part: 15 items, 7 minutes

Suitable for grades 8-16

Locations Test -- I-2

Suggested by 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.

Length of each part: 14 items, 6 minutes

Suitable for grades 8-16

Figure Classification -- I-3

This test was suggested by 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.

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

Suitable for grades 8-16

Cover Pages

LETTER SETS TEST -- I-1 (Rev.)

Each problem in this test has five sets of letters with four letters in each set. Four of the sets of letters are alike in some way. You are to find the rule that makes these four sets alike. The fifth letter set is different from them and will not fit this rule. Draw an X through the set of letters that is different.

NOTE: The rules will not be based on the sounds of sets of letters, the shapes of letters, or whether letter combinations form words or parts of words.

Examples:

A.	NOPQ	DEFL	ABCD	Hijk	UVWX
B.	NLIK	PLIK	QLIK	THIK	VLIK

In Example A, four of the sets have letters in alphabetical order. An X has therefore been drawn through DEFL. In Example B, four of the sets contain the letter L. Therefore, an X has been drawn through THIK.

Your score on this test will be the number of problems marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to elininate one or more of the letter sets.

You will be allowed 7 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

LOCATIONS TEST — I-2

Each problem in this test consists of five rows of small dashes separated into groups by blank spaces. In each of the first four rows one dash is replaced by an "x". In the fifth row five of the dashes are replaced by numbers. In each problem there is a rule guiding the placement of the "x" in each of the first four rows. You are to figure out what that rule is and to use the rule in deciding where the "x" should come in row 5. When you have picked the number in row 5 which appears where the "x" belongs, draw an X through it.

Example A:

Row 1	-----	--x-----
Row 2	-----	-x-----
Row 3	-----	--x-----
Row 4	-----	-x-----
Row 5	-----	1--X--3-4 5--

Example A has been correctly marked. In the first four rows the "x" always replaces the third dash from the left of a group. The group is always the second group in the row. Therefore the correct answer is 2 because the number 2 replaces the third dash of the second group in row 5.

Example B:

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

In the first four rows of example B the "x" replaces the first dash in a group. The group with the "x" is always the next to last group in the row. Therefore the correct answer is 4, since the number 4 replaces the first dash in the next to last group in row 5.

You should expect to find any kind of relation or rule to explain the position of the x's.

Your score on this test will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

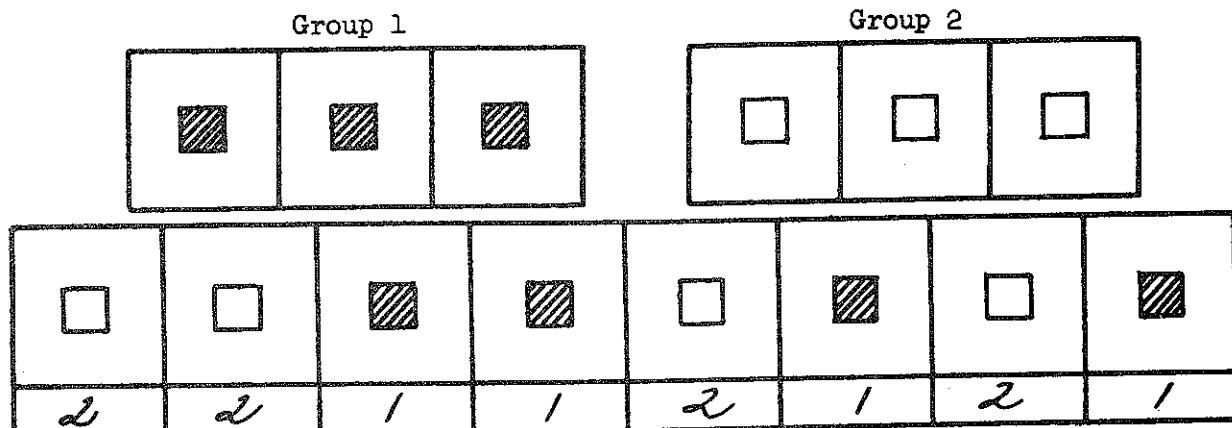
You will have 6 minutes for each of the two parts of this test. Each part has one page with 14 items. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

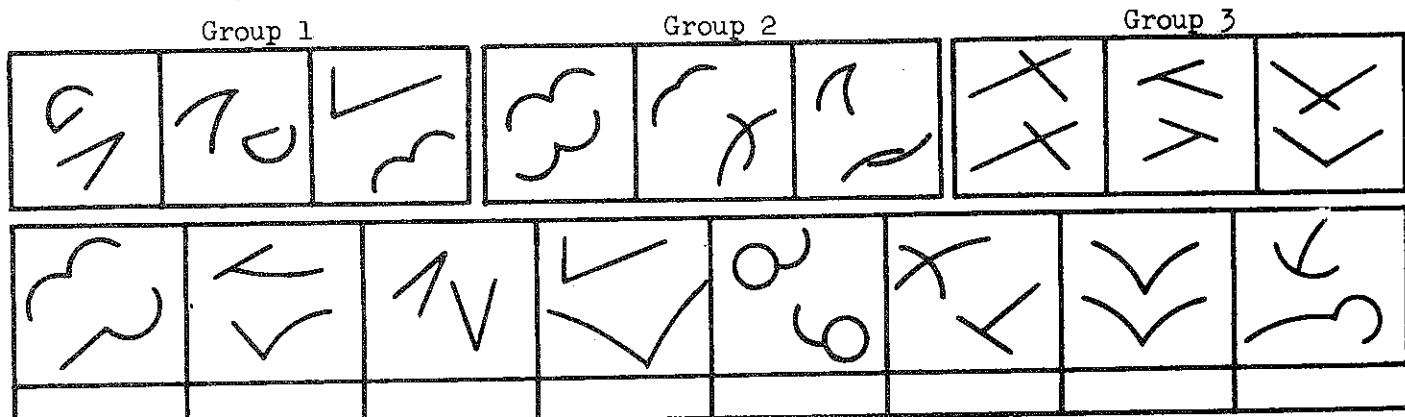
FIGURE CLASSIFICATION — I-3

This is a test of your ability to discover rules that explain things. In each problem on this test there are either two or three groups, each consisting of three figures. You are to look for something that is the same about the three figures in any one group and for things that make the groups different from one another.

Now look at the sample problem below. In the first line, the figures are divided into Group 1 and Group 2. The squares in Group 1 are shaded and the squares in Group 2 are not shaded. In the second line a 1 has been written under each figure that has a shaded square as in Group 1. A 2 has been written under each figure with an unshaded square as in Group 2.



Now try this more difficult sample, which has three groups:



The figures in Group 1 consist of both straight and curved lines. The figures in Group 2 consist of curved lines only. The figures in Group 3 consist of straight lines only. As you can see, there are other details that have nothing to do with the rule. The answers are: 1, 1, 3, 1, 2, 1, 2, 2.

Your score on this test will be the number of figures identified correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea of the group to which the figure belongs.

You will have 8 minutes for each of the two parts of this test. Each part has 4 pages. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysLetter Sets Test -- I-1

<u>Part 1</u>	<u>Part 2</u>
1. QPPQ	16. UVWZ
2. PRST	17. DTFL
3. PWXQ	18. OPQT
4. STWX	19. STTS
5. GFFG	20. QQQR
6. QQBB	21. MKJI
7. EGFH	22. BFDB
8. BODQ	23. TVWU
9. FUZG	24. SVWX
10. CLXC	25. CUWG
11. XDBK	26. KLHJ
12. CGVZ	27. AOUI
13. VEBT	28. WRPM
14. GKHM	29. QQAR
15. KIFB	30. QIFB

Locations Test -- I-2

<u>Part 1</u>	<u>Part 2</u>
1. 3	15. 3
2. 3	16. 3
3. 4	17. 4
4. 5	18. 4
5. 2	19. 1
6. 2	20. 5
7. 5	21. 2
8. 2	22. 2
9. 4	23. 3
10. 4	24. 2
11. 3	25. 4
12. 4	26. 3
13. 5	27. 2
14. 4	28. 1

Figure Classification -- I-3Part 1Page 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 2Page 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

IP INTEGRATIVE PROCESSES

Factor

The ability to keep in mind simultaneously or to combine several conditions, premises, or rules in order to produce a correct response

The tests for this factor frequently require the subject to follow a fairly complex set of directions or to handle a set of complex rules. Since the rules or directions are readily available for reference, loadings on memory are minimized.

This factor has been described as "integration" in several studies (Guilford and Lacey, 1944; Lucas and French, 1953; Traub, 1970). There are similar factors requiring the "non-intellectual following of directions" or internalizing rules in order to solve problems.

Ekstrom, French, and Harman (1975) found this factor tended to combine with some reasoning factors.

Identification: Possibly Guilford's MSR

References: 43, 44, 55, 91, 130, and 188.

TestsCalendar Test -- IP-1

The subject is asked to select certain dates on a calendar by following fairly complex sets of directions.

Length of each part: 10 items, 7 minutes

Suitable for grades 8-16

Following Directions -- IP-2

The subject is asked to determine the point in a matrix of letters that would be reached by following a complex set of directions.

Length of each part: 10 items, 7 minutes

Suitable for grades 9-16

CALENDAR TEST -- IP-1

This is a test of your accuracy in following directions. Each direction will ask you to find a date on a calendar which is printed on the last page of this booklet.

In this calendar you are to remember that:

1. A circled number is a holiday
2. Saturdays and Sundays are weekend days
3. All days except holidays and weekends are work days
4. The first day of Spring is March 21
5. The first day of Summer is June 21
6. The first day of Fall is September 21
7. The first day of Winter is December 21

Look at the sample items below. Put an x on the letter in front of the correct answer.

S	M	T	W	T	F	S
			1	2	3	4
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

- I. What is the third Tuesday of the month?
a. 15th b. 17th c. 22nd d. 24th e. Not given
- II. What is the third working day after the holiday?
a. 13th b. 14th c. 15th d. 16th e. Not given
- III. What is the seventh working day after the third Monday of the month?
a. 9th b. 27th c. 29th d. 30th e. Not given

The answers are I,a; II,d; III,d.

Your score will be the number of dates you mark correctly minus a fraction of those marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea about which date is correct.

This test has two parts. Each part has 10 dates for you to select. You will have 7 minutes for each part. When you have finished Part 1, STOP. Please do not go on to Part 2 until asked to do so.

Tear off the last page of this booklet now so you will be able to refer to that calendar easily as you take the rest of this test.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

FOLLOWING DIRECTIONS -- IP-2

This is a test of your ability to follow a set of directions. You will be given a pattern of letters to look at and will be asked questions about how certain directions will change that pattern. The answer to each question will be one of the letters in the pattern. You are to decide which letter is correct and put an x on that letter.

Look at this example:

	<u>Column</u>				
	1	2	3	4	5
Row 1	A	B	C	D	E
Row 2	E	A	B	C	D
Row 3	D	E	A	B	C
Row 4	C	D	E	A	B
Row 5	B	C	D	E	A

I. Which is the only letter that appears directly above the letter A?

A B C D E

II. If one letter occurs more frequently than another, the answer is the most frequently occurring letter; if no letter occurs most frequently, the answer is the letter in the upper left to lower right diagonal.

A B C D E

You should have marked B for I. and A for II.

Your score on this test will be the number of letters which you mark correctly minus a fraction of those incorrect. Therefore it will not be to your advantage to guess unless you are fairly certain of your answer.

This test has two parts. Each part has 10 items on one page. You will have 7 minutes for each part. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Scoring KeysCalendar Test -- IP-1

<u>Part 1</u>	<u>Part 2</u>
1. a	11. c
2. b	12. e
3. d	13. e
4. c	14. c
5. a	15. a
6. b	16. e
7. b	17. e
8. a	18. a
9. b	19. d
10. b	20. c

Following Directions -- IP-2

<u>Part 1</u>	<u>Part 2</u>
1. E	11. A
2. D	12. A
3. E	13. C
4. E	14. E
5. E	15. A
6. C	16. B
7. E	17. B
8. C	18. E
9. D	19. A
10. C	20. D

MA MEMORY, ASSOCIATIVE

Factor

The ability to recall one part of a previously learned but otherwise unrelated pair of items when the other part of the pair is presented

The tasks used to measure this factor are similar to those used in studies of paired-associates learning. A major question is whether or not this factor is restricted to memory for non-meaningful material and relationships.

This factor, according to Carroll (1974), involves the storage and retrieval of information from intermediate term memory. The degree to which strategies, such as rehearsal in short-term memory and the discovery of mnemonic mediators in lexicosemantic and/or experiential long-term memory, are employed and the success of such strategies may be largely responsible for the individual differences observed.

Identification: Cattell, UI-T7; Guilford, MSI; Thurstone, M.

References: 4, 11, 15, 22, 24, 25, 33, 35, 37, 42, 46, 48, 64, 74, 75, 77, 86, 91, 93, 110, 111, 119, 126, 128, 131, 135, 136, 149, 177, 179, 182, 184, 185, 187, 188, 189, 202, 203, 205, and 207.

TestsPicture-Number Test -- MA-1

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 in a different order, the subject writes the appropriate number under each.

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

Suitable for grades 6-16

Object-Number Test -- MA-2

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

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

Suitable for grades 6-16

First and Last Names Test -- MA-3

Adapted from Thurstone's First Names. The subject examines full names, including first and last. Later, when the last names are presented in different order, the subject writes the appropriate first name in front of each last name.

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

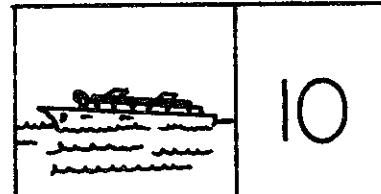
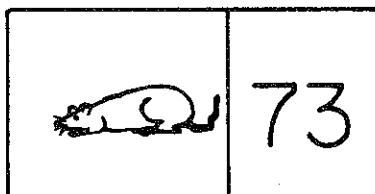
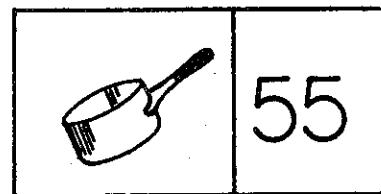
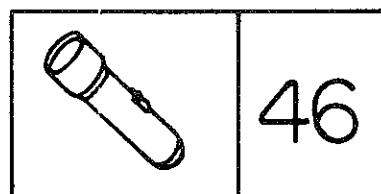
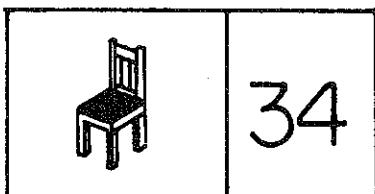
Suitable for grades 6-16

Cover Pages

PICTURE-NUMBER TEST — MA-1

This is a test of your ability to learn picture-number combinations. In each part of the test you will study a page of 21 pictures with numbers. After studying the page showing both pictures and numbers, you will turn to a page showing the pictures in a different order. You will be asked to write down the numbers that go with them.

Here are some practice pictures with numbers. Study them until you are told to turn to the next page (1 minute).



DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

OBJECT - NUMBER TEST — MA-2

This is a test of your ability to learn combinations of words and numbers. In each part of the test you will study a page showing 15 object names with numbers. After studying the page showing both objects and numbers you will turn to a page showing the names of the objects in a different order. You will be asked to write down the numbers that go with them.

Here is a practice list. Study it until you are asked to turn to the practice test page (1 minute).

<u>Object</u>	<u>Number</u>
window	73
desk	41
carpet	19
door	84
glass	90

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

FIRST AND LAST NAMES TEST — MA-3

This is a test of your ability to learn first and last names. In each part of the test you will study a page of 15 full names, first and last. After studying the page showing full names you will turn to a page showing a list of the last names in a different order. You will be asked to write the first names that go with each last name.

Here are some practice names. Study them until you are asked to turn to the next page (1 minute).

Janet Gregory

Thomas Adams

Roland Donaldson

Patricia Fletcher

Betty Bronson

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysPicture-Number Test -- MA-1

<u>Part 1</u>	<u>Part 2</u>
49 99 74	76 25 64
77 27 36	39 53 17
86 30 42	56 43 47
13 24 19	40 31 37
62 98 20	84 79 33
88 15 82	87 29 93
32 51 35	48 52 61

Object-Number Test -- MA-2

<u>Part 1</u>	<u>Part 2</u>
49	31
65	42
43	13
29	14
17	82
40	63
35	44
22	23
56	77
62	59
58	37
33	18
26	91
36	28
78	54

First and Last Names Test -- MA-3Part 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

MS MEMORY SPAN

Factor

The ability to recall a number of distinct elements for immediate reproduction

The factor does not seem to be seriously affected by the mode of presentation (visual or auditory) nor by the order of presentation (reverse or same).

The variation in the number of units recalled is fairly limited, ranging from five to nine in most normal subjects (Miller, 1956).

Cattell (1971) considers span memory too narrow to accept as a separate factor. Guilford and Hoepfner (1971) state that memory span factors are fairly test specific. Memory span involves storage and retrieval in short-term memory (Carroll, 1974). Strategies involving chunking or grouping of the elements may be used by some subjects.

Identification: Guilford, MSU

References: 2, 6, 8, 16, 22, 48, 67, 74, 97, 116, 117, 119, 128, 131, 135, 155, 164, 174, 179, 188, and 204.

TestsAuditory Number Span Test -- MS-1

A test developed by Kelley (1954). This is a conventional digit-span test with digits in series of varying length being read at a speed of one digit per second. 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 Scoring Keys pages at the end of this section on Memory Span.

Length: 24 series, about 10 minutes

Suitable for grades 6-16

Visual Number Span Test -- MS-2

A test developed by Kelley (1954). The items in this test are parallel with those for MS-1. They are presented by having each digit printed on a large card, 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 section on Memory Span.

Length: 24 series, about 10 minutes

Suitable for grades 6-16

Auditory Letter Span Test -- MS-3

A test developed by Kelley (1954). 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 Scoring Keys pages at the end of this section on Memory Span.

Length: 24 series, about 10 minutes

Suitable for grades 6-16

Cover Pages

AUDITORY NUMBER SPAN TEST — MS-1

This is a test of your ability to remember series of numbers. The examiner will call out the numbers. After he finishes, you are to write down the numbers in the exact order in which they were called out. Please do not write any numbers until the examiner has finished the whole series.

Some of the series will be too long for you to remember all of the numbers. If you do not remember some of them, leave a blank space for them and write down all the numbers you do remember. Try to remember all the numbers if possible, and be sure to write them down in the exact order in which they were called out.

For example, the examiner might call out, "Series One. 7 2 4 Begin."

When he says "Begin" (showing that the series is complete), write the numbers on the answer page in this manner:

1. 7 2 4

It is very important that you do not write numbers while a series is being called out, since this is a test of your memory for numbers.

Your score on this test will be the number of series you remember correctly.

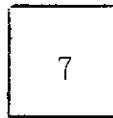
DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

VISUAL NUMBER SPAN TEST — MS-2

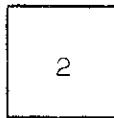
This is a test of your ability to remember series of numbers. For each series the examiner will show you several numbers on cards, one after the other. After he finishes, you are to write down the numbers in the exact order in which they were shown to you. Please do not write any numbers until the examiner has finished the whole series.

Some of the series will be too long for you to remember all of the numbers. If you do not remember some of them, leave a blank space for them and put down all the numbers you do remember. Try to remember all the numbers if possible, and be sure to write them down so that they will be in the exact order in which they were written on the cards.

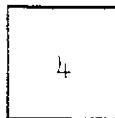
For example, the examiner might show you a card like this:



, then



, then



, and then say "Begin."

When he says "Begin" (showing that the series is complete), write the numbers on the answer page in this manner:

1. 7 2 4

It is very important that you do not write numbers while a series is being shown to you, because this is a test of your memory of numbers.

Your score on this test will be the number of series you remember correctly.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

AUDITORY LETTER SPAN TEST — MS-3

This is a test of your ability to remember series of letters. The examiner will call out the letters. After he finishes, you are to write down the letters in the exact order in which they were called out. Please do not write any letters until the examiner has finished the whole series.

Some of the series will be too long for you to remember all of the letters. If you do not remember some of them, leave a blank space for them and write down all the letters you do remember. Try to remember all the letters if possible, and be sure to write them down in the exact order in which they were called out.

For example, the examiner might call out, "Series One. H R L Begin."

When he says "Begin" (showing that the series is complete), write the letters on the answer page in this manner:

1. H R L

Only the following letters will be used: C, F, G, H, K, L, P, R, S, W, Y.

It is very important that you do not write letters while a series is being called out, because this is a test of your memory for letters.

Your score on this test will be the number of series you remember correctly.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysAuditory 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

Visual Number Span Test -- 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

Auditory Letter Span Test -- MS-3

1. K, F, C
2. H, S, L, Y, G
3. P, F, R, C, W, S, G, K, Y
4. P, L, S, C, W, K, R, F, H, G
5. R, G, S
6. L, W, C, Y, K, R, P
7. F, S, Y, L, C, H
8. S, C, F, K, W, L, P
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, G, W, K, S, R, L, 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, W, G, P, L, K, H
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. Y, C, W, S, P, R, F
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, G, H, L, P, S, K

MV MEMORY, VISUAL

Factor

The ability to remember the configuration, location, and orientation of figural material

There has been considerable debate as to whether or not this factor is due to test content. Thurstone (1946) thought that "the memorizing factor transcends the nature of the content" but more recent research has demonstrated the existence of iconic memory, which is used to store visual impressions. This suggests that visual memory is not simply the result of test content but involves cognitive processes different from those used in other memory factors.

There may be sub-factors of visual memory. Guilford describes six figural memory abilities. Petrov (1970) has found separate factors both for iconic memory and for short-term retention of visual material.

Identification: Guilford, MFU, MFC, and MFR, possibly others.

References: 21, 33, 55, 86, 91, 108, 109, 155, 164, 165, 174, and 179.

Tests

Shape Memory Test -- MV-1

The subject is asked to identify those irregular forms which were previously seen in the same orientation on a study page.

Length of each part: 16 items, 4 minutes for memorizing,
4 minutes for testing

Suitable for grades 6-16

Building Memory -- MV-2

The subject is asked to indicate the location of a number of buildings seen on a previously studied map.

Length of each part: 12 items, 4 minutes for memorizing,
4 minutes for testing

Suitable for grades 6-16

Map Memory -- MV-3

The subject is asked to identify those maps which were previously presented on a study page.

Length of each part: 12 items, 3 minutes for memorizing,
3 minutes for testing

Suitable for grades 6-16

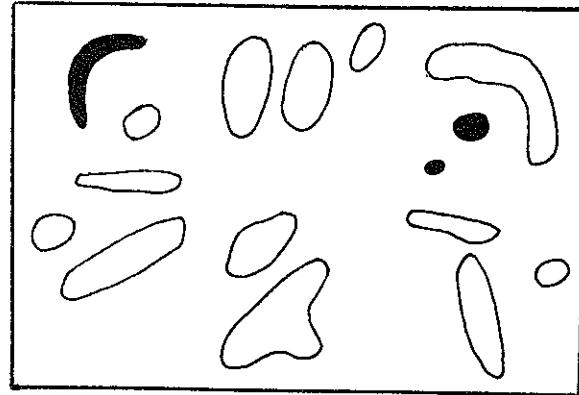
Cover Pages

SHAPE MEMORY TEST -- MV-1

This is a test of your ability to remember a group of shapes and their positions in relation to each other.

You will be given a page of different shapes to study. After you have had some time to learn the shapes and their orientation, you will be asked to turn to a test page which will show some of the same shapes that you studied. For each picture on the test page you will be asked whether it is the same as the one in the study page or whether it is different from those you studied.

Now look at this sample:



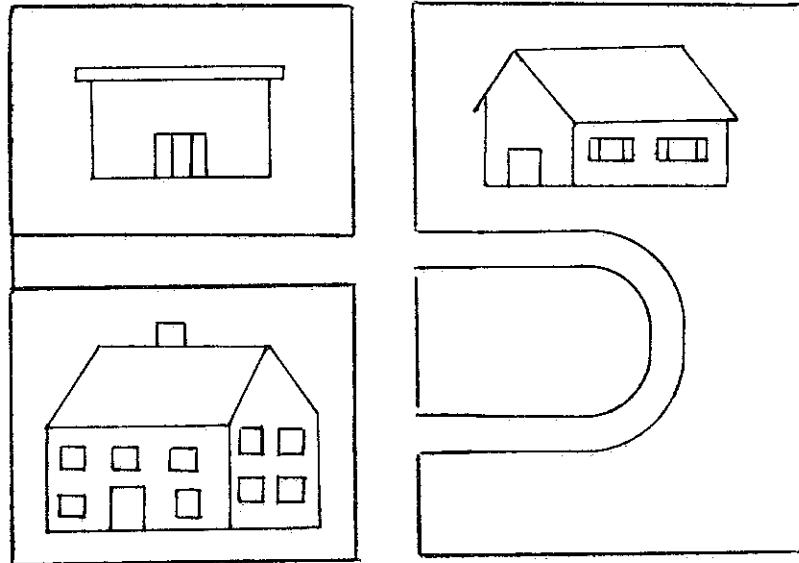
After you have studied the sample above for about a minute, turn to the next page.

BUILDING MEMORY -- MV-2

This is a test of your ability to remember the position of things on a street map.

You will be given a map with streets and buildings and other structures to study. After you have had some time to learn the street layout and the different kinds of structures, you will be asked to turn to a test page. On that page you will find the street map and numbered pictures of some of the structures. You will be asked to put an x on the letter that shows where each of the structures was located on the study map.

Now look at this simple and enlarged sample:

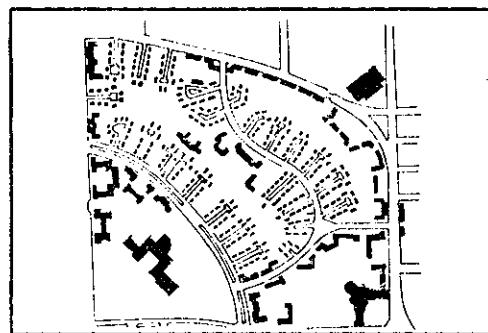
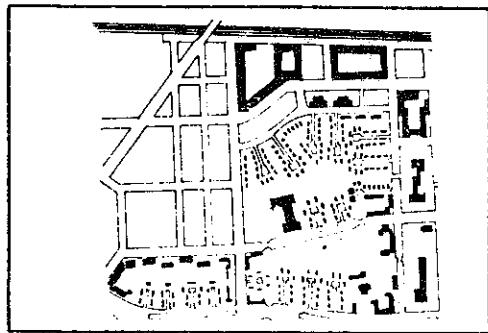


After you have studied the sample above for a minute, turn to the next page.

MAP MEMORY -- MV-3

This is a test of your ability to remember part of a map so that you can recognize it when you see it again.

Study the sample item below. You have 1 minute.



NOTE:

This is followed by a sample test page showing four maps. The subject is required to identify two of the four maps as those that were presented for study.

Each of the two parts of this test will have two sections: (1) a page for you to study for 3 minutes and (2) a memory page which you have 3 minutes to complete.

Your score will be the number of maps which you identify correctly minus the number which you identify incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea of whether or not you have studied the map.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysShape Memory Test -- MV-1

<u>Part 1</u>		<u>Part 2</u>	
1. Y	9. N	17. Y	25. N
2. Y	10. Y	18. Y	26. N
3. N	11. Y	19. N	27. N
4. N	12. Y	20. Y	28. Y
5. Y	13. N	21. N	29. N
6. N	14. Y	22. Y	30. Y
7. Y	15. Y	23. N	31. N
8. N	16. N	24. Y	32. N

Building Memory -- MV-2

<u>Part 1</u>		<u>Part 2</u>	
1. A	7. E	13. D	19. B
2. A	8. C	14. D	20. B
3. A	9. D	15. B	21. B
4. A	10. C	16. D	22. B
5. C	11. B	17. E	23. A
6. C	12. A	18. D	24. E

Map Memory -- MV-3

<u>Part 1</u>		<u>Part 2</u>	
1. N	7. Y	13. N	19. Y
2. N	8. N	14. Y	20. Y
3. Y	9. Y	15. N	21. N
4. Y	10. N	16. Y	22. Y
5. N	11. N	17. Y	23. N
6. N	12. Y	18. N	24. N

N NUMBER FACILITY

Factor

The ability to perform basic arithmetic operations with speed and accuracy. This factor is not a major component in mathematical reasoning or higher mathematical skills.

It is possible that this factor may be broader than simple arithmetic manipulation. For example, several studies by Thurstone show non-numerical coding tasks to have a moderate loading on N. Other researchers (Keats, 1965; Werdelin and Stjernberg, 1971; Flores and Evans, 1972) have suggested that N may be part of an "automatic process" factor, incorporating both number facility and perceptual speed, which is operant when responding to over-learned material. However, an experimental test developed to test this hypothesis by requiring the subject to count the distance between certain letters of the alphabet failed to combine with other tests of this factor (Ekstrom, French, and Harman, 1975).

Guilford thinks that N is a test specific subfactor of memory for symbolic implications but, according to Carroll (1974), number facility involves both "retrieving appropriate number associations and algorithms from long-term memory and performing serial operations on the stimulus materials using these associations and algorithms." Two possible differences in the approaches employed on addition tests have been described by Groen and Parkman (1972): (1) memory look-up, used by most adults, and (2) incremental counting, used by most children and some adults. Such differences in strategies may explain the confusion about the nature of numerical facility.

Identification: Cattell, UI-T10; a subfactor of Guilford's MSI;
Thurstone's N.

References: This factor has been found in over 80 studies.

TestsAddition Test -- N-1

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

Length of each part: 60 items, 2 minutes

Suitable for grades 6-16

Division Test -- N-2

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

Length of each part: 60 items, 2 minutes

Suitable for grades 6-16

Subtraction and Multiplication Test -- N-3

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 (French, 1957).

Length of each part: 60 items, 2 minutes

Suitable for grades 6-16

Addition and Subtraction Correction -- N-4

The subject is asked to indicate whether the answer shown for simple addition and subtraction problems is correct or incorrect.

Length of each part: 60 items, 2 minutes

Suitable for grades 6-16

Cover Pages

ADDITION TEST — N-1

This is a test to see how quickly and accurately you can add. It is not expected that you will finish all the problems in the time allowed.

You are to write your answers in the boxes below the problems. Several practice problems are given below with the first one correctly worked. Practice for speed on the others. This practice may help your score.

Practice Problems:

4	7	12	84	7	34	17	45	31	80
9	6	5	54	38	81	50	41	52	78
1	15	67	72	80	51	74	89	19	15
14									

Your score on this test will be the number of problems that are added correctly. Work as rapidly as you can without sacrificing accuracy.

You will have 2 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

DIVISION TEST — N-2

This is a test to see how quickly and accurately you can divide. It is not expected that you will finish all the problems in the time allowed.

You are to write your answers in the boxes below the problems. Several practice problems are given below with the first one correctly worked. Practice for speed on the others. This practice may help your score.

If you wish, you may use the space between the lines or at the bottom of the page for scratchwork. All of the problems come out even. There are no remainders.

Practice Problems:

$64 \div 4$

16

$150 \div 6$

--

$648 \div 8$

--

$238 \div 7$

--

$423 \div 9$

--

$546 \div 6$

--

$376 \div 8$

--

$153 \div 3$

--

$415 \div 5$

--

$117 \div 9$

--

Your score on this test will be the number of problems that are divided correctly. Work as rapidly as you can without sacrificing accuracy.

You will have 2 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

SUBTRACTION AND MULTIPLICATION TEST — N-3

This is a test to see how quickly and accurately you can subtract and multiply. It is not expected that you will finish all the problems in the time allowed.

You are to write your answers in the boxes below the problems. Several practice problems are given below with the first one correctly worked. Practice for speed on the others. This practice may help your score.

Practice Problems:

Subtract:

98 -75	40 -35	37 -19	84 -47	81 -38	76 -40	59 -46	90 -31	46 -29	56 -23
23	<input type="text"/>								

Multiply:

86 \times 6	67 \times 4	30 \times 3	81 \times 8	42 \times 5	37 \times 8	81 \times 4	86 \times 3	43 \times 6	69 \times 7
516	<input type="text"/>								

Your score on this test will be the number of problems solved correctly. Work as rapidly as you can without sacrificing accuracy. Be sure that you are using the correct process; check the sign for each row.

You will have 2 minutes for each of the two parts of this test. Each part has one page with 60 items. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

ADDITION AND SUBTRACTION CORRECTION — N-4

This will try out your ability and speed at adding and subtracting 2-digit numbers. You may use this sheet for scratch paper, but you will probably move along faster if you solve the problems in your head, because they are not very hard. There will be more items than you will be able to finish.

For each item, two numbers are given to be added or subtracted according to the sign between them (+ or -). In all cases an answer is suggested. If the suggested answer is correct, make an X on the letter "C" for correct. If the suggested answer is not correct, make an X on the letter "I" for incorrect.

Sample problems:

- | | | |
|-------------------|---|---|
| 1. $11 + 23 = 34$ | C | I |
| 2. $20 - 17 = 3$ | C | I |
| 3. $35 - 10 = 20$ | C | I |

You would mark C (correct) for problems 1 and 2, because 11 added to 23 is 34, and 20 minus 17 is 3. For problem 3 you would mark the I (incorrect), because 35 minus 10 is 25, not 20.

Your score on this test will be the number of items marked correctly minus the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea about the correct answer.

You will have 2 minutes for each of the two parts of this test. Each part has one page with 60 items. When you finish Part 1, STOP. Please do not go on to Part 2 until asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysAddition Test -- N-1Part 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-2Part 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-3Part 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

Addition and Subtraction Correction -- N-4Part 1

1. C	16. I	31. C	46. C
2. I	17. C	32. C	47. I
3. C	18. C	33. I	48. C
4. C	19. I	34. I	49. I
5. I	20. C	35. C	50. C
6. I	21. I	36. C	51. C
7. C	22. I	37. I	52. I
8. I	23. C	38. I	53. C
9. C	24. C	39. C	54. C
10. C	25. I	40. I	55. I
11. C	26. I	41. C	56. I
12. I	27. C	42. I	57. I
13. C	28. I	43. I	58. C
14. I	29. I	44. C	59. I
15. I	30. C	45. I	60. C

Part 2

61. I	76. C	91. I	106. I
62. C	77. I	92. C	107. C
63. C	78. C	93. C	108. I
64. C	79. C	94. I	109. I
65. C	80. C	95. C	110. C
66. I	81. I	96. I	111. C
67. C	82. I	97. C	112. I
68. I	83. C	98. I	113. I
69. C	84. I	99. C	114. C
70. C	85. C	100. I	115. I
71. I	86. I	101. I	116. I
72. C	87. C	102. C	117. I
73. I	88. I	103. C	118. C
74. I	89. I	104. C	119. C
75. C	90. C	105. I	120. C

P PERCEPTUAL SPEED

Factor

Speed in comparing figures or symbols, scanning to find figures or symbols, or carrying out other very simple tasks involving visual perception. It may be the centroid of several subfactors (including form discrimination and symbol discrimination) which can be separated but are more usefully treated as a single concept for research purposes.

Three components which account for the individual differences in tasks for this factor have been described: (1) perceptual fluency, or the "readiness with which the subject oscillates between alternating percepts," (2) decision speed, or the "readiness with which the choice is made when the response is not completely determined by sensory input," which may be similar to Thurstone's speed of judgment factor, and (3) immediate perceptual memory (Kunnapas, 1969).

According to Carroll (1974) perceptual speed "involves primarily the temporal parameters of a visual search through a field of specified elements; this search occurs by addressing sensory buffers." Possible relationships between this factor and flexibility of closure have been pointed out by Pawlik (1966) and by Ekstrom (1973). This factor may also be related to or a part of an "automatic process" factor.

Royce (1973) has suggested that perceptual speed may be a subfactor of the cognitive style called scanning. It is also possible that this factor is related to the automatization cognitive style.

Identification: Thurstone, P; Cattell, UI-T12; Guilford, ESU and EFU

References: 2, 10, 11, 14, 17, 18, 19, 22, 23, 36, 37, 41, 44, 45, 49, 50, 51, 52, 63, 64, 66, 69, 72, 73, 76, 79, 80, 85, 86, 91, 93, 96, 97, 101, 104, 107, 108, 110, 114, 122, 123, 124, 130, 140, 142, 143, 147, 150, 155, 156, 158, 164, 165, 168, 174, 175, 177, 179, 182, 183, 184, 185, 187, 188, 189, 198, 199, 200, 206, and 209.

TestsFinding A's Test -- P-1

Suggested by Thurstone's Letter "A." In each column of 41 words, the task is to check the 5 words having the letter "a." Scoring of this test could be facilitated if examinees used colored pencils.)

Length of each part: 820 words, 2 minutes

Suitable for grades 6-16

Number Comparison Test -- P-2

Suggested by 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.

Length of each part: 48 items, 1 1/2 minutes

Suitable for grades 6-16

Identical Pictures Test -- P-3

Suggested by similar tests by Thurstone. For each item the subject is to check which one of 5 numbered geometrical figures or pictures in a row is identical to the given figure at the left end of the row.

Length of each part: 48 rows, 1 1/2 minutes

Suitable for grades 6-16

Cover Pages

FINDING A'S TEST — P-1

This is a test of your speed in finding the letter "a" in words. Your task is to put a line through any such word. Listed below are five columns of words. Each column has five words containing the letter "a". The first two columns have already been marked correctly. Now, on the other three columns, practice for speed in putting a line through the words with an "a".

1	2	3	4	5
cider	east	stripe	insert	defend
bough	blind	coarse	court	settle
fudge	chord	govern	pearl	lodge
greet	solar	perfect	bridle	oaken
fault	spoon	special	recess	crown
leap	piece	consist	soapy	quest
count	rinse	mostly	able	glimpse
shore	drown	shrink	pledge	every
easer	fleet	pencil	refuse	break
define	sense	hinder	better	where
entire	uncle	solace	patrol	thorn
ghost	white	keeper	judge	pause
knife	coach	night	defect	hence
hedge	south	clock	trust	short
petal	period	picnic	other	person
scope	miller	smart	straw	warm
ripen	slogan	finger	noisy	juice
under	height	useful	defer	enter
hoard	event	slowly	field	ordeal
quite	bond	meant	mend	nurse
jump	west	quick	skill	cool

Remember, in each column there are five words containing the letter "a".

Your score on this test will be the number of words marked correctly. Work as quickly as you can without sacrificing accuracy.

You will have 2 minutes for each of the two parts of this test. Each part has four pages. When you have finished Part 1 (pages 2 to 5), STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

NUMBER COMPARISON TEST — P-2

This is a test to find out how quickly you can compare two numbers and decide whether or not they are the same. If the numbers are the same, go on to the next pair, making no mark on the page. If the numbers are not the same, put an X on the line between them. Several examples are given below with the first few marked correctly. Practice for speed on the others.

659	<u> </u>	659	7343801	<u> </u>	7343801
73845	X	73855	18824	<u> </u>	18824
1624	<u> </u>	1624	705216831	<u> </u>	795216831
438	X	436	971	<u> </u>	971
4821459	<u> </u>	4814259	446014721	<u> </u>	446014721
658331	<u> </u>	656331	5173869	<u> </u>	5172869
11653	<u> </u>	11652	6430017	<u> </u>	6430017
617439428	<u> </u>	617439428	518198045	<u> </u>	518168045
1860439	<u> </u>	1860439	55179	<u> </u>	55097
90776105	<u> </u>	90716105	63216067	<u> </u>	63216057

Your score will be the number marked correctly minus the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea whether or not the numbers are the same.

You will have 1 1/2 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

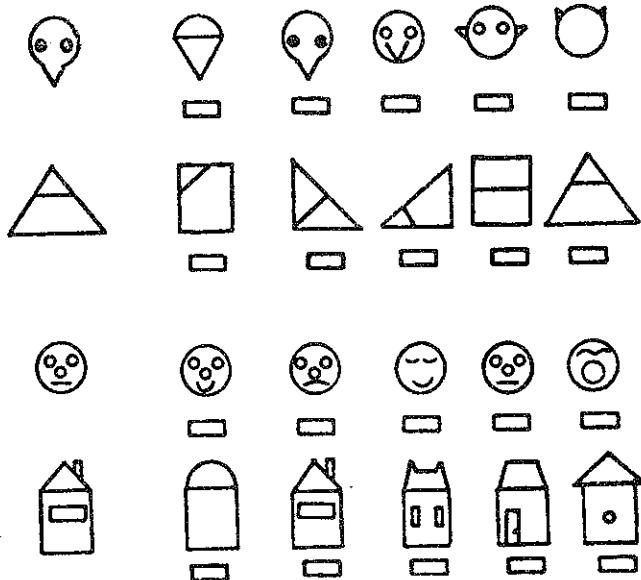
IDENTICAL PICTURES TEST -- P-3

How fast can you match a given object? This is a test of your ability to pick the correct object quickly. At the left of each row is an object. To the right are five test objects, one of which matches the object at the left. Look at the example below:



The third test object has been marked by blackening the space below it, because it is the same as the object at the left.

Now practice on the problems below. Mark them as fast as you can:



Your score on this test will be the number of objects marked correctly minus a fraction of the number marked incorrectly. Work as quickly as you can without sacrificing accuracy.

You will have 1 1/2 minutes for each of the two parts of this test. Each part has two pages. Be sure to do both pages if you have time. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysFinding A's Test -- P-1Part 1Page 2

ladder	dismal	durable	quarrel	instead
spread	distant	leave	steam	readily
reward	race	bread	hear	grease
message	shawl	fatigue	boast	general
chalk	guard	regular	giant	happy

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

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-1Part 2Page 6

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 7

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 8

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 9

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

Number Comparison Test -- P-2Part 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
O X
X O
X X
X O
O O
O X
X X

Part 2

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

Identical Pictures Test-- P-3Part 1Page 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

Part 2Page 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 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

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

RG REASONING, GENERAL

Factor

The ability to select and organize relevant information for the solution of a problem

Although mathematical reasoning tests are the measures most frequently used as markers for this factor, they frequently confound numerical ability with general reasoning. Other kinds of problem solving tests, such as Guilford's Ship Destination or Necessary Arithmetic Operations have also loaded on this factor.

In studying tests of arithmetic problems, non-mathematical logical reasoning, and number series, Werdelin and Stjernberg (1971) found that the more difficult the test was made the higher the loading on general reasoning. Thus, this factor could also represent the upper difficulty level of other reasoning factors.

Cattell (1971) does not differentiate between general reasoning and induction because "general reasoning is nothing more than a partial perception of fluid intelligence, gf, in the first order."

General reasoning is described by Carroll (1974) as being very similar to logical (syllogistic) reasoning since both involve retrieval and serial operations. The differentiating elements are the types of content of long-term memory which are retrieved and utilized. Some researchers have had problems in separating general reasoning from logical reasoning.

Identification: Guilford, CMS

References: 6, 8, 9, 13, 15, 19, 22, 23, 24, 25, 31, 34, 36, 37, 40, 41, 46, 47, 48, 49, 55, 61, 64, 65, 66, 71, 72, 77, 79, 84, 85, 90, 91, 92, 103, 114, 118, 120, 128, 129, 130, 131, 135, 138, 139, 140, 141, 142, 143, 145, 148, 150, 158, 162, 173, 174, 175, 184, 190, 194, 197, 198, 200, 204, 206, 207, and 209.

TestsArithmetic Aptitude Test -- RG-1

This consists of 5-choice word problems requiring arithmetic only. It is intended for younger subjects than is RG-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 RG-2. However, adding other suitable arithmetic reasoning tests to the battery would be desirable.

Length of each part: 15 items, 10 minutes

Suitable for grades 6-12

Mathematics Aptitude Test -- RG-2

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

Length of each part: 15 items, 10 minutes

Suitable for grades 11-16

Necessary Arithmetic Operations -- RG-3

A test suggested by a similar test by Guilford. The task is to determine what numerical operations are required to solve arithmetic problems without actually having to carry out the computations.

Length of each part: 15 items, 5 minutes

Suitable for grades 6-16

Cover Pages

ARITHMETIC APTITUDE TEST -- RG-1

In this test you will be asked to solve some problems in arithmetic. Work each problem and put an x on the letter in front of the answer that you choose.

Example:

How many candy mints can you buy for 50 cents at the rate of 2 for 5 cents?

- A - 10
- B - 20
- C - 25
- D - 100
- E - 125

The correct answer to this problem is 20. Therefore, you should have marked an x through the letter B to indicate the correct answer.

Your score on this test will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 10 minutes for each of the two parts of this test. Each part has 3 pages with 15 items. Be sure to do all the pages in each part if you have time. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

MATHEMATICS APTITUDE TEST -- RG-2

In this test you will be asked to solve some problems in mathematics. Solve each problem and put an X through the number in front of the answer that you select.

Example

How many candy mints can you buy for 50 cents at the rate of 2 for 5 cents?

- A - 10
- B - 20
- C - 25
- D - 100
- E - 125

Your score on this test will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 10 minutes for each of the two parts of this test. Each part has 3 pages. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

NECESSARY ARITHMETIC OPERATIONS TEST -- RG-3

This test consists of problems in mathematics. However, instead of solving the problems and finding an answer, your task will be merely to indicate which arithmetic operations could be used, if you solved the problems. Put an X through the number in front of the option that you select.

Example I

If a man earns \$2.75 an hour, how many hours should he work each day in order to make an average of \$22.50 per day?

1. subtract
2. divide
3. add
4. multiply

In order to solve the problem you should divide \$22.50 by \$2.75; therefore, you should have put an X through 2.

Example II

Chairs priced at \$40 each are being sold in lots of 4 at 85% of the original price. How much would 4 chairs cost?

1. divide and add
2. multiply and multiply
3. subtract and divide
4. multiply and divide

One way to solve the problem would be to multiply \$40 by .85 and then multiply this product by 4; therefore, you should have put an X through number 2. (Although some problems may be solved in more than one way, as with Example II, only the operations for one of these ways will be given among the options).

When 2 operations are given, they are always given in the order in which they should be performed.

Your score on this test will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 5 minutes for each of the two parts of this test. Each part has 3 pages with 15 items. Be sure to do all the pages in each part if you have time. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Scoring KeysArithmetic Aptitude Test-- RG-1Part 1Page 2

- 1. B
- 2. E
- 3. A
- 4. D
- 5. C

Page 3

- 6. B
- 7. C
- 8. D
- 9. D
- 10. A
- 11. B
- 12. C
- 13. E
- 14. B
- 15. A

Part 2Page 5

- 16. C
- 17. A
- 18. E
- 19. D
- 20. B

Page 6

- 21. E
- 22. A
- 23. B
- 24. C
- 25. D
- 26. B
- 27. C
- 28. B
- 29. E
- 30. D

Page 7

Mathematics Aptitude Test -- RG-2Part 1Page 2

1. E
2. A
3. B
4. C
5. D

Page 3

6. E
7. B
8. C
9. A
10. A

Page 4

11. C
12. E
13. D
14. C
15. E

Part 2Page 5

16. E
17. D
18. C
19. E
20. A

Page 6

21. C
22. B
23. B
24. E
25. A

Page 7

26. B
27. D
28. B
29. D
30. C

Necessary Arithmetic Operations Test -- RG-3Part 1Page 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 2Page 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

RL REASONING, LOGICAL

Factor

*The ability to reason from premise to conclusion,
or to evaluate the correctness of a conclusion*

This factor was originally called "Deduction" by Thurstone. In the 1963 edition of this Kit, it was called "Syllogistic Reasoning." Guilford and Cattell have sometimes called this factor "Logical Evaluation."

Guilford has pointed out that what is called for in syllogistic reasoning tasks is not deduction but the ability to evaluate the correctness of the answers presented. This factor can be confounded with verbal reasoning when the level of reading comprehension required is not minimized.

The complexity of this factor has been pointed out by Carroll (1974) who describes it as involving both the retrieval of meanings and of algorithms from long-term memory and then performing serial operations on the materials retrieved. He feels that individual differences on this factor can be related not only to the content and temporal aspects of these operations, but also to the attention which the subject gives to details of the stimulus materials.

Identification: Cattell, UI-T4; Guilford, EMR or EMI; Thurstone, D.

References: 3, 13, 20, 22, 48, 49, 55, 65, 79, 85, 103, 111, 128, 139, 173, 193, and 205.

TestsNonsense Syllogisms Test -- RL-1

Suggested by Thurstone's False Premises. The subjects are presented with formal syllogisms using nonsensical content 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 whether or not the conclusion is logically correct.

Length of each part: 15 items, 4 minutes

Suitable for grades 11-16

Diagramming Relationships -- RL-2

The subject is asked to select one of five diagrams which best illustrates the interrelationship among sets of three objects.

Length of each part: 15 items, 4 minutes

Suitable for grades 9-16

Inference Test -- RL-3

A test suggested by a similarly named test by Guilford. The task is to select one of 5 conclusions that can be drawn from each given statement.

Length of each part: 10 items, 6 minutes

Suitable for grades 11-16

Deciphering Languages -- RL-4

The subject is asked to use reasoning to determine the English translation of artificial languages.

Length of each part: 12 items, 8 minutes

Suitable for grades 11-16

NONSENSE SYLLOGISMS TEST - RL-1

This is a test of your ability to tell whether the conclusion drawn from certain statements is correct or incorrect. Although all of the statements are really nonsense, you are to assume that the first two statements in each problem are correct. The conclusion drawn from them may or may not show good reasoning. You are to think only about the reasoning.

If the conclusion drawn from the statements shows good reasoning, put an X on the letter G. If the conclusion drawn from the statements shows poor reasoning, put an X on the letter P.

Now try the practice problems given below. The first two syllogisms have been correctly marked.

- | | | |
|--|---|---|
| 1) All trees are fish. All fish are horses.
Therefore all trees are horses. | X | P |
| 2) All trees are fish. All fish are horses.
Therefore all horses are trees. | G | X |
| 3) Some swimming pools are mountains. All mountains like cats. Therefore all swimming pools like cats. | G | P |
| 4) All swimming pools are mountains. All mountains like cats. Therefore all swimming pools like cats. | G | P |
| 5) All elephants can fly. All giants are elephants.
Therefore all giants can fly. | G | P |
| 6) Some carrots are sports cars. Some sports cars play the piano. Therefore some carrots play the piano. | G | P |
| 7) No two flowers look exactly the same. Roses and tulips look exactly the same. Therefore roses and tulips are not two flowers. | G | P |

The answers to the other five problems are as follows: 3 is P; 4 is G; 5 is G; 6 is P; 7 is G.

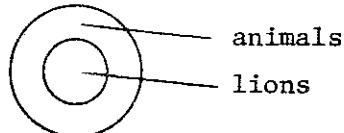
Your score on this test will be the number marked correctly minus the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea whether the reasoning is good or bad.

You will have 4 minutes for each of the two parts of this test. Each part has 1 page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

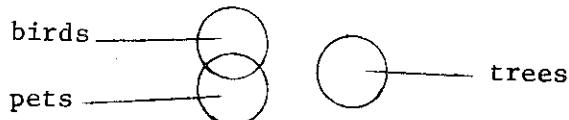
DIAGRAMMING RELATIONSHIPS -- RL-2

Sometimes the relationships among groups of things are best explained by diagrams that consist of overlapping circles. For example, if certain specific things, let's say lions, all belong to one larger class of things, let's say animals, you could diagram the situation as follows:



In these diagrams we do not care about the relative sizes of any of the circles. That is, we are not suggesting here that a relatively large proportion of animals are lions, but we are indicating that all lions are animals. That is why the circle representing lions is drawn entirely within the circle that represents animals.

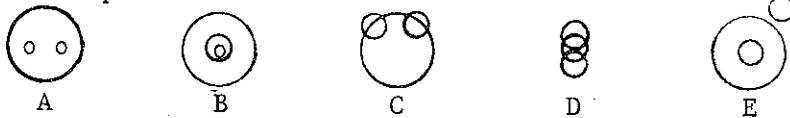
Now take the relationships among three groups of different things: birds, pets, and trees. These should be diagrammed as follows:



This diagram shows that no trees are either pets or birds, but some birds are pets and some pets are birds.

Each item in this test names three groups of things. You are to choose from the lettered diagrams at the top of the test pages the one diagram that shows the correct relationships among the three groups of things in each item. Mark the letter of the diagram that you select.

Now try these sample items:



1. Animals, cats dogs

A B C D E
2. Desks, furniture, pencils

A B C D E

You should have marked A for 1. and E for 2.

Your score on this test will be the number of correct choices minus a fraction of the number of incorrect choices. Therefore, it will not be to your advantage to guess, unless you have at least some idea that will help you make a correct choice.

There are two parts to this test. Each part has one page with 15 items. You will have 4 minutes to complete each part. When you have finished Part 1, STOP. Please do not go on to Part 2 until asked to do so.

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INFERENCE TEST — RL-3

In each item on this test you will be given one or two statements such as you might see in newspapers or popular magazines. The statements are followed by various conclusions which some people might draw from them. In each case, decide which conclusion can be drawn from the statement(s) without assuming anything in addition to the information given in the statement(s). There is only one correct conclusion.

Mark your answer by putting an X through the number in front of the conclusion that you select.

Consider the following sample item:

Bill, a member of the basketball team, is 6 feet, 2 inches tall and weighs 195 pounds. To qualify for the team, a person must be at least 5 feet, 10 inches tall.

- 1-The larger a man is, the better basketball player he is.
- 2-Basketball players are often underweight.
- 3-Some players on the team are more than 6 feet tall.
- 4-Bill is larger than the average man.
- 5-The best basketball players come from the ranks of larger-than-average men.

Only conclusion 3 may be drawn without assuming that you have information or knowledge beyond what the statements give. The statements say nothing about how good different players are, nothing about whether they are underweight, and nothing about average or taller-than-average men.

Your score on this test will be the number marked correctly minus some fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 6 minutes for each of the two parts of this test. Each part has three pages with 10 items. Be sure to do all the items in each part if you have time. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

DECIPHERING LANGUAGES -- RL-4

An archeologist who discovers small fragments of some ancient language must do a lot of reasoning to put the language together. This is a test of your ability to do this kind of reasoning.

For each different artificial language, three expressions in English and their translations into the language are given. From these you will need to figure out logically which syllable or which symbol in the language is equivalent to which English word. Note that the order of the symbols is consistent for any language, but may be different in each language and different from English. Therefore, do not assume that the first word in the artificial language refers to the first word in the English phrase, although sometimes it does.

Now try this sample item. Circle the number of the correct answer.

shaggy dog	=	* b
black cat	=	■ m
black, shaggy cat	=	■ * m

- | | |
|----------------|-----------------|
| A. black dog = | B. shaggy cat = |
| 1. * b | 1. ■ m |
| 2. ■ d | 2. * m |
| 3. * d | 3. ■ d |
| 4. ■ b | 4. * d |
| 5. * m | 5. m ■ |

You should have marked 4. for sample A. and 2. for sample B.

Your score on this test will be the number of questions which you answer correctly minus a fraction of those which you answer incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea of which answer is correct.

You will have 8 minutes for each of the two parts of this test. Each part consists of 12 items on 2 pages. There will be three languages to decipher in each part. When you have finished Part 1, STOP. Do not go on to Part 2 until asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Scoring KeysNonsense Syllogisms -- RL-1

<u>Part 1</u>		<u>Part 2</u>	
1. G	9. G	16. G	24. G
2. P	10. G	17. P	25. P
3. G	11. P	18. G	26. P
4. G	12. P	19. P	27. G
5. P	13. G	20. G	28. G
6. G	14. P	21. G	29. P
7. G	15. P	22. P	30. P
8. P		23. P	

Diagramming Relationships -- RL-2

<u>Part 1</u>		<u>Part 2</u>	
1. A	9. E	16. C	24. E
2. E	10. A	17. E	25. C
3. C	11. D	18. B	26. B
4. B	12. B	19. A	27. A
5. D	13. B	20. A	28. E
6. C	14. E	21. D	29. C
7. D	15. C	22. D	30. D
8. A		23. B	

Inference Test -- RL-3

<u>Part 1</u>	<u>Part 2</u>
<u>Page 2</u>	<u>Page 5</u>
1. 3	11. 1
2. 2	12. 5
3. 4	13. 4
4. 1	14. 2
<u>Page 3</u>	<u>Page 6</u>
5. 3	15. 2
6. 5	16. 3
7. 1	17. 1
8. 3	18. 5
<u>Page 4</u>	<u>Page 7</u>
9. 2	19. 2
10. 5	20. 3

Deciphering Languages -- RL-4

<u>Part 1</u>	<u>Part 2</u>
1. 2	13. 1
2. 5	14. 4
3. 1	15. 3
4. 2	16. 2
5. 4	17. 2
6. 3	18. 4
7. 3	19. 3
8. 1	20. 2
9. 2	21. 5
10. 2	22. 4
11. 5	23. 1
12. 2	24. 3

S SPATIAL ORIENTATION

Factor

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

There has been some difficulty in explaining the difference between this factor and visualization. One hypothesis is that the figure is perceived as a whole in spatial orientation but must be mentally restructured into components for manipulation in visualization. Three studies (Zimmerman, 1954; Werdelin and Stjernberg, 1969; Werdelin and Stjernberg, 1971) have suggested that complexity accounts for some of the differentiation and that spatial orientation may be a more difficult or less practiced aspect of perceptual speed.

According to Carroll (1974), both spatial orientation and visualization require short-term visual memory. Spatial orientation requires only mental rotation of the configuration; visualization requires both rotation and performing serial operations. Shepard (1971) and his colleagues have described the processes involved in the mental rotation of shapes.

Some researchers have described two similar factors: (1) spatial relations -- identifying an object when seen from different positions, and (2) spatial orientation -- where the body orientation of the observer is an essential part of the problem. However, Guilford considers these to be a single factor in his Structure of Intellect model. Spatial orientation may be related to spatial egocentrism.

The tests described for this factor 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.

Identification: Cattell, UI-T11; Guilford, CFS; Thurstone, S.

References: 3, 5, 6, 7, 8, 10, 11, 14, 20, 32, 35, 36, 37, 44, 45, 51, 52, 55, 57, 58, 60, 63, 64, 67, 72, 75, 77, 79, 85, 86, 91, 97, 99, 108, 118, 141, 142, 143, 149, 151, 158, 159, 164, 165, 174, 175, 182, 185, 187, 189, 193, 194, 197, 199, 204, 206, and 209.

TestsCard Rotations Test -- S-1

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 and sometimes turned over to its other side. The subject indicates whether or not the card has been turned over.

Length of each part: 10 items, 3 minutes

Suitable for grades 8-16

Cube Comparisons Test -- S-2

Suggested by 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 present drawings that cannot be of the same cube.

Length of each part: 21 items, 3 minutes

Suitable for grades 8-16

CARD ROTATIONS TEST — S-1 (Rev.)

This is a test of your ability to see differences in figures. Look at the 5 triangle-shaped cards drawn below.



All of these drawings are of the same card, which has been slid around into different positions on the page.

Now look at the 2 cards below:



These two cards are not alike. The first cannot be made to look like the second by sliding it around on the page. It would have to be flipped over or made differently.

Each problem in this test consists of one card on the left of a vertical line and eight cards on the right. You are to decide whether each of the eight cards on the right is the same as or different from the card at the left. Mark the box beside the S if it is the same as the one at the beginning of the row. Mark the box beside the D if it is different from the one at the beginning of the row.

Practice on the following rows. The first row has been correctly marked for you.

B									
	S <input checked="" type="checkbox"/> D <input type="checkbox"/>	S <input type="checkbox"/> D <input checked="" type="checkbox"/>	S <input checked="" type="checkbox"/> D <input type="checkbox"/>	S <input checked="" type="checkbox"/> D <input type="checkbox"/>	S <input type="checkbox"/> D <input checked="" type="checkbox"/>				
C									
	S <input type="checkbox"/> D <input type="checkbox"/>								
B									
	S <input type="checkbox"/> D <input type="checkbox"/>								

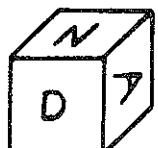
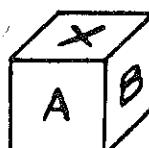
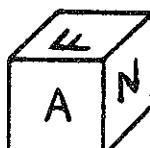
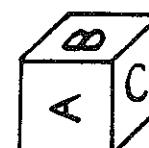
Your score on this test will be the number of items answered correctly minus the number answered incorrectly. Therefore, it will not be to your advantage to guess, unless you have some idea whether the card is the same or different. Work as quickly as you can without sacrificing accuracy.

You will have 3 minutes for each of the two parts of this test. Each part has 1 page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

CUBE COMPARISONS TEST -- S-2 (Rev.)

Wooden blocks such as children play with are often cubical with a different letter, number, or symbol on each of the six faces (top, bottom, four sides). Each problem in this test consists of drawings of pairs of cubes or blocks of this kind. Remember, there is a different design, number, or letter on each face of a given cube or block. Compare the two cubes in each pair below.

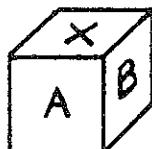
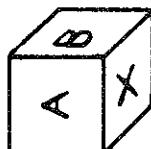
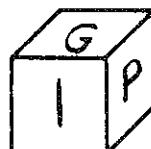
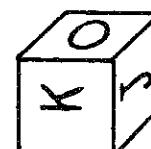
S D S D 

The first pair is marked D because they must be drawings of different cubes. If the left cube is turned so that the A is upright and facing you, the N would be to the left of the A and hidden, not to the right of the A as is shown on the right hand member of the pair. Thus, the drawings must be of different cubes.

The second pair is marked S because they could be drawings of the same cube. That is, if the A is turned on its side the X becomes hidden, the B is now on top, and the C (which was hidden) now appears. Thus the two drawings could be of the same cube.

Note: No letters, numbers, or symbols appear on more than one face of a given cube. Except for that, any letter, number or symbol can be on the hidden faces of a cube.

Work the three examples below.

S D S D S D 

The first pair immediately above should be marked D because the X cannot be at the peak of the A on the left hand drawing and at the base of the A on the right hand drawing. The second pair is "different" because P has its side next to G on the left hand cube but its top next to G on the right hand cube. The blocks in the third pair are the same, the J and K are just turned on their side, moving the O to the top.

Your score on this test will be the number marked correctly minus the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea which choice is correct. Work as quickly as you can without sacrificing accuracy.

You will have 3 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP.

DO NOT TURN THE PAGE UNTIL YOU ARE ASKED TO DO SO.

Scoring KeysCard Rotations Test-- S-1Part 1

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

Part 2

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

Cube Comparisons Test-- S-2Part 1

1. D
2. D
3. D
4. S
5. D
6. S
7. S
8. S
9. S
10. D
11. D
12. S
13. S
14. S
15. S
16. S
17. S
18. D
19. D
20. D
21. D

Part 2

22. S
23. D
24. S
25. S
26. D
27. S
28. S
29. D
30. S
31. D
32. D
33. S
34. D
35. D
36. S
37. D
38. D
39. D
40. S
41. D
42. D

SS SPATIAL SCANNING

Factor

Speed in exploring visually a wide or complicated spatial field

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

Carroll (1974) points out that in this factor, which requires addressing sensory buffers to make a visual search for the paths, subjects may discover the simplifying strategy of searching from the goal rather than from the start.

Identification: Guilford, CFI

References: 9, 22, 61, 67, 80, 86, 91, 122, 123, 128, 161, and 174.

TestsMaze Tracing Speed Test -- SS-1

The task is to find and mark an open path through a moderately complex series of printed mazes. Scoring of this test could be facilitated if examinees used colored pencils.)

Length of each part: 4 scorable units, 3 minutes
Suitable for grades 6-16

Choosing a Path -- SS-2

Suggested by one of the AAF Printed Classification Tests. 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 one of 5 pairs 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.

Length of each part: 16 items, 7 minutes
Suitable for grades 8-16

Map Planning Test -- SS-3

Suggested by one of the 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 road-blocks need to be crossed. The task is to find the shortest available route as quickly as possible.

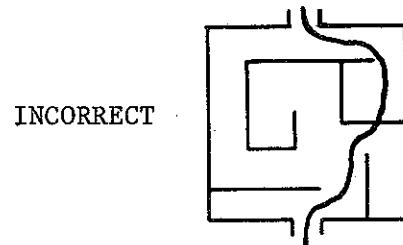
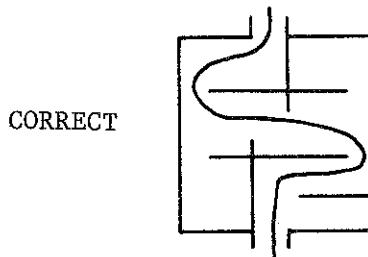
Length of each part: 2 maps each with 10 routes, 3 minutes
Suitable for grades 6-16

Cover Pages

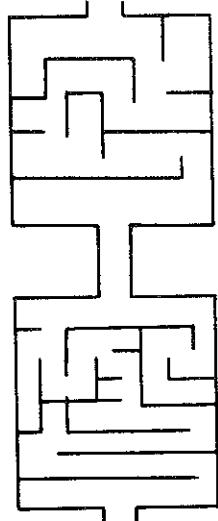
MAZE TRACING SPEED TEST -- SS-1

This is a test of your ability to find a path through a maze quickly. You are to draw a pencil line through each maze without having to cross any printed lines.

Look at the two drawings below. In the left square a pencil line has been drawn to show the correct path from top to bottom. The square on the right shows an incorrect path. It is incorrect because the pencil line crosses a printed line.



Practice for speed on the squares below. Remember, you must make a pencil line through each square without having to cross a printed line.



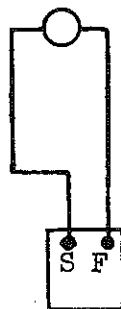
Your score on this test will be the number of squares through which a line has been correctly drawn. If you should become stuck in any square, you may skip to the following one. You should try to avoid making mistakes, but you will not be penalized for lifting your pencil, for retracing a path that leads to a dead end, or for accidentally crossing lines at the sides of the path being taken. Work as quickly as you can without sacrificing accuracy. On the test, follow the squares around the page the way that they are connected, starting at the top of the left-hand column.

You will have 3 minutes for each of the two parts of this test. Each part has 1 page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

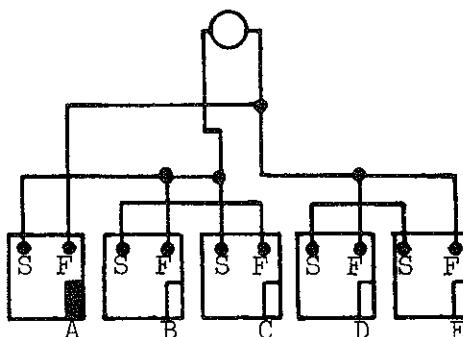
DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

CHOOSING A PATH -- SS-2

This is a test of your ability to choose a correct path from among several choices. In the picture below is a box with dots marked S and F. S is the starting point and F is the finish. You are to follow the line from S, through the circle at the top of the picture and back to F.



In the problems in this test there will be five such boxes. Only one box will have a line from the S, through the circle, and back to the F in the same box. Dots on the lines show the only places where connections can be made between lines. If lines meet or cross where there is no dot, there is no connection between the lines. Now try this example. Show which box has the line through the circle by blackening the space at the lower right of that box.



The first box is the one which has the line from S, through the circle, and back to F. The space lettered A has therefore been blackened.

Each diagram in the test has only one box which has a line through the circle and back to the F. Some lines are wrong because they lead to a dead end. Some lines are wrong because they come back to the box without going through the circle. Some lines are wrong because they lead to other boxes that do not have lines going through the circle.

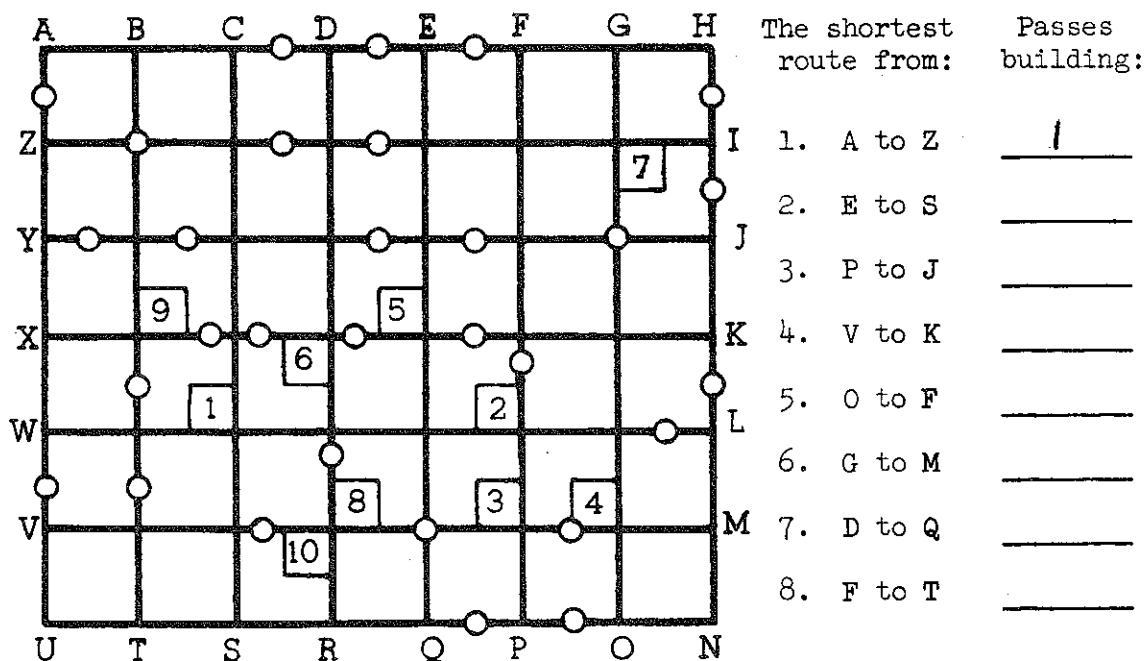
[Instructions are continued on second page]

MAP PLANNING TEST — SS-3

This is a test of your ability to find the shortest route between two places as quickly as possible. The drawing below is a map of a city. The dark lines are streets. The circles are road-blocks, and you cannot pass at the places where there are circles. The numbered squares are buildings. You are to find the shortest route between two lettered points. The number on the building passed is your answer.

- Rules:
1. The shortest route will always pass along the side of one and only one of the numbered buildings.
 2. A building is not considered as having been passed if a route passes only a corner and not a side.
 3. The same numbered building may be used on more than one route.

Look at the sample map below. Practice by finding the shortest route between the various points listed at the right of the map. The first problem has been marked correctly.



The answers to the other practice problems are as follows: 2 passes 5; 3 passes 3; 4 passes 2; 5 passes 4; 6 passes 4; 7 passes 6; 8 passes 5.

Your score on this test will be the number of right answers. It will not be to your advantage to guess unless you have some idea which route is correct. Work as rapidly as you can without sacrificing accuracy.

You will have 3 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysMaze 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

<u>Part 1</u>		<u>Part 2</u>	
<u>Page 3</u>	<u>Page 4</u>	<u>Page 5</u>	<u>Page 6</u>
1. C	9. A	17. C	25. C
2. D	10. C	18. A	26. B
3. E	11. A	19. E	27. D
4. C	12. B	20. B	28. C
5. A	13. A	21. B	29. D
6. B	14. B	22. D	30. C
7. E	15. D	23. C	31. C
8. B	16. A	24. B	32. D

Map Planning Test-- SS-3

<u>Part 1</u>	<u>Part 2</u>
1. 8	21. 10
2. 1	22. 4
3. 7	23. 8
4. 2	24. 5
5. 3	25. 3
6. 5	26. 2
7. 4	27. 10
8. 10	28. 7
9. 9	29. 6
10. 4	30. 9
11. 3	31. 1
12. 7	32. 2
13. 2	33. 5
14. 10	34. 9
15. 6	35. 7
16. 1	36. 4
17. 4	37. 6
18. 5	38. 10
19. 3	39. 8
20. 8	40. 4

V VERBAL COMPREHENSION

Factor

The ability to understand the English language

Factors similar to the verbal factor for the English language have been found in studies of native speech in other languages and in bilingual or multilingual populations. There may be separate verbal comprehension factors for each language (Guthrie, 1963). This factor contrasts with the ideational fluency and word fluency factors which are not specific to a given language.

Some research has suggested that verbal comprehension is a subfactor of a broader factor involving reading comprehension, verbal analogies, matching proverbs, grammar and syntax. Others have suggested a broader factor that seems to be closer to verbal reasoning or verbal relations.

Two studies (Haag and David, 1969; Messick and French, 1975) have suggested a verbal factor related to "availability and flexibility in the use of multiple meaning of words."

According to Carroll (1974) verbal comprehension is almost exclusively dependent on the contents of the lexicosemantic long-term memory store. He suggests that a set of verbal comprehension tests more diversified than multiple-choice vocabulary tests based on synonyms might call on other aspects of the lexicosemantic store.

Identification: Cattell, UI-T13; Guilford, CMU; Thurstone, V.

References: This factor has been found in more than 125 studies.

TestsVocabulary I -- V-1

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

Length of each part: 18 items, 4 minutes

Suitable for grades 7-12

Vocabulary II -- V-2

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

Length of each part: 18 items, 4 minutes

Suitable for grades 7-12

Extended Range Vocabulary Test -- V-3

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

Length of each part: 24 items, 6 minutes

Suitable for grades 7-16

Advanced Vocabulary Test I -- V-4

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

Length of each part: 18 items, 4 minutes

Suitable for grades 11-16

Advanced Vocabulary Test II -- V-5

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

Length of each part: 18 items, 4 minutes

Suitable for grades 11-16

Cover Pages

VOCABULARY TEST I -- V-1

This is a test of your knowledge of word meanings. Look at the sample below. One of the four numbered words has the same meaning or nearly the same meaning as the word at the left. Indicate your answer by writing, in the parentheses at the right, the number of the word that you select.

attempt 1-run 2-hate 3-try 4-stop ()

The answer to the item is number 3; you should have a "3" written in the parentheses.

Your score will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 4 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

VOCABULARY TEST II — V-2

This is a test of your knowledge of word meanings. Look at the sample below. One of the five numbered words has the same meaning or nearly the same meaning as the word above the numbered words. Mark your answer by putting an X through the number in front of the word that you select.

- joyful
1-refreshing
2-scare
3-thickset
4-wise
~~5~~-jolly

The answer to the sample item is number 5; therefore, an X has been put through number 5.

Your score will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 4 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

EXTENDED RANGE VOCABULARY TEST — V-3

This is a test of your knowledge of word meanings. Look at the sample below. One of the five numbered words has the same meaning or nearly the same meaning as the word above the numbered words. Mark your answer by putting an X through the number in front of the word that you select.

- joyful
- 1-refreshing
 - 2-scare
 - 3-thicket
 - 4-wise
 - 5-jolly

The answer to the sample item is number 5; therefore, an X has been put through number 5.

Your score will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 6 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

ADVANCED VOCABULARY TEST I — V-4

This is a test of your knowledge of word meanings. Look at the sample below. One of the five numbered words has the same meaning or nearly the same meaning as the word above the numbered words. Mark your answer by putting an X through the number in front of the word that you select.

jovial

- 1-refreshing
- 2-scare
- 3-thickset
- 4-wise
- 5-jolly

The answer to the sample item is number 5; therefore, an X has been put through number 5.

Your score will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 4 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

ADVANCED VOCABULARY TEST II — V-5

This is a test of your knowledge of word meanings. Look at the sample below. One of the four numbered words has the same meaning or nearly the same meaning as the word at the left. Indicate your answer by writing, in the parentheses at the right, the number of the word that you select.

attempt 1-run 2-hate 3-try 4-stop ()

The answer to the item is number 3; you should have a "3" written in the parentheses.

Your score will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 4 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring Keys

Vocabulary Test I -- V-1

<u>Part 1</u>				<u>Part 2</u>	
1.	3	10.	1	19.	3
2.	4	11.	4	20.	1
3.	2	12.	4	21.	4
4.	4	13.	2	22.	2
5.	1	14.	2	23.	3
6.	3	15.	3	24.	4
7.	3	16.	2	25.	3
8.	1	17.	4	26.	4
9.	2	18.	1	27.	3
					36. 1

Vocabulary Test II -- V-2

<u>Part 1</u>				<u>Part 2</u>			
1.	4	10.	3	19.	2	28.	3
2.	5	11.	3	20.	5	29.	5
3.	2	12.	2	21.	5	30.	5
4.	4	13.	4	22.	5	31.	2
5.	3	14.	3	23.	4	32.	2
6.	2	15.	3	24.	1	33.	5
7.	3	16.	4	25.	3	34.	2
8.	3	17.	1	26.	4	35.	4
9.	1	18.	1	27.	2	36.	1

Extended Range Vocabulary Test -- V-3

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

Advanced Vocabulary Test I -- V-4

Part 1				Part 2			
1.	1	10.	5	19.	4	28.	1
2.	2	11.	3	20.	3	29.	1
3.	2	12.	4	21.	4	30.	5
4.	4	13.	1	22.	2	31.	1
5.	1	14.	3	23.	5	32.	4
6.	3	15.	5	24.	4	33.	4
7.	1	16.	4	25.	5	34.	5
8.	1	17.	3	26.	1	35.	4
9.	4	18.	5	27.	2	36.	2

Advanced Vocabulary Test II -- V-5

<u>Part 1</u>		<u>Part 2</u>	
1.	3	10.	4
2.	4	11.	3
3.	3	12.	3
4.	2	13.	4
5.	1	14.	4
6.	2	15.	1
7.	2	16.	2
8.	2	17.	3
9.	3	18.	2
		19.	3
		20.	1
		21.	4
		22.	4
		23.	3
		24.	1
		25.	3
		26.	1
		27.	4
		28.	3
		29.	3
		30.	2
		31.	1
		32.	3
		33.	2
		34.	1
		35.	4
		36.	2

VZ VISUALIZATION

Factor

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

The visualization and spatial orientation factors are similar but visualization requires that the figure be mentally resturctured into components for manipulation while the whole figure is manipulated in spatial orientation. Some researchers think that visualization is a more difficult or more complex and less speeded form of spatial orientation.

Cattell (1971) does not accept visualization as a primary factor. He suggests that it is a second-order factor which includes spatial ability, figural adaptive flexibility, speed of closure, and flexibility of closure. Royce (1973) suggests both primary and higher order visualization factors.

As Carroll (1974) has pointed out, both visualization and spatial orientation require the mental rotation of a spatial configuration in short-term visual memory; visualization requires the additional component of performing serial operations.

Some subjects may employ an analytic strategy in visualization tests and search for symmetry and planes of reflection as clues to the solution. Shepard and Feng (1972) have described the mental processes involved in paper-folding tests.

Identification: Guilford, CFT

References: 3, 7, 13, 18, 21, 39, 45, 52, 58, 60, 67, 69, 73, 79, 85, 86, 90, 91, 93, 100, 103, 108, 110, 121, 130, 143, 153, 156, 161, 164, 165, 174, 197, 200, 207, and 209.

TestsForm Board Test -- VZ-1

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.

Length of each part: 24 items, 8 minutes

Suitable for grades 9-16

Paper Folding Test -- VZ-2

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

Length of each part: 10 items, 3 minutes

Suitable for grades 9-16

Surface Development Test -- VZ-3

Suggested by Thurstone's test of the same name. 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.

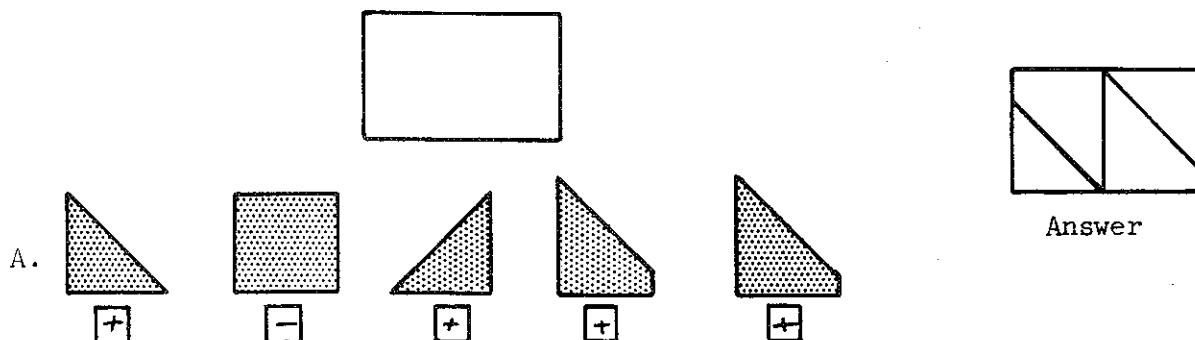
Length of each part: 5 items in each of 6 drawings, 6 minutes

Suitable for grades 9-16

FORM BOARD TEST - VZ-1

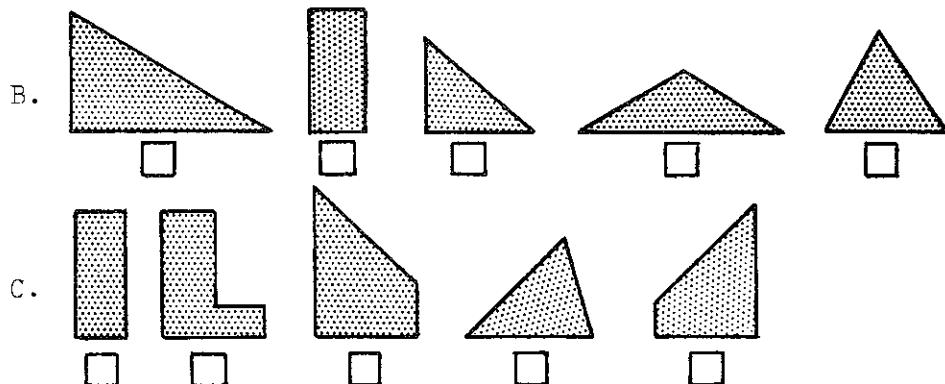
This is a test of your ability to tell what pieces can be put together to make a certain figure. Each test page is divided into two columns. At the top of each column is a geometrical figure. Beneath each figure are several problems. Each problem consists of a row of five shaded pieces. Your task is to decide which of the five shaded pieces will make the complete figure when put together. Any number of shaded pieces, from two to five, may be used to make the complete figure. Each piece may be turned around to any position but it cannot be turned over. It may help you to sketch the way the pieces fit together. You may use any blank space for doing this. When you know which pieces make the complete figure, mark a plus (+) in the box under ones that are used and a minus (-) in the box under ones that are not used.

In Example A, below, the rectangle can be made from the first, third, fourth, and fifth pieces. A plus has been marked in the box under these places. The second piece is not needed to make the rectangle. A minus has been marked in the box under it. The rectangle drawn to the right of the problem shows one way in which the four pieces could be put together.



Answer

Now try to decide which pieces in Examples B and C will make the rectangle.



In Example B, the first, fourth, and fifth pieces are needed. You should have marked a plus under these three pieces and a minus under the other two pieces. In Example C, the second, third, and fifth pieces should be marked with a plus and the first and fourth with a minus.

Your score on this test will be the number marked correctly minus the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea whether or not the piece is correct.

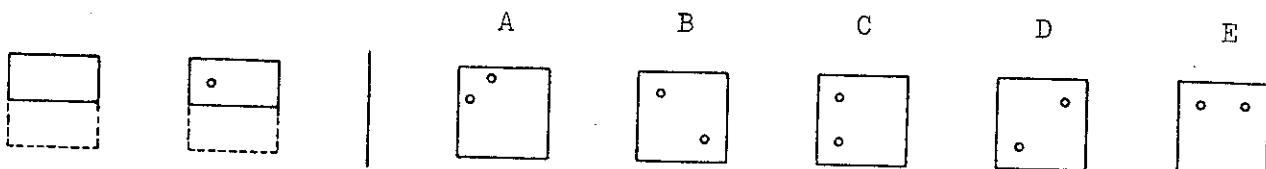
You will have 8 minutes for each of the two parts of this test. Each part has 2 pages. When you have finished Part 1 (pages 2 and 3), STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

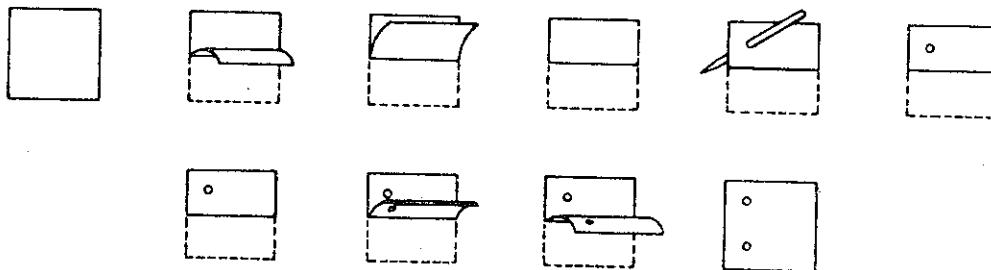
PAPER FOLDING TEST — VZ-2

In this test you are to imagine the folding and unfolding of pieces of paper. In each problem in the test there are some figures drawn at the left of a vertical line and there are others drawn at the right of the line. The figures at the left represent a square piece of paper being folded, and the last of these figures has one or two small circles drawn on it to show where the paper has been punched. Each hole is punched through all the thicknesses of paper at that point. One of the five figures at the right of the vertical line shows where the holes will be when the paper is completely unfolded. You are to decide which one of these figures is correct and draw an X through that figure.

Now try the sample problem below. (In this problem only one hole was punched in the folded paper.)



The correct answer to the sample problem above is C and so it should have been marked with an X. The figures below show how the paper was folded and why C is the correct answer.



In these problems all of the folds that are made are shown in the figures at the left of the line, and the paper is not turned or moved in any way except to make the folds shown in the figures. Remember, the answer is the figure that shows the positions of the holes when the paper is completely unfolded.

Your score on this test will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

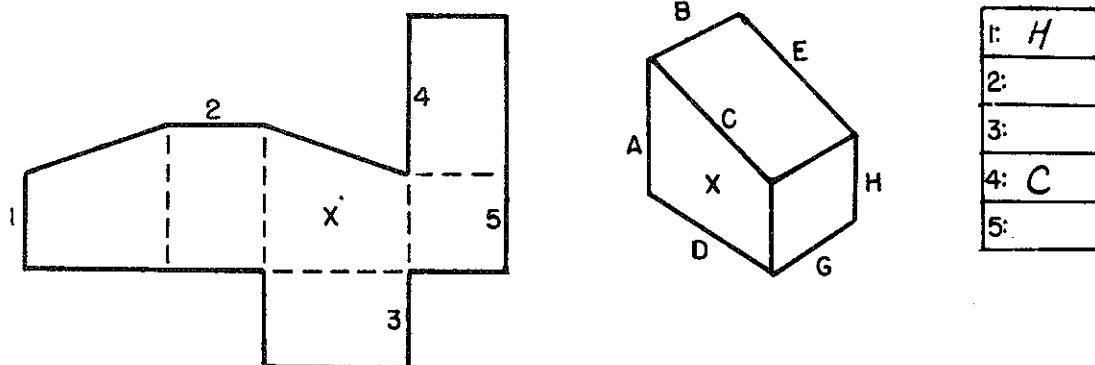
You will have 3 minutes for each of the two parts of this test. Each part has 1 page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

SURFACE DEVELOPMENT TEST — VZ-3

In this test you are to try to imagine or visualize how a piece of paper can be folded to form some kind of object. Look at the two drawings below. The drawing on the left is of a piece of paper which can be folded on the dotted lines to form the object drawn at the right. You are to imagine the folding and are to figure out which of the lettered edges on the object are the same as the numbered edges on the piece of paper at the left. Write the letters of the answers in the numbered spaces at the far right.

Now try the practice problem below. Numbers 1 and 4 are already correctly marked for you.



NOTE: The side of the flat piece marked with the X will always be the same as the side of the object marked with the X. Therefore, the paper must always be folded so that the X will be on the outside of the object.

In the above problem, if the side with edge 1 is folded around to form the back of the object, then edge 1 will be the same as edge H. If the side with edge 5 is folded back, then the side with edge 4 may be folded down so that edge 4 is the same as edge C. The other answers are as follows: 2 is B; 3 is G; and 5 is H. Notice that two of the answers can be the same.

Your score on this test will be the number of correct letters minus a fraction of the number of incorrect letters. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 6 minutes for each of the two parts of this test. Each part has 2 pages. When you have finished Part 1 (pages 2 and 3), STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysForm Board Test-- VZ-1Part 1Page 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 2Page 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

<u>Part 1</u>	<u>Part 2</u>
1. A	11. C
2. D	12. B
3. B	13. A
4. D	14. E
5. B	15. B
6. E	16. A
7. A	17. E
8. C	18. D
9. E	19. D
10. E	20. C

Surface Development Test -- VZ-3

<u>Part 1</u>	<u>Part 2</u>
<u>Page 2</u>	<u>Page 4</u>
1. B, A, A, E, B	7. C, B, E, A, B
2. E, D, A, F, A	8. A, D, H, C, B
3. A, B, A, B, E	9. D, B, A, F, G
<u>Page 3</u>	<u>Page 5</u>
4. A, C, G, H, A	10. F, C, D, G, E
5. F, E, C, D, B	11. C, H, B, D, F
6. A, A, D, C, E	12. C, G, D, F, H

XF FLEXIBILITY, FIGURAL

Factor

The ability to change set in order to generate new and different solutions to figural problems

In the 1963 edition of this Kit and in work done in Guilford's laboratory, this factor was called figural adaptive flexibility. Cattell refers to it as adaptive flexibility. Since the existence of the factor has been demonstrated only with figural material and there appear to be other types of flexibility restricted to non-figural material, the new term was selected.

Both Royce (1973) and Cattell (1971) have stated that figural adaptive flexibility combines with several other abilities into a second-order visualization factor.

Carroll (1974) suggests that figural adaptive flexibility requires the same process, imagining a figure in relation to a surrounding visual-representational field, as does flexibility of closure but also requires a search for relevant hypotheses in long-term memory and the performance of serial operations. Wardell (1973) considers that figural adaptive flexibility is identical with flexibility of closure.

There are probably personality correlates of this factor.

Identification: Guilford, DFT

References: 1, 13, 22, 46, 54, 55, 56, 71, 76, 89, 106, 121, 137, and 200.

Tests

Toothpicks Test -- XF-1

The subject is asked to present up to five different arrangements of toothpicks according to sets of specified rules. Scoring of this test could be facilitated if examinees used colored pencils.

Length of each part: 5 items, 6 minutes

Suitable for grades 11-16

Planning Patterns -- XF-2

The subject is asked to arrange a certain number of specified capital letters in up to 12 different positions or orientations on matrices of dots.

Length of each part: 3 items, 2 minutes

Suitable for grades 10-16

Storage Test -- XF-3

The subject is asked to show the different ways small boxes can be arranged inside of a large container. Scoring of this test could be facilitated if examinees used colored pencils.

Length of each part: 1 stimulus, 3 minutes

Suitable for grades 10-16

Cover Pages

TOOTHPICKS TEST -- XF-1

In this test you will be asked to make different patterns of squares outlined by toothpicks. You will be given a pattern of squares and asked to change it by removing some of the toothpicks. You can show which toothpicks are to be removed by drawing a short line through them. Look at the example:

Take away 2 toothpicks
Leave 2 squares



To show this:



You mark like this:



Whenever you make a pattern it must have complete squares with no extra toothpicks left over. The example below shows a correct solution and an incorrect solution in which one of the toothpicks is not a part of any square.

Take away 2 toothpicks
Leave 2 squares



Correct



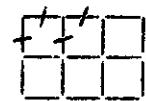
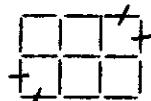
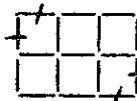
Incorrect

In some of the problems it is possible to make both large and small squares or to make overlapping squares.

You will be asked to think of several different solutions for each item in this test. In some problems you will be told both how many toothpicks to remove and how many squares to leave; some problems tell you only how many squares to leave. Each answer that you give for an item must be a new pattern, based on a different rule or principle, and not just the same answer turned around or turned over.

Look at the examples below:

Take away 4 toothpicks
Leave 4 squares



The first two examples are correct but both use the same rule -- cross out the toothpicks from opposite corners. Only one of these answers would count. The third example uses a different rule so it would receive credit.

Your score on this test will be the number of correct solutions that use different rules. Each problem has at least 4 possible different solutions.

You will have 6 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until asked to do so.

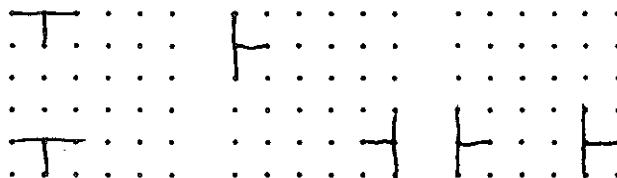
DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

PLANNING PATTERNS -- XF-2

In this test you will be asked to plan how certain figures can be fitted onto a group of dots. You will be asked to think of as many different ways as possible to arrange the figures.

Look at the example below. Three possible solutions to the problem are shown at the right.

Make 2 T's
Each T must touch exactly 4 dots



In order to receive credit for a different pattern, you must place the figures in different positions relative to each other. Drawings which show the figures in the same relative positions, as if the pattern were turned around or turned over, will not receive credit. In the example above, the first and last solutions are the same only turned. They could not both receive credit. The second solution is different and correct so it would be credited. The figures cannot reach outside the group of dots, touch each other, or overlap; that is to say that two letters cannot use the same dot or have their lines cross each other. The letters may be different in shape from each other as long as they are clearly recognizable.

Now try this practice item:

Make 3 L's
Each L must touch exactly 3 dots

Your score on this test will be the number of different solutions which you draw using different rules.

You will have 2 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until asked to do so.

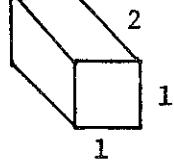
DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

STORAGE TEST -- XF-3

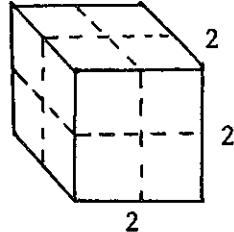
In this test you will be asked to plan how objects can be stored in a given space. You will be asked to think of as many different ways as possible to arrange the objects in this space.

How many different ways can 4 boxes, like the one on the left below, be stored in the container shown on the right? The numbers on the sides of the figures and the dotted lines are to help you compare sizes.

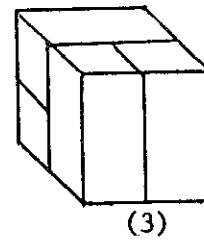
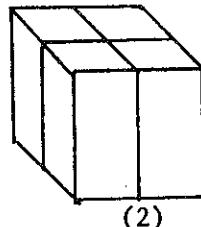
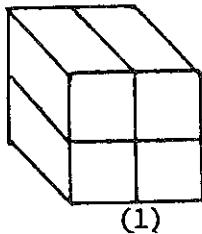
Box:



Container:



The drawings below show three correct solutions to this problem. Note that drawings (1) and (2) use the same rule. The rule is that all of the square ends of the boxes are on the same face of the cube. Drawing (3) uses a different rule.



Your score on this test will be:

2 points credit for each drawing which shows a new rule;
1 point credit for each drawing which is not exactly the same as earlier drawings but which uses the same rule.

You will have 3 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until asked to do so.

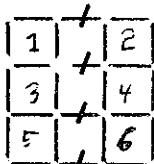
DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Scoring KeysToothpicks Test -- XF-1

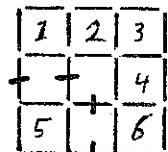
1. Score is the number of different solutions.
2. The answers given in the key are not exhaustive. Care must be taken to determine whether an answer not represented on the key is correct, i.e., has the proper number of toothpicks removed, leaves the correct number of squares (including medium- and large-sized squares), and has no toothpicks that are not parts of squares.
3. The keyed solution may be only one of a "family" of alternative solutions. A rotation or reflection is acceptable, but credit is given only once for solutions in a particular family. In other words, rotations and reflections of the respondent's correct solutions are not counted.
4. Since reflections and rotations of a given solution are not counted, it is important that they be recognized as such. A relatively high level of ability in the Spatial Orientation factor is probably needed in scoring. It may help to expand the scoring key to represent all rotations and reflections of keyed solutions (and any additional solutions discovered). Such an expanded key would most usefully be organized such that each family of solutions is grouped together.
5. In a few instances two figures appear in the key with an "or" between them. In these instances either one or the other, but not both, is counted as a new solution.
6. Strictly speaking, the last solution given for item number 10 is incorrect in that the square formed by the whole figure has not been counted. Users are left to decide for themselves whether to accept the solution (probably rare) as correct.

Part 1

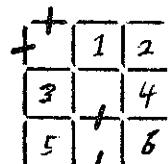
1. Take away 4 toothpicks
Leave 6 squares



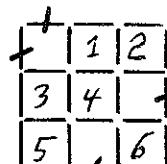
or 90° rotation



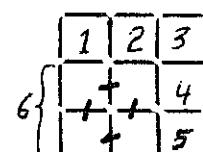
or rotations
or reflections



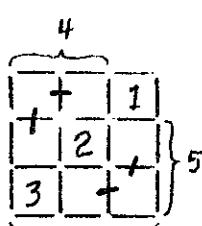
or rotations
or reflections



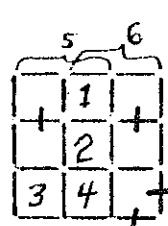
or rotations
or reflections



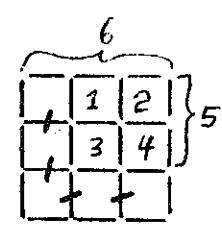
or rotations
or reflections



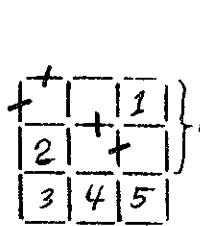
or 90° rotation



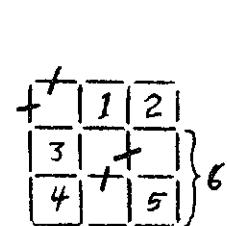
or rotations
or reflections



or rotations
or reflections

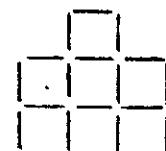
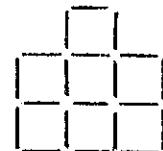
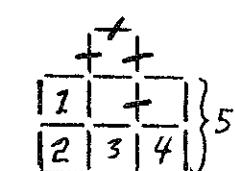
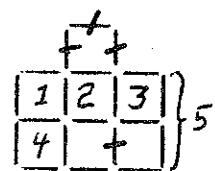
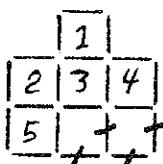
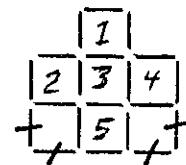
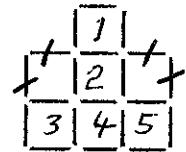
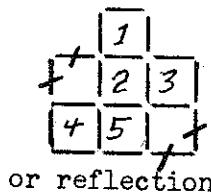
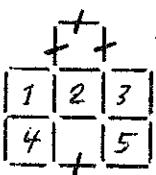
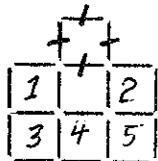


or rotations
or reflections

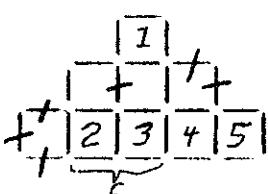
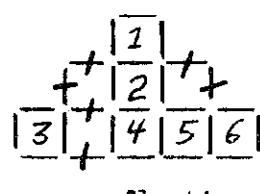
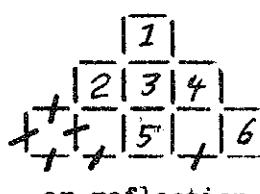
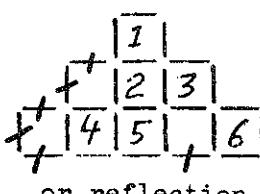
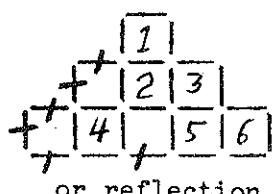
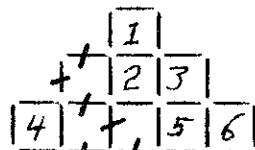
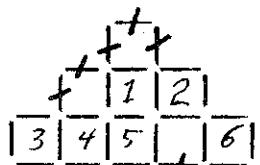
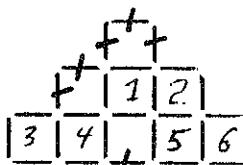
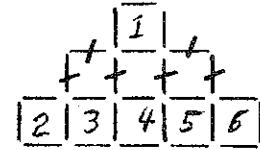
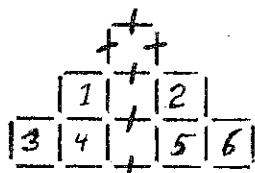


or rotations
or reflections
(and more)

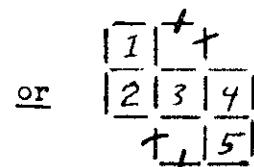
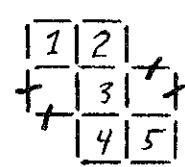
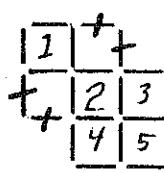
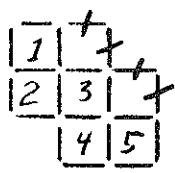
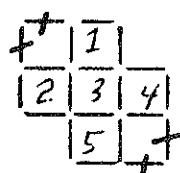
2. Take away 4 toothpicks
Leave 5 squares



3. Take away 6 toothpicks
Leave 6 squares

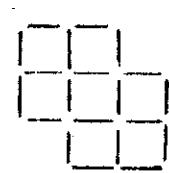
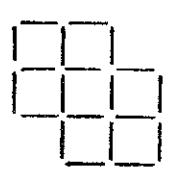
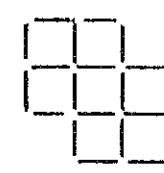
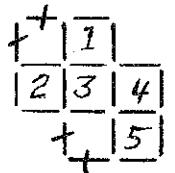
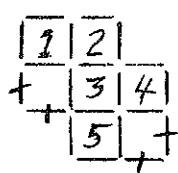


4. Take away 4 toothpicks
Leave 5 squares

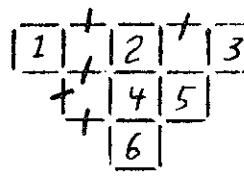


or 180° rotation

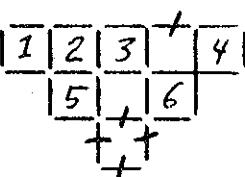
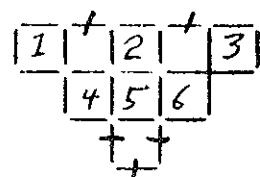
or 180° rotation



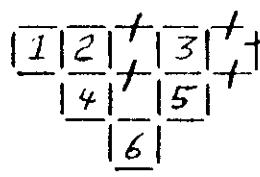
5. Take away 5 toothpicks
Leave 6 squares



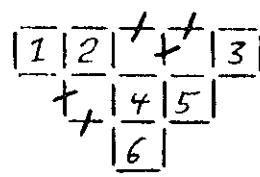
or reflection



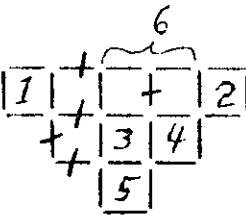
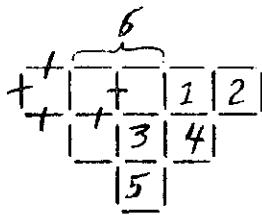
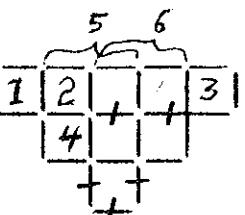
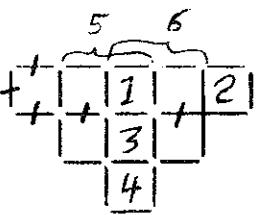
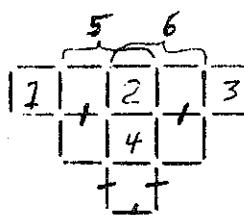
or reflection



or reflection



or reflection



or reflection

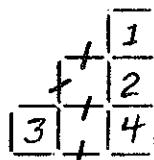
or reflection

or reflection

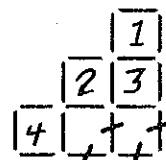
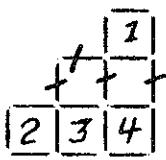
or reflection
(and more)

Part 2

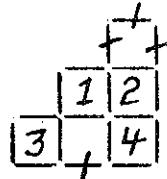
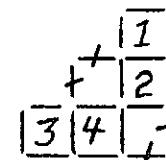
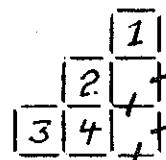
6. Take away 4 toothpicks
Leave 4 squares



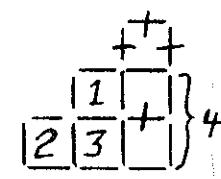
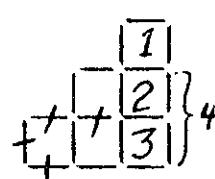
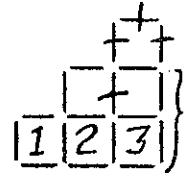
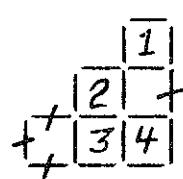
or



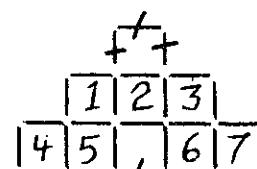
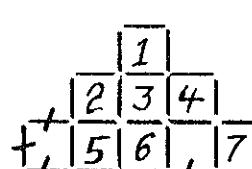
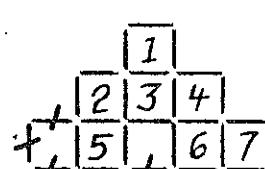
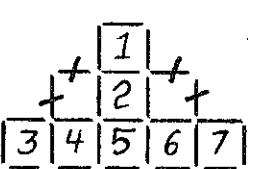
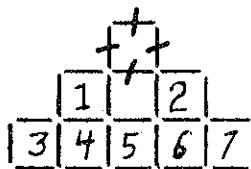
or



or

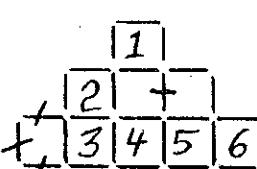
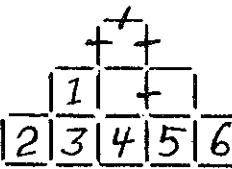
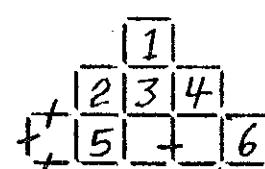
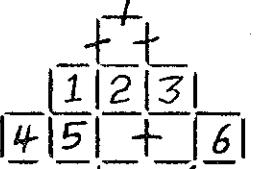
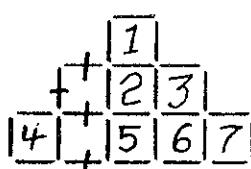
or reflection
around diagonal
(and more)

7. Take away 4 toothpicks
Leave 7 squares



or reflection

or reflection



or reflection

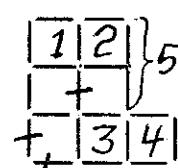
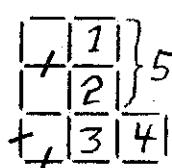
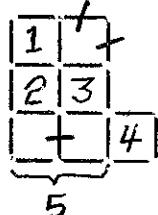
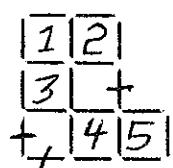
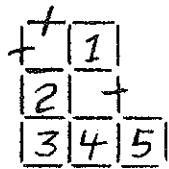
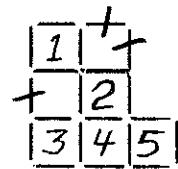
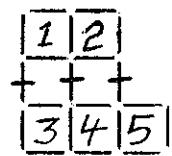
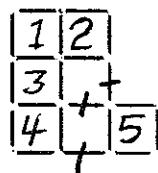
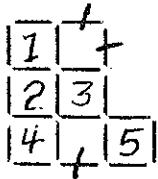
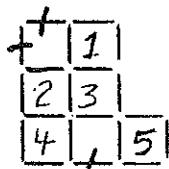
or reflection

or reflection

or reflection

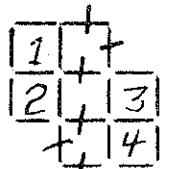
or reflection

8. Take away 3 toothpicks
Leave 5 squares

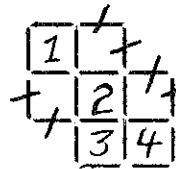
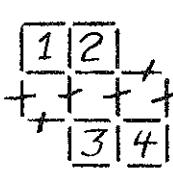


(and more)

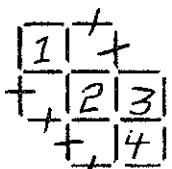
9. Take away 6 toothpicks
Leave 4 squares



or

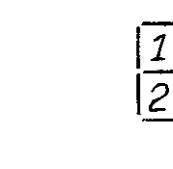


or

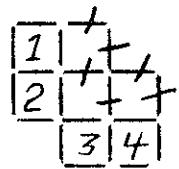


or 180° rotation

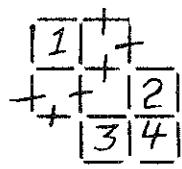
or



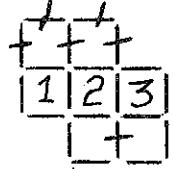
or 180° rotation



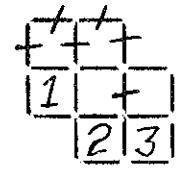
or 180° rotation



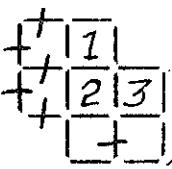
or 180° rotation



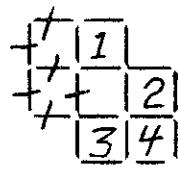
or 180° rotation



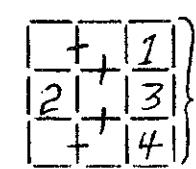
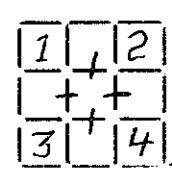
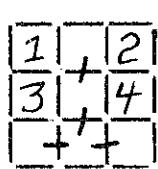
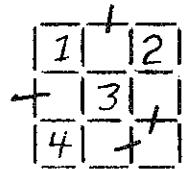
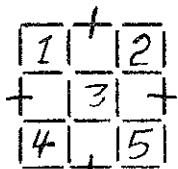
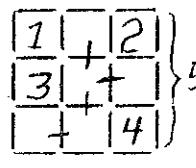
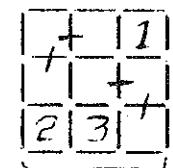
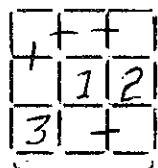
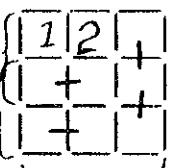
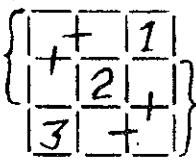
or 180° rotation



or 180° rotation

or 180° rotation
(and more)

10. Take away 4 toothpicks
Leave 5 squares

or rotations
or reflectionsor rotations
or reflectionsor rotations
or reflectionsor rotations
or reflectionsor rotations
or reflections

or 90° rotation

Planning Patterns -- XF-2

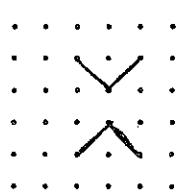
There are an almost infinite number of solutions to these problems since the design of the letters can be varied (e.g., capital, lower case, script, etc.) as well as the position of the letters relative to each other within the matrix.

- (1) Count to be sure that the correct number of letters, as specified for the problem, have been drawn.
- (2) Count the number of dots touched by each letter to be sure that this is the number specified.
- (3) Count the number of matrices containing different patterns of the letters (different arrangements of the letters in the matrix relative to each other). Do not credit rotations or reflections of patterns already used.

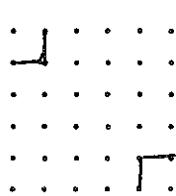
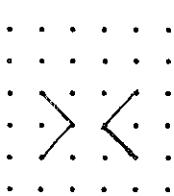
Credit any recognizable variation of the letters.

Part 1

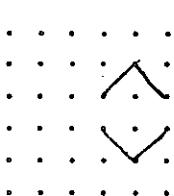
1. 2 V's, touch 3 dots

Solution

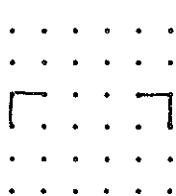
← (A) Rotations and reflections
are not credited, for example →
do not credit if solution A
has already been credited

Solution

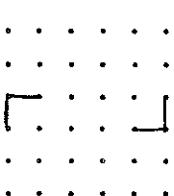
→ (B) or any rotations or
reflections



→ (C) or any
rotations or
reflections



→ (D) or any rotations or
reflections



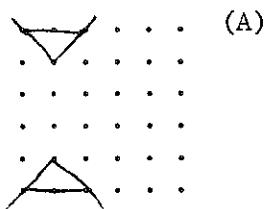
→ (E) or any
rotations or
reflections

Etc.

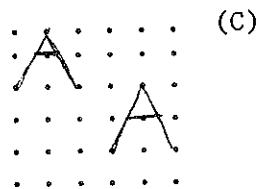
Planning Patterns -- XF-2 (cont'd.)

2. 2 A's, touch 4 dots

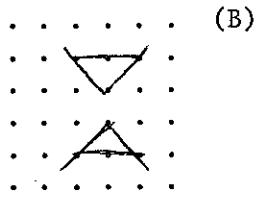
The A can have all of the variations used for V since it can be (if printed capital letters are used) the same figure with the addition of the cross bar.

Solution

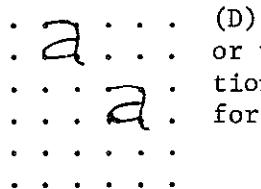
(A)



(C)

Solution

(B)



(D)

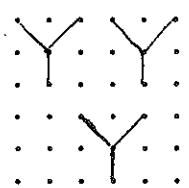
Lower case or written variations can be used for the solutions.

Etc.

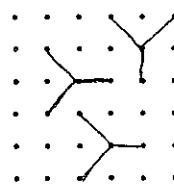
3. 3 Y's, touch 4 dots

The Y shape is also the same as the V (if printed capital letters are used) except for the addition of the stem. Watch to be sure the subject makes 3 figures instead of two as in the first two problems.

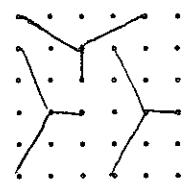
(A)



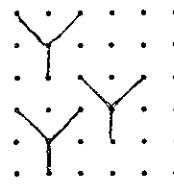
(B)



(C)



(D)

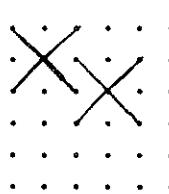


Etc.

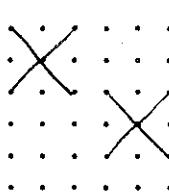
Planning Patterns -- XF-2 (cont'd.)Part 2

4. 2 X's, touch 5 dots

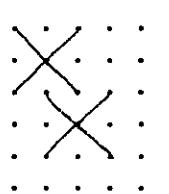
The X (when printed capital letters are used) is still another variation on the V shape, this time a joining of 2 V's. Thus variations of many of the solutions above will be creditable here.

Solution

(A)

Solution

(B)

Solution

(C)

Etc.

5. 3 Z's, touch 4 dots

Be sure that the subject makes 3 figures, not 2 as in item 4.

N : N :

:: Z ::

:: : ::

:: . . .

(A)

Z : : Z

:: . . .

:: Z ::

(B)

:: : Z :

:: . . .

Z : : Z

(C)

Etc.

6. 3 E's, touch 6 dots

Be sure that the subject makes 3 figures.

: E : . .

M : E

. . . : E

(A)

: E : E

. . . : E

. . . : E

(B)

. . : M :

E < :

. . . : E

(C)

Etc.

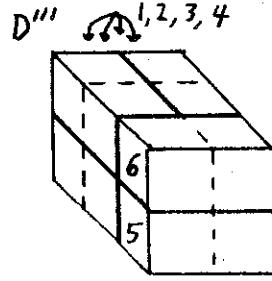
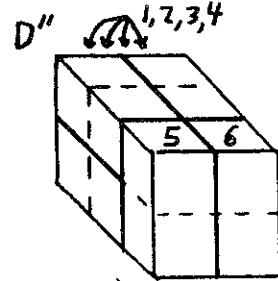
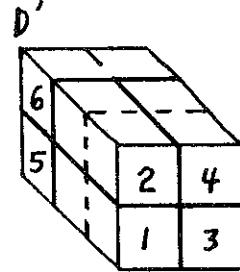
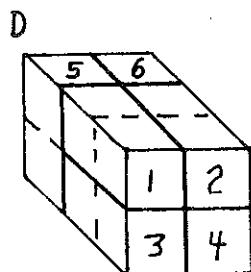
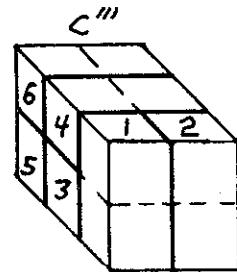
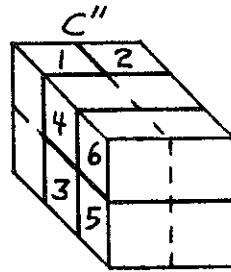
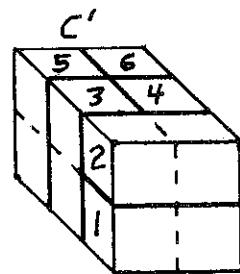
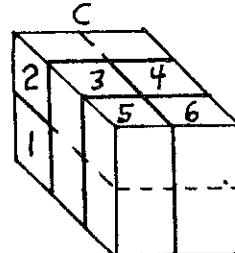
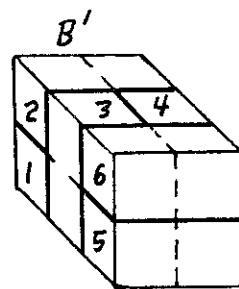
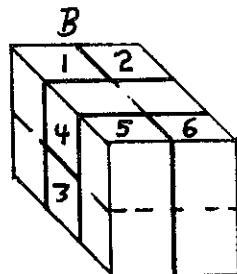
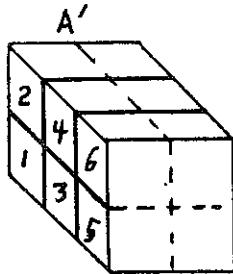
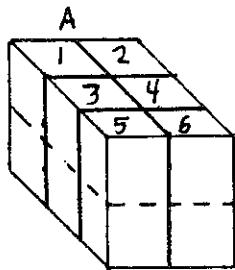
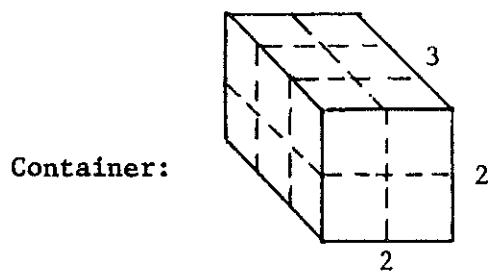
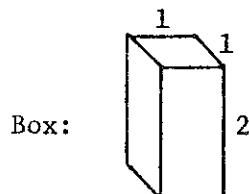
Storage Test -- XF-3

As indicated on the cover of the test booklet, 2 points are scored for each solution that uses a new rule, and 1 point for each solution that is different but which uses the same rule as a preceding solution. Duplicates are not counted.

Solutions using a particular rule are identified with a single letter in the key.

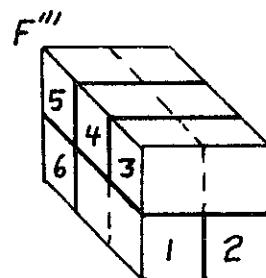
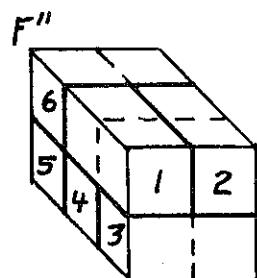
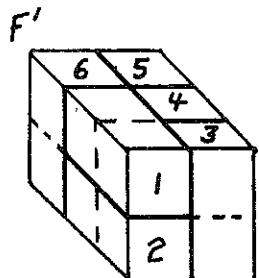
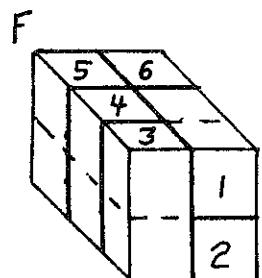
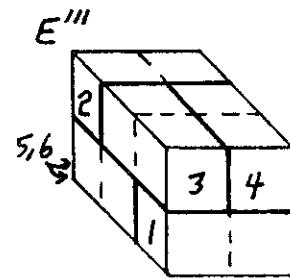
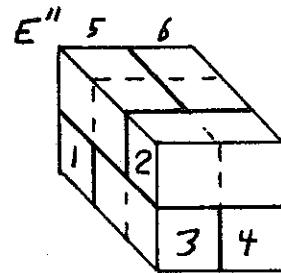
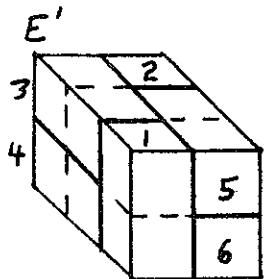
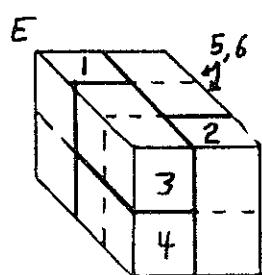
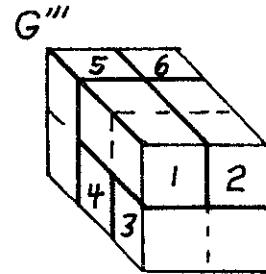
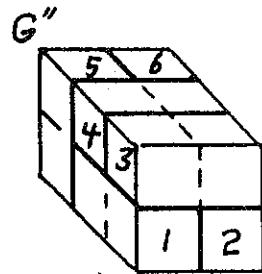
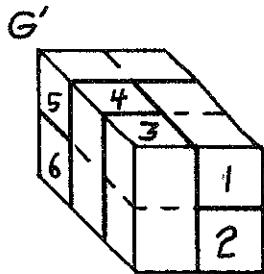
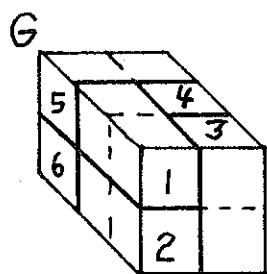
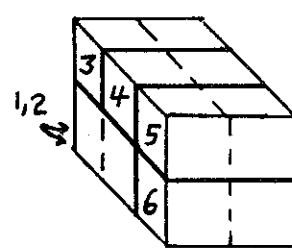
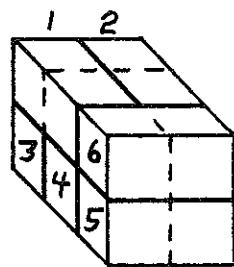
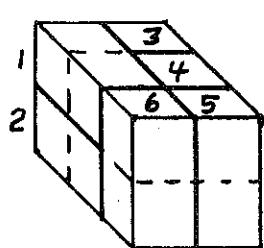
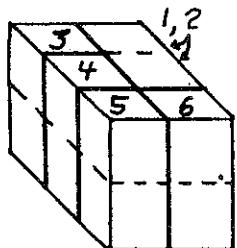
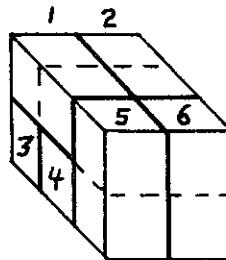
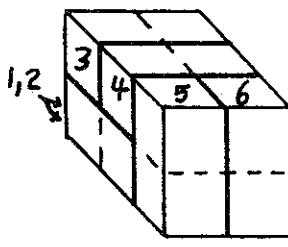
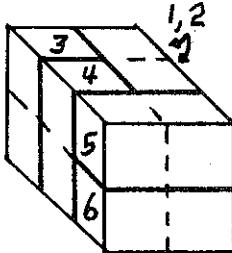
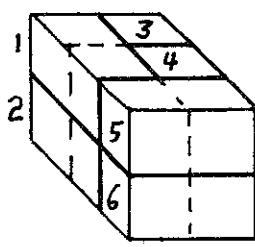
Examples: (1) If solutions A and B are given, they are scored 2 points each since they use different rules. (2) If solutions A and A' are both given, the first is scored 2 points, the second 1 point. (3) Similarly, if solutions D' and D'' are given, the first is scored 2 points, the second 1 point, and additional solutions of type D would be scored 1 point each.

Part 1



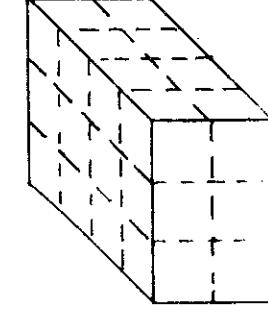
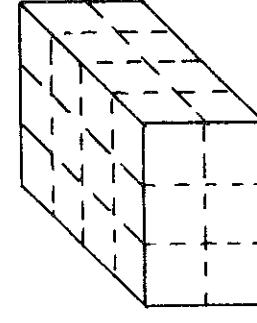
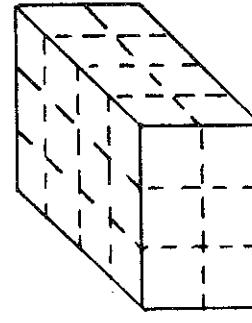
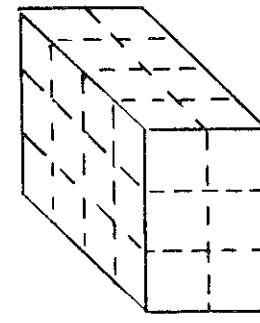
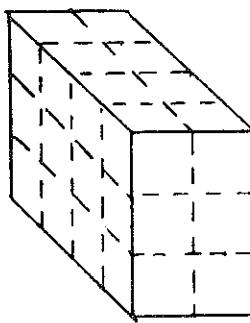
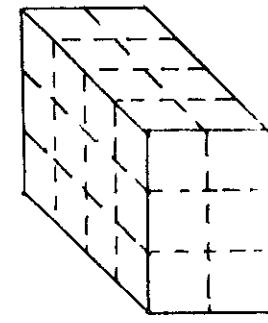
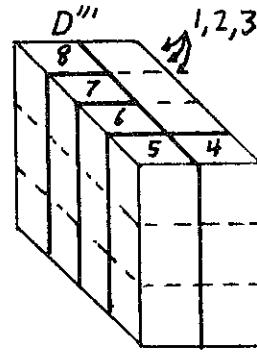
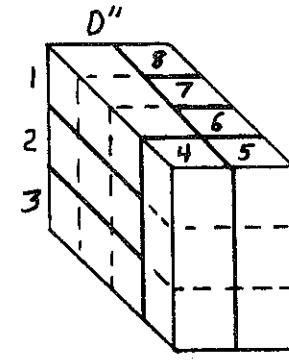
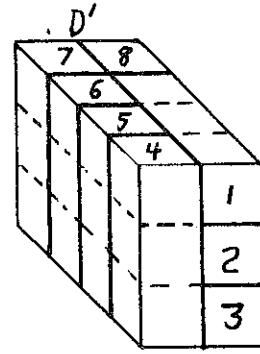
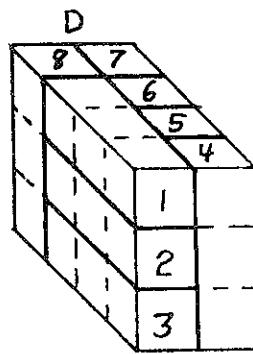
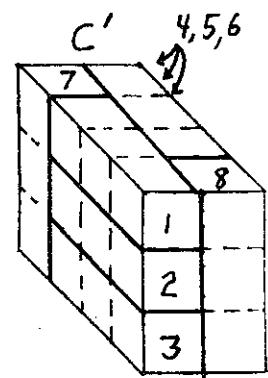
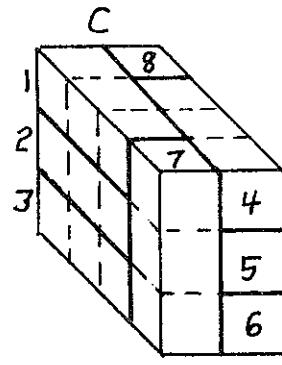
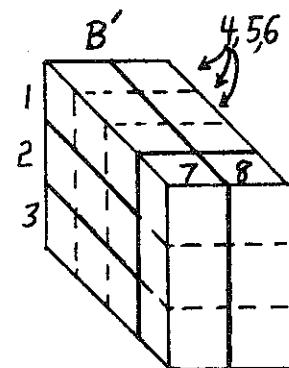
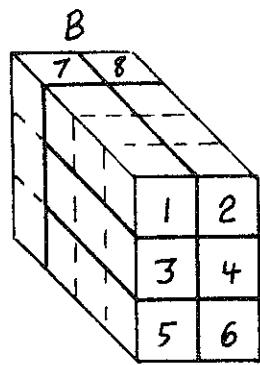
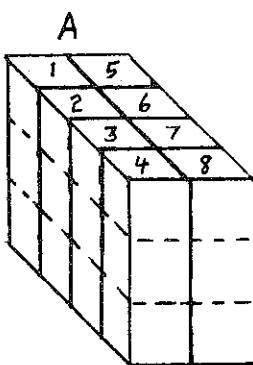
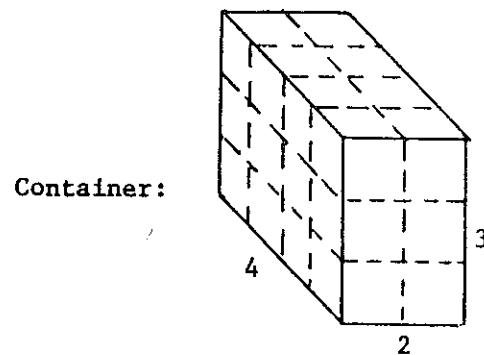
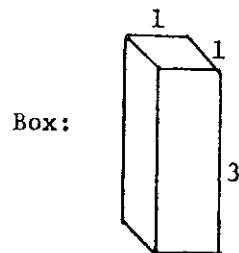
Storage Test -- XF-3

Part 1 (cont'd.)

plus the end-for-end reversals of the *F*'s:plus the end-for-end reversals of the *G*'s:

Storage Test -- XF-3

Part 2



XU FLEXIBILITY OF USE

Factor

The mental set necessary to think of different uses for objects

This factor is the combination of two factors which were considered separately in the 1963 edition of this Kit: (1) semantic redefinition, and (2) semantic spontaneous flexibility. It probably is the opposite pole of "functional fixedness." Guilford and Hoepfner (1971) suggest that semantic spontaneous flexibility is the opposite of perseveration.

The decision that these two factors represent a single ability is based on data from studies by Reed (1966), Adcock and Martin (1971), and Ekstrom, French, and Harman (1974) in which redefinition and semantic flexibility tests loaded on the same factor.

This factor is probably related to personality characteristics. Singer and Roby (1967) have reported that a "Uses" test, used to measure flexibility, loaded on a factor which included scores from the Adventure and Self-Reliant scales of the D-F Opinion Survey.

Identification: Guilford, DFT and NMT

References: 1, 54, and 162.

Tests

Combining Objects -- XU-1

The subject is asked to name two objects which, when used together, would fulfill a particular request.

Length of each part: 10 items, 5 minutes

Suitable for grades 9-16

Substitute Uses -- XU-2

The subject is asked to think of a common object that could serve as a substitute for the given object or purpose.

Length of each part: 10 items, 5 minutes

Suitable for grades 9-16

Making Groups -- XU-3

From a list of seven items, the subject is asked to combine three or more objects into groups (up to seven) and to provide a reason for each grouping.

Length of each part: 2 items, 5 minutes

Suitable for grades 9-16

Different Uses -- XU-4

The subject is asked to think of up to six different uses for four common objects. Score is based on number of changes of use, not on total number of responses.

Length of each part: 4 items, 5 minutes

Suitable for grades 6-16

Cover Pages

COMBINING OBJECTS -- XU-1

In this test you will use your practical resourcefulness in naming two objects that can be used together in order to make something or do something that is required. You will name objects usually found around specified locations. For example:

Request: Rub dirt off the inside of a small bottle.

Location: An ordinary house; bottle cleaners are not available.

For this problem you would write down "rag" and "pencil" or two similar objects, since you could wrap the rag around the pencil and insert it into the bottle.

Each item in the test will make a request and will indicate your location and the lack of some particular appropriate object. You are to name two objects that would usually be found in the given location and which can be used together to fulfill the request. Assume that you are allowed to prepare the objects with tools or equipment that are usually available in the given location.

Your score will be the number of correct responses which you give.

You will have 5 minutes for each of the two parts of this test. Each part has one page with 10 items. When you have finished Part 1, STOP. Do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

SUBSTITUTE USES -- XU-2

Sometimes you find yourself in a place where the object that you normally would use to perform a task is not available and it is necessary for you to find a substitute. For example, suppose you are at a baseball game on a very hot day. You have forgotten to bring a fan of any sort. What could you use instead to fan yourself? You might think of using the baseball program or a hat as a substitute for a fan.

In this test you will be asked to think of objects that can be used as substitutes. You will be asked to imagine yourself in a situation with certain surroundings and to name a common object that is likely to be found in this location and which can serve as a substitute for the named object or purpose.

Now try this example: Suppose you have been shipwrecked and are on a small raft with only your clothing, some food, some water, and some fishing equipment available. What one object might you use to make a small sail?

A shirt or a blouse would be correct answers. It would be incorrect to say a tablecloth because it is not likely that there would be one available.

Your score on this test will be the number of acceptable answers which you give.

You will have 5 minutes for each of the two parts of this test. Each part has 10 items. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

MAKING GROUPS — XU-3

In this test you will be asked to make groups of things which are alike in some way and to explain the reason for each group.

Each item in the test will have a list of seven things. You should try to think of ways in which these things are alike. Use the letters beside the names of the things to identify groups which are alike in some way. Then write what it is about the things that makes them alike.

Look at this example: Group (letters)

	<u>Group (letters)</u>	<u>Reason</u>
a. trout	<u>a, b, c, f</u>	<u>animals</u>
b. robin	<u>d, e, g</u>	<u>transportation</u>
c. frog	<u>b, f, g</u>	<u>fly</u>
d. car	<u>a, c, e</u>	<u>found in water</u>
e. boat		
f. bat		
g. airplane		

You might have written down different groups or different reasons from those given in the sample.

Try to think of as many different ways as possible to make groups. Each group must have at least three things in it. The same group cannot be used with different reasons. The groups should be based on such characteristics as size, color, shape, or use and not on how the words are spelled or their sounds.

Try to think of as many different groups as possible (up to 10) for each item. However, if you have trouble in thinking of enough groups for one item, leave it and go on to the next item.

Your score on this test will be the number of correct groups that you make. Remember that a group must have both the letters of the objects and the reason for grouping them in order to be correct.

You will have 5 minutes for each of the two parts of this test. Each part has one page with two items. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

DIFFERENT USES -- XU-4

In this test you are to think of different uses for common objects.

Each item will consist of the name of a common object and, in parentheses, a description of its usual use. You are to think of other ways in which the whole object, or parts of it, can be used. Write these uses on the lines provided.

Look at the example below:

MAGAZINE (used for reading)

Other uses:

swat mosquitoes
start a fire
make paper beads

Try to think of as many different uses (up to six) as you can for each object. Each use that you give must be really different from the others. For example, in the item above, you could not receive credit for both "swat flies" and "swat mosquitoes."

Your score on this test will be the number of acceptable responses which you give.

You will have 5 minutes for each of the two parts of this test. Each part has one page with four items. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Scoring KeysCombining Objects -- XU-1

Partial credit can be given -- score 1 for each part of an item
score 2 for both parts

Part 1

Give credit for:

1. anything that can burn or be used as fuel;
matches or other means of starting a fire
2. any writing surface (paper, cardboard, wood, etc.)
anything that will make a mark (lipstick, charcoal, pen, etc.)
3. anything that will make a handle (stick, coat hanger, etc.)
anything that will make a swatter (rag, screening, newspaper, etc.)
4. anything that can be used to reach a limb (stick, rope, etc.)
anything that will break off limb (saw, weight, etc.)
5. any large piece of clothing (trousers, shirt, etc.)
any material to tie clothing after inflation (string, etc.)
6. any small piece of sports or boating equipment that could be
used as a weight (oarlock, fish sinker, etc.)
any kind of string or line
7. any materials that might make body (brooms, stick, etc.)
any materials that might be used as costume (old clothes, rags, etc.)
8. bricks or other block-like material
boards or other shelf substitutes
9. anything that could make a handle (stick, etc.)
anything that could do brushing (twigs, etc.)
10. any heavy automobile part (engine, wheel, etc.)
wire or other material which could be used as a chain

Part 2

11. radio antenna
wire
12. paper of any kind
any adhesive (glue, scotch tape, etc.)
13. any type of screening or sieve
any object that could be used as a shovel
14. any material to make stick (wire, match, bobby pin, etc.)
any material suitable for padding (cotton, tissues, etc.)
15. string, thread, or other such materials
any writing implement (pen, pencil, etc.)

Combining Objects (cont'd.)

16. any weighty object (brick, etc.)
any material to pad or silence the weight
17. coat hanger, spring or other wire
cloth of any type
18. branches
rope
19. any object that can be used as a balance
string-like objects or anything that can be used as a fulcrum
or pivot
20. blankets or clothing with arms or legs (coats, trousers, shirts, etc.)
poles, brooms, sticks or similar materials

Substitute Uses -- XU-2

Do not credit objects ordinarily used for the described purposes.

Part 1

1. drinking straw, spoon or knife
2. stone (whetstone or flint)
3. paper bag, paddle (to hit something with), pans, rocks, tent poles
4. frying pan or skillet, bucket
5. pan, cup, bucket, tent, bowl, tackle box
6. fish pole or line, stock (long), hook and line
7. gasoline, knife, kerosene, scouring pad
8. watch
9. knife
10. hatchet or axe, piece of cloth, knife, neckerchief

Part 2

11. shoe
12. nail file, pocket knife, key, coin
13. nylon stockings (women's), nylon night gown
14. clothing, newspaper
15. pillow case
16. shirt or other clothing, wash cloth or towel, toilet tissue
17. soap, hair oil
18. sock
19. soap, lipstick, phone book
20. sheets, blankets or clothing tied together, telephone cord

Making Groups -- XU-3

The score for this test is the number of acceptable responses. Each response, to be acceptable, must have both the letters for the objects to be grouped, and a reason for the grouping. Do not credit when only letters are given.

Each group must include at least three letters.

Groups of the exact same letters cannot be credited twice even if the reasons given are different.

Do not accept reasons which are based on the spelling, sound, or shape of the words. The reasons must be based on characteristics of the objects listed, e.g., their size, color, shape, use, etc.

The reasons given must be public knowledge -- not personal; do not give credit for reasons such as "I like them." "I have some."

Examples of acceptable responses for each item are given below.

Part 1

<u>Group</u>	<u>Reason</u>
1. a, b, g	red
c, e, f	orange
a, e, f	fruit
b, c, d, g	vegetables
a, e, g	common juice drinks
b, c, d	grow underground
a, b, d, e, f, g	round
a, c, d, g	eaten both raw and cooked
2. a, b, g	live performance
c, d, e, f	electronic
d, e, f	means of communication
a, b, c, d, f, g	audience of more than one
b, d, e	primarily heard
a, b, c, d, f	often involve music
a, c, f, g	both seen and heard

Making Groups (cont'd.)Part 2

<u>Group</u>	<u>Reason</u>
3. a, b, g,	reach trees
a, b, c, g	domestic pets
d, e, f, g	wild animals
b, c, e, f, g	furred animals
d, e, f	African animals
b, e, f	"cat family"
b, c, d, e, f, g	four legged
a, d, g	not carnivorous
b, c, e, f	carnivorous
4. a, b, d	have wheels
a, d, e, b	have motors
b, c, f, g	self-propelled
c, e, f	need water
a, b, d, g	land

Different Uses -- XU-4

The score is based on the number of changes of use, not on the total number of responses. Preparation of the key is left to the user.

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