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ABSTRACT

This publication contains a course outline and syllabus, self-study units, and testing materials finished and tested in the Open Classroom, an auto-tutorial learning laboratory at Skagit Valley College (Washington). This self-contained course in informal logic is organized around problem-solving strategy and a collection of modules for extensive studies of informal logic and psychosynthesis. The course outline is designed to be used in conjunction with Vincent Ryan Ruggiero's "Beyond Feelings: A Guide to Critical Thinking" (1975). In this course, the student is expected to enhance his respect for rational problem-solving and develop discursive abilities. Suggested prerequisites for the course include: 11th grade reading level, fundamental compositional skill, dictionary usage proficiency, and ability to manage time and academic work without supervision. The first three units are subdivided into 31 constituent lessons, each of which takes about two hours to complete. At the end of unit III, there is an open-book, multiple-choice test. A fourth special project unit, additional optional project modules, and independent study modules in problem-solving and critical thinking complete the course materials. Student worksheets, answers to reading assignments, and test answers are furnished throughout. (NHM)

PHILOSOPHIC HEURISTIC INSTRUCTION (PHI) -- II

Course outline

Course syllabus

Test

The Phile

SUMMARY. This publication contains finished and tested materials for a broad course in informal logic, organized around problem-solving strategy and a collection of modules for extensive studies of informal logic and psychosynthesis.

These materials will be modified and extended in the Greenbook Abstract & Catalog, *an occasional paper published through ERIC.*

I wish to acknowledge the contributions of the following:

Star McDaniel Heimsath
John McClure
John Connell
Mike Kearns
George Gentry
John Reid
John Larson

and many students, who, over the years, have contributed to this model.

Suggestions and criticism would be welcome; I'd be happy to correspond over technical questions with users.

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INFORMAL LOGIC. Course outline by
Walter A. Coole, Skagit Valley College

Skagit Valley College course number: Philosophy 111

Quarter credits: 3 *Semester credits:* 2

Average student completion time: 100 hours

Goal. In this course, the student is expected to enhance his/her respect for rational problem-solving, develop discussive abilities, and solve problems more adequately.

Performance objectives. The completion of this course should result in the following accomplishments:

(a) express his/her reasons for wanting to think clearly and solve problems effectively and efficiently;

(b) identify fallacies and their sources in non-technical terms;

(c) describe and practice good problem-solving strategies

(d) At the end of the basic course of study, the student selects from an extensive list of apecialized problem-solving skills, one which he/she particularly desires--and masters it. If the student desires a higher grade, more selections may be made.

Entry. In order to perform well in this course, the student should meet the following criteria:

--11th grade reading level; fundamental compositional skill

--proficiency in the use of a dictionary

--ability to manage time and academic work on his/her own

--cogent demand to acquire critical thinking skills

Student materials.

Ruggiero, Vincent Ryan: *Beyond Feelings: A Guide to Critical Thinking.* Alfred Publishing Co. 75 Channel Dr., Port Washington, NY 11050. 1975 $3.50.

Coole, Walter A.: *Informal Logic: A Course Syllabus*

3 ring, 1" notebook binder

Notebook paper #2 lead pencil

Teacher Preparation.

Burton, Kimball, & Wing: *Education for Effective Thinking.* N.Y.: Appleton-Century-Crofts, Inc. 1960

INFORMAL LOGIC: A course syllabus by Walter A. Coole, Skagit Valley College

Your *GOAL* for this course will be to enhance your respect for rational problem-solving, develop discursive abilities, and solve problems more adequately.

There are no formal prerequisites for this course. Nevertheless, we recommend that you...

--have a real desire to attain the course goals as a matter of your own preference
--be able to read at a college level and write brief essays without difficulty
--know how to manage your time and study efforts
--understand how to use a dictionary with ease

COURSE MATERIALS

This syllabus
Ruggiero: *Beyond Feelings*
3-ring, 1" notebook binder
Notebook paper
#2 lead pencil
College dictionary

Toward the end of the course, you may wish to purchase some additional materials for optional projects.

GRADING

To attain a grade of "B", you must complete the first four units of the course. At the end of unit III, there will be an open-book, multiple-choice test.

To attain a grade of "A", you must either...

--act as a coach in the Open Classroom for 20 hours, helping other students in this course or...
--complete additional optional projects for (approximately) 10 hours as indicated at the end of this syllabus
--writing 20 paragraphs about contemporary issues (pp. 179-180 in the text)

YOUR PROGRESS THROUGH THE COURSE

The first three units of this course will take about 65 hours to complete; they are subdivided into 31 constituent lessons, each of which take about

two hours to complete. The fourth unit will require about 35 hours; it is important for you to select the project work involved, since the required materials may have to be special-ordered through the bookstore--and "turn-around time" for special orders is about 4-6 weeks in some cases.

Complete the column marked by the arrow in the planning chart below. For starred entries, see the unit schedule provided; using a calendar, select target dates for the intervening lesson completions. You MAY procede more quickly than the required schedule but may NOT go slower. USE PENCIL!

Unit	Lesson	Plan to complete	Date actually completed	Lesson reading score (%)	Estimated time used for lesson
I	1				
	2				
	3				
	4				
	5*				
II	6				
	7				
	8				
	9				
	10				
	11				
	12				
	13				
	14				
	15*				
III	16				
	17				
	18				
	19				
	20				
	21				

--continued on page 3--

As you complete each lesson, fill these columns out.

Unit Lesson	Plan to complete	Date actually completed	Lesson reading score (%)	Estimated time used for lesson
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
Test*				
IV*				
A-project (optional)				

UNIT I

Lesson 1

Your *OBJECTIVES* for this lesson: (to be attained before beginning the next lesson)

( ) to survey the textbook and be able to tell in your own words:
--WHAT three issues will be addressed
--WHY the author feels that the ability to think is important
( ) to describe yourself in certain ways relevant to the goals of this course

This lesson's assignment: (how to reach the objectives)

Read:

This text was written to "typical" college freshmen. Its vocabulary and sentence are quite simple. Nevertheless, its message is, I think, quite profound.

If you have doubts about the meanings of words, you should check out key words in your dictionary.

When you undertake to study a lesson, you should do the following things:

a. establish clearly in your mind what you're trying to accomplish--by reading the lesson's objectives carefully

b. work your way through the assignment as advised in the syllabus

c. complete all written work as directed

d. review the assignment by checking off each objective you've met and re-studying each objective you're not absolutely sure about

If you run into difficulty, here are some ways you can bail yourself out...

1. Write down what page you encountered the problem on

2. Write out briefly what you see the problem to be

3. Try to find a passage in the text or syllabus that deals with the problem

4. Check the classroom for a listing of informal logic coaches; consult one of them

5. Ask the instructor

6. If all else fails, try studying

Read:

In reading the text, you'll be asked to answer some questions as you procede. I've abbreviated these exercises by omitting some of the contentional notations. Each item will call for some kind of response; there are three categories...

i. True-false. These are indicated by simple sentences with no choice indicated.

ii. Conventional multiple-choice. Mark the appropriate response.

iii. Citation alternatives (these are the tricky items). These are indicated by three decimal numbers immediately after the item. The direct answer to the question appears in the textbook. The decimal numbers indicate three possible places where the answer might appear; *but not necessarily--the answer MAY be somewhere else.*

The decimal number 45.1 refers to page 45--the first *quarter* of the page--the passage will begin.

To respond to the citation question, give the alternative whether offered or not and write the first few words of the appropriate sentence, thus...

22.4--The quick brown fox...

This may appear a bit opaque now, but a couple of examples will be given shortly.

ACHTUNG! In measuring your text, include the margins.

Several students have discovered that marking the edge of the text in quarters with a felt-tip pen saves a lot of nuisance.

Read pp. *ix-xii* of the text and respond to the following "reading questions" *as you read.* Write your answers on notebook paper or simply mark in the syallabus--whichever is more convenient.

1. For roughly the past decade in American education, increasing emphasis has been placed on subjectivity, on *feelings.*
This is a true-false item; it happens to be true, according to Ruggiero, our tentative standard of verity. See page ix.

2. The subjective interest in the immediate past, came as a result of:

A. an earlier tendency to exalt science and technology
B. a tendency to revere "objectivity".
C. a mechanistic view of people
D. all of the above
E. none of these

This is a conventional multiple-choice question whose correct answer is "D. all of the above" according to Ruggiero.

By now, you may be irritated at being asked to label what the author says as "true". What we mean by "true" in this limited context is merely what the author says. It's not important that you agree with the author, merely understand what he says and form your own opinion.

3. What did the existentialists declare about rationalistic and behavioristic models of the human person? ix.2, ix.3, ix.4

This is one of those sneaky citation questions. The correct response goes like this...

ix.3--"A person is not a robot..."

Note that we cite where the passage begins, not where it ends.

4. Was such a reaction needed? ix.2, ix.3, ix.4
OK, baby, you're on your own for this item.

5. What is the first reason why the neglect of thinking is bad: ix.2, ix.3, ix.4

This is another sneaky citation item. This one is doubly sneaky because the answer in the text doesn't occur in any of the locations suggested. The correct answer is...

x.1---First, because we live in...

Note: we may not always agree on the quarter of the page in close measurement cases. It's nothing to worry about. What IS important is selecting a sentence that directly and correctly answers the question. For the rest of the reading exercises, you're on your own.

6. We confront complex issues and serious problems.

7. What should we be able to cope with?
   A. the known
   B. the unknown
   C. the unexpected
   D. the impossible
   E. all of the above

8. What does Piaget suggest? x.2, x.3, x.4

9. Booth claims that there is only one valid test of speculations.

10. Today's youth overvalues subjectivity.

11. Feeling is natural and thinking is unnatural.

12. What is demanded in order to think? xi.1, xi.2, xi.3

13. The chapters of the text are designed to teach the student what to think.

14. What does the text deal with?
   A. CONTEXT
   B. PROBLEMS
   C. STRATEGY
   D. all three of the above
   E. none of these

Now, check your answers...

1
1. True
2. D
3. ix.3--"A person is not a robot..."
4. ix.4--"Such a reaction..."
5. x.1--"First, because we..."
6. True
7. E
8. x.4--"Swiss psychologist..."
9. False
10. True
11. False
12. xi.4--"To do it demands..."
13. False
14. D

If you scored at least 12 right, check out the answers you've missed and procede. If you scored less than 12 right, go back to the BEGINNING OF THE SYLLABUS and start again; this time, be more careful.

Read pages 1-7, responding to the following as you read.

15. The answer to "Who are you?' is often more complex than a name.

16. The answer to "Who are you?" includes items that are...
    A. physical
    B. emotional
    C. intellectual
    D. all of the above
    E. none of these

17. The time one lives in influences being who you are.

18. What else strongly influences who one is? 2.2, 2.3, 2.4.

19. A person can not reject what he's taught at home.

20. What you believe about yourself affects what you are able to do.

21. Small children are relatively easy to influence.

22. At what age, according to Harris, does an important juncture occur? 5.1, 5.2, 5.3

23. What position is the only conscious one? 5.2, 5.3, 5.4

24. What does a thinking, self-directed person have?
    A. a sense of his own worth
    B. faith and trust in others
    C. both of the above
    D. neither A nor B

25. What is the problem with the notion that individuality means "doing your own thing"? 6.1, 6.2, 6.3

26. Individuality means that you are the controller and not the controlled.

27. What is the first step toward becoming an individual? 6.5, 7.1, 7.2

Now, check your answers...

15. True
16. D
17. True
18. 2.4--"Variations in place & circumstance..."
19. False
20. True
21. True
22. 5.3--"Age two or three..."
23. 6.1--"The fourth..."
24. C
25. 6.3--"The problem with that..."
26. True
27. 7.1--"The first step..."

You should have 11 of these right to procede. If not, re-read the text, beginning with page 1.

A final part of this lesson's assignment...

Write short paragraphs in response to the "Applications" on page 7. You may wish to discuss your results with the instructor; if so, make an appointment or see him during conferenc hours--but procede to the next assignment without waiting for that discussion.

Finishing up the lesson...

--write your reading score on page... 2
--check out the lesson's objectives; do you feel you've met them?
--write your completion date on the completion schedule--p.2

UNIT 1

Lesson 2

Your *OBJECTIVE* for this lesson:

( ) to be able to contrast good and poor thinking in four ways, in such a way that you can select examples of each when asked to do so.

ASSIGNMENT:

Read the textbook, pp. 9-16, responding to the following...

1. The term 'thinking' is specific and corresponds to one unique activity.

2. Which of the following verbs corresponds to entries in Roget's Thesaurus?
   A. ruminate
   B. appreciate
   C. cerebrate
   D. cogitate
   E. all of the above

3. What is thinking and how does it work? 3.4, 4.1, 4.2

4. Some people believe that thinking is a private conversation inside your head

5. Ryle claims that we cannot think without speaking.

6. Ryle believes that thinking and doing are two separate steps.

7. What do those who are interested in the study of human thinking find especially perplexing? 12.1, 12.2, 12.4

8. The question of whether thinking is exclusively a human ability is not finally settled.

9. The brain is one center of learning.

10. If a person has an inaccurate intuition, he will not be able to do anything about his thinking ability.

11. A good thinker can take charge of his thoughts.

12. A good thinker can use his mind actively.

13. Good thinkers and poor thinkers are quite similar in the ways that they control their thoughts.

14. Four ways that good and poor thinkers differ are listed, beginning on page... 15.3, 15.4, 16.1

15. It would be dumb to commit these four ways to memory.

16. Good thinking is mental discipline.

17. According to John Dewey, mental discipline is incompatible with freedom.

Now, check your answers...

1. 1. False
   2. E
   3. 11.1--"Exactly what..."
   4. True
   5. False
   6. False
   7. 12.2--"Those who are..."
   8. True
   9. False
   10. False
   11. True
   12. True
   13. False
   14. 15.3--"The good thinker..."
   15. False
   16. True
   17. False

Write short paragraphs in response to APPLICATIONS, p. 17.

Write your reading score on p. 2

Check your mastery of the lesson's objective. If you feel you've met that objective, you've completed this lesson

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UNIT I

Lesson 3

Your *OBJECTIVES* for this lesson will be to be able to...

( ) explain situation in which a statement "changes" from being true to false--in a manner satisfactory both to you and to the instructor.

( ) describe what happens when two people in apparent good faith, acco account for the same way in conflicting manners
( ) decide cogently on the issue of "relative truth"

ASSIGNMENT:

Read the textbook, pp. 10-25 and respond to the following...

1. What did philosophers battle over for hundreds of years?
   A. whether truth turns blue
   B. who knows the most
   C. whether truth exists
   D. how fat truth is
   E. who threw the overalls in Mrs. Ruggiero's minestone

2. What did those who experienced the existence of Truth believe it was? 19.1, 19.2, 19.3

3. No one ever argued that the concept of an all-embracing truth was an empty notion.

4. Most contemporary thinkers doubt the existence of a "Truth-with-a-capital-T".

5. The problem of truth is no longer important.

6. We are inclined to believe what our senses tell us.

7. All witnesses to an event are bound to percieve it in the same way.

8. What can we (first) be mistaken in? 21.1, 21.2, 21.4

9. We can never be mistaken in what we percieve.

10. What can our information be (secondly)? 22.1, 22.2, 22.3

11. Which of these can our information be?
   A. acute
   B. obtuse
   C. inaccurate
   D. incomplete
   E. C and D above

12. It is not easy to be misinformed in common situations.

13. What is believed by the most respected minds of modern science can be counted on as 100% accurate.

14. The carefully analyzed observations of the best thinkers is no better than any other system of beliefs.

15. The truth about something is *what is so* about it.

16. The truth about something is...
   A. the facts in their exact arrangment and proportions
   B. only relative anyway
   C. the correct answer

D. The answer that completely expresses reality in the matter
E. A, C, and D above

17. The difficulty in descerning the truth is relevant to what truth is.

18. The difficulty in expressing the truth is relevant to what truth is.

19. Why do we pursue truth? 25.1, 25.3, 25.4

20. It is unnatural to pursue truth.

21. How can we mitigate some of the burden of pursuing truth and give some adventure to such activity? 25.2, 25.3, 25.4

22. Which of these remarks, characterizing an attitude toward thinking is NOT recommended as a good way to begin pursuing truth?
A. "K know I've got limitations..."
B. "I'll never find all the answers..."
C. "There's no point in even trying..."
D. "I can observe a little more accurately..."
E. (None of the above are recommended)

23. The author believes that the authority of truth is idiosyncratic.

Now, check your answers...

1. C
2. 19.3--"Those who accepted..."
3. False
4. True
5. False
6. True
7. False
8. 21.1--"First, we can..."
9. False
10. 22.1--"Secondly, our information..."
11. E
12. False
13. False
14. False
15. True*
16. E
17. False
18. False
19. 25.2--"We pursue truth..."
20. False
21. 25.2--"Having the right frame of mind..."
22. C

---

*Thus spake Ruggiero!

Write short paragraphs in response to APPLICATIONS, pp. 26-27

From this lesson onward, we'll have similar end-of-lesson routines--

i. write in your reading score
ii. check out your accomplishment of the lesson's objectives
iii. write in your completion date

from here on, you're expected to do these without being told.

UNIT I

Lesson 4

OBJECTIVE:

( ) to be able to tell what you mean by knowing

ASSIGNMENT:

Text reading, pp. 29-36.

1. The feeling that accompanies knowing is strong evidence that knowledge is present.

2. Which of these is identical to knowing?
   A. assuming
   B. guessing
   C. speculating
   D. all of these
   E. none of these

3. What is quessing? 32.1, 32.2, 32.3

4. Speculating involves guessing without any evidence.

5. Knowing involves not only having the truth, but also knowing that one has the truth.

6. How do we achieve knowledge passively? 32.3, 32.4, 33.1

7. Vigorous active learning and a highly critical approach to passive learning will yield complete and perfect knowledge.

8. What is it to admit that one does not know? 36.1, 36.2, 36.3

Check, your answers on next page. (Don't Peek!)

Answers:

1. False
2. E
3. 32.1--"Guessing is..."
4. False
5. True
6. 33.2--"We achieve knowledge passively by..."
7. False
8. 36.4--"To make that admission..."

APPLICATIONS: p. 37

UNIT I

Lesson 5

OBJECTIVES: to be able to ...

( ) evaluate just how valuable opinion is
( ) name & describe Bacon's "Idols"
( ) List Locke's error-prone types

Reading : p. 39-48

1. What does the word "opinion" refer to in current usage?
   A. taste
   B. belief
   C. judgement
   D. all of these
   E. None of the above

2. Everyone is entitled to his opinion.

3. Being free to hold an opinion and express it entitles one to guaranteed favorable consequences.

4. What limits are their on our acting on our opinions? 40.4, 41.1, 41.2

5. How many general kinds of error are there? 41.4, 42.1, 42.3

6. How did Francis Bacon classify errors? 42.2, 42.3, 42.4

7. How did John Locke describe error-prone people? 42.3, 42.4, 43.1

8. Which of these do we accomplish be examining the views of informed people?
   A. broaden our perspective
   B. consider facts we are unaware of
   C. see details we could not see by ourselves
   D. all of these
   E. none of the above

9. The opinion most worthy of consideration is that of the established expert.

10. Experts can make no mistakes.

11. What is turning to experts like? 46.1, 46.2, 46.3

12. We should want to escape having opinions.

13. What is the difference between a wise man's opinion and a fool's? 47.1, 47.2, 47.3

Answers.

1. D
2. True
3. False
4. 41.1--"We are free..."
5. 42.1--"There are four..."
6. 42.1--"Francis Bacon classified..."
7. 42.2--"He described them..."
8. D
9. True
10. False
11. 46.1--"Turning to experts..."
12. False
13. 47.4--"The difference..."

APPLICATIONS, p. 48-49.

WHOA! This time, there's more to the assignment...

Bacon's "Idols"

This fragment, extracted and paraphrased from Francis Bacon's "Aphorisms Concerning the Interpretation of Nature and the Kingdom of Man," was originally published in 1620. It was first translated from the Latin text by Theodore Kitchins in Bacon, Francis: Novum Organum. Oxford University Press, 1885.

THE IDOLS OF THE TRIBE

Some fallacy arises merely from being subject to human frailty. But human understanding is a false mirror when it mingles its own nature with its perceptions.

1. (XLI) Tendency to rely on limited personal data.
2. (XLV) Reading more order into things than is really there.
3. (XLVI) Clinging tenaciously to an established belief in face of opposing data, when it is emotionally mollifying.
4. (XLCII) Tendency to be seduced by the striking, bizarre, or colorful.
5. (XLVIII) Tendency to seek first or final causes and not be satisfied by a statement of experientially-derived relation-statements.
6. (L) Unwillingness to seek below the surface.
7. (LI) Anthropomorphic views of things that have no personality.

THE IDOLS OF THE CAVE

These foibles arise from the accident of an individual's constitution or education. Heraclitus said: "Men look for sciences in their own lesser worlds and not in the greater or common world."

1. (LIV) Overspecialization of viewpoint.
2. (LV) Pathological grabbing at resemblance or difference.
3. (LVI) Fear of change and willingness to change for the sake of novelty.
4. (LVII) Inability to vary attention from specific parts to general structure.
5. (XLII) Undue optimism or pessimism.
6. (XLII) Over-reaction to authority: credulity or cavil.
7. (XLII) Narrow-mindedness.
8. (XLII) Mental or physical laziness.
9. Tendency to precipitate inference.

THE IDOLS OF THE MARKET PLACE

The limits of words are not necessarily congruent with the seams of nature. I. A. Richards said: "The great disease of knowledge is that in which, starting from words, we end up with them."

1. The naming of non-existent things, e.g., Progress, the Great Pumpkin, Gravity, Los Angeles.
2. Use of vague terminology.
3. Idiosyncratic use of language.
4. Judging the soundness of thinking by the complexity of its expression.
5. Slogan-thinking.
6. Beatifying thought from the presence of honorific terms. (Does the mere mention of "logic" impute validity to an argument?)

THE IDOLS OF THE THEATER

The theater was, to Bacon, the epitome of intellectual life. In this passage, he exposes academic-type blunders.

1. Three species of false philosophy: sophism, charlatanism, and dogmatism.
2. Hyperskepticism, philistinism.
3. False demonstration.

ACHTUNG! You have now completed Unit I, Ain't that grand?

UNIT II

Lesson 6

OBJECTIVE: to be able to...

( ) tell how to control "Mine is better" mental laspes

ASSIGNMENT: Chapter 6, pp. 53-57.

1. When a child says "Mine is better", what is he ref erring to? 53.2, 53.3, 53.4.

2. What about psychologists? 54.4, 55.1, 55.3

3. Ethnocentric people consider that their beliefs are above the normal processes of examination and question.

4. Ethnocentric people are born, not made.

5. As adults, ethnocentric people tend to hard categorizing.

6. What is suspect, threatening, & dangerous? 55.2, 55.3, 55.4

7. What did Gordon Allport say? 55.3, 55.4, 56.1

8. Even in its mildest form, "Mine is better" thinking...
   A. can shut us off from other perspectives
   B. blind us to unfamiliar truths
   C. make us slaves to yesterday's conclusions
   D. none of these
   E. A,B, & C above

9. How do we avoid the unfavorable effects of "mine is better" thinking? 56.4, 57.1, 57.2

ANSWERS...

1. 53.3--"Hey, Look at..."
2. 55.1--"Psychologists have a name..."
3. True
4. False
5. True
6. 55.3-- Whatever differs...
7. 55.4--"By taking a negative..."
8. E
9. 57.1--The way to avoid...

Extract from the last paragraph of the reading assignment, four bits of advice about beating "mine is better" thinking. Write them:

1. _____

2. _____

3. _____

4. _____

----------DO NOT PEEK UNTIL YOU HAVE----------

1. Look for "mine is better" thinking in ourselves.

2. Make a determined effort to overcome it.

3. Try to understand the other side.

4. Consider the other side's merits without bias.

APPLICATIONS, pp. 57-58.

UNIT II

Lesson 7

OBJECTIVE: to be able to...

( ) identify & tell how to avoid stupid resistance to change

Reading: Chapter 7, pp. 59-65

1. What does a change invariably demand? 59.2, 59.3, 60.1

2. Why do people react to change in such a screwey way? 60.1, 60.2, 60.3

3. Traditions are unworthy

4. How does one appraise the merits of new ideas? 65.1, 65.2, 65.3

ANSWERS...

1. 59.2--It demands...
2. 60.2--Mainly because...
3. False
4. 65.3--To answer this...

APPLICATIONS, pp. 65-66

UNIT II

Lesson 8

OBJECTIVES: to be able to...

( ) tell what the term "conformity"means
( ) anticipate the effects of conforming in given situations

ASSIGNMENT: read Chapter 8, pp. 67-72

1. Conformity is behaving the way others around us do.

2. Conformity is...
   A. Good
   B. Bad
   C. Both A & B
   D. Neither A nor B
   E. Sometimes A, sometimes B

3. What does conformity promise? 68.3, 68.4, 69.1

4. Everybody reacts to external pressure to conform the same.

5. Who do we tend to associate with? 70.3, 70.4, 71.1

6. What word did Irving L. Janis coin? 71.1, 71.2, 71.3

7. Defects Janis identified in decision-making include:
   A. Failing to survey the full range of options
   B. Failing to reconsider decisions
   C. seldom testing decisions
   D. All of the above
   E. None of these

8. He furthur identified:
   A. Ignoring expert judgements
   B. Sticking to views that reinforce one's position
   C. Ignoring obstacles
   D. All of these
   E. None of these

9. What happened in each case Janis studied? 71.1, 71.2, 71.3

10. The wise person is selective in his conformity.

11. What does the wise person do in important matters?
   A. Doese his own thinking
   B. Is willing to risk disagreements
   C. Both A & B
   D. Neither A nor B

ANSWERS...

1. True
2. E
3. 69.1--Conformity promises...
4. False
5. 70.4--For we tend to associate...
6. 71.1--Janis named this...
7. D
8. D
9. 71.3--In each case!!.
10. True
11. C

Complete the Applications, pp. 72-74.

UNIT II

Lesson 9

Your *OBJECTIVE:* to be able to...

( ) identify the causes & effects of face-saving behavior

Read Ch. 9, pp. 75-80.

1. What is it natural to want to see ourselves as?
   A. observant
   B. Thoughtful of others
   C. intelligent
   D. A & B
   E. A, B, & C

2. What is face-saving? 75.2, 75.3, 75.4

3. Which of these theories was suggested by Adler to explain face-saving?
   A. The utilitarian value of public respect
   B. Early childhood domination by adults.
   C. Common feelings of superiority that cannot be disturbed.
   D. All of the above
   E. None of these

4. Face-saving can block development of self-awareness.

ANSWERS...

1. E
2. 75.3--Face-saving is...
3. E
4. True

Complete the Applications on page 81.

UNIT II

Lesson 10

Your *OBJECTIVES* for this lesson will be to be able to...

( ) tell what a stereotype is
( ) describe the effect of stereotypical thinking

Your assignment is to read Chapter 10, pp 83-91.

1. Stereotypes are a form of generalization.

2. What may be the case if our observations are too limited? 83.3, 83.4, 84.1

3. And when a stereotype is challenged, what's likely to happen? 83.3, 83.4, 84.1

4. When the facts are known, the stereotypes disappear.

5. According to the text, what is the relationship between ethnocentrism and stereotyping?
   A. Ethnocentrism is a cause of stereotyping
   B. Stereotyping is a cause of ethnocentrism
   C. Ethnocentrism is an effect of stereotyping
   D. Stereotyping is an effect of ethnocentrism
   E. A and D above

6. What is another cause of stereotyping? 87.2, 87.3, 87.4

7. A stereotyper is often a victim of his own fallacies.

8. What is the most dangerous effect of stereotyped thinking? 90.1, 90.2, 90.3

ANSWERS..

1. True
2. 83.3--If our observations...
3. 83.3--When a stereotype...
4. False
5. E
6. 87.3--Another cause..
7. True
8. 90.3--Thus, the most...

Complete the Applications, pp. 91-92.

Unit II

Lesson 11

Your *OBJECTIVE* in this lesson will be to be able to...

( ) tell what the phrase "common sense" means

ASSIGNMENT:

--Look up the phrase "Common Sense" in the *Oxford English Dictionary*. You'll find a copy in the reference section of the College Library and andother in the Open Classroom. *Take notes* of the definition that strikes you as the appropriate one; pay special attention to (4)--the philosophical usage of the term.
--Read the text, Chapter 11, pp. 93-97.

1. What does the common sense label signal? 93.3, 93.4, 94.1

2. The closer an error is, the easier it is to recognize.

3. How can we begin to solve theproblem common sense raises for critical thinking? 96.1, 96.2, 96.3

4. There is a foolproof way of knowning which ideas will wear well with the passage of time.

ANSWERS...

1. 93.3--The common sense label...
2. False
3. 96.4--We can begin...
4. False

Complete the Applications, pp 97-98.

UNIT II

Lesson 12

Your *OBJECTIVES* for this lesson will be to be able to...

( ) tell how oversimplification distorts thinking
( ) tell how to avoid oversimplification

Read, Chapter 12, pp. 99-103

1. Oversimplification is excessive simplification.

2. What is likely to be the case in any particular situation? 100.1, 100.2, 100.3

3. What makes oversimplications sound reasonable? 102.1, 102,2, 102.3

4. Which of these is given as a cause of oversimplification?
   A. Frequent element of truth
   B. Laziness
   C. Insecurity
   D. All of these
   E. Only B and C

ANSWERS...

1. True
2. 101.1--In any particular...
3. 102.3--What makes...
4. D

UNIT II

Lesson 13

In this lesson, your *OBJECTIVES* will be to be able to

( ) tell what a hasty conclusion is
( ) list some of the causes of hasty conclusions

Read Chapter 13, pp. 105-110

1. What is a hasty conclusion? 105.2, 105.3, 105.4

2. Generally, when does one have insufficient evidence? 105.3, 105.4, 106.1

3. Educated scholars are not afflicted by hasty conclusions.

4. Some people are rattled by complexity.

5. Once we form a hasty conclusion, we are likely to continue in our curiosity.

6. Whatis it important to do? 110.1, 110.2, 110.3

ANSWERS...

1. 105.2--A nasty conclusion...
2. 105.3--In general, we...
3. False
4. True
5. False
6. 110.3--It is important, then...

Complete the Applications on pp. 111-112.

UNIT II

Lesson 14

Your *OBJECTIVES* for Lesson 14 will be to be able to...

( ) tell what an unwarranged assumption is
( ) list two things that should be done about assumptions

Read Chapter 14, pp. 113-118

1. What is an assumption? 113.1, 113.3, 113.4

2. What would we have to do if we did not make assumptions? 113.3, 113.4, 114.1

3. What makes an assumption unwarranted? 114.1, 114.2, 114.3

4. The network of assumptions a person makes is routine.

5. It is difficult to take too much for granted.

6. We are at the mercy of our unidentified assumptions.

ANSWERS...

1. 113.3--An assumption, or...
2. 113.4--Without assmuptions...
3. 114.3--What makes an assumption...
4. False
5. False
6. True

Complete the Applications on pp. 119-120.

Lesson 15

Your *OBJECTIVES* for this lesson will be to be able to...

( ) see how problems in thinking occur in various combinations
( ) avoid problems about thinking

Read Chapter 15, pp. 121-124-

1. Claude fell prey to which of these problems? (pp. 121-122)
   A. "mine is better"
   B. oversimplification
   C. face-saving
   D. A & B, but not C
   E. A, B, & C

2. What problems vexed Agnes?
   A. resistance to change
   B. faulty common sense
   C. hasty conclusions
   D. B & C, But not A
   E. A, B, & C

3. A person who indulges unthinking reactions in one area of life is most likely to compensate by being super-rational in others.

4. Problems in thinking afflict only the uneducated and less intelligent.

5. There is nothing one can do about his/her proneness to having problems about thinking.

ANSWERS...

1. E
2. E
3. False
4. False
5. False

Complete the Applications on pp. 125-126.

You have now completed Unit II!

UNIT III

Lesson 16

After completing this lesson, you should have achieved the following *OBJECTIVES:* to be ablt to...

( ) tell why self-knowledge is important
( ) give a re-evaluated account of yourself

Read Chapter 16, pp. 129-131.

Complete the Application, p. 133.

Lesson 17

Your *OBJECTIVES* for this lesson: to be able to...

( ) tell why being observant contributes to clear thinking.
( ) relate methods of becoming more observant

Read Chapter 17, pp. 135-140.

1. What did Pastuer say? 135.2, 135.3, 135.4

2. What depends on subtle ties revealed only by close observation?
   A. Clear thinking
   B. Sound thinking
   C. Fallaceous thinking
   D. All of these
   E. A & B only

3. Which of these are valuable clues to a person's unspoken views and attitudes?
   A. What a person says
   B. How a person says something
   C. What he omits
   D. All of these
   E. None of the above

4. Which of the following were given as examples of fruitful observations in science & medicine?
   A. Fleming's discovery of penicillin.
   B. Monod's discovery of manic-depression's genetic linkage
   C. Gauss' development of summation
   D. all of these
   E. A & B only

5. List two ways Ruggiero suggests for becoming more observant:
   A. _____
   B. _____

ANSWERS...

1. 135.2--Pastuer once said...
2. E
3. D
4. E
5. Try to become more efficient in making observations
   Look for the significance of things

Complete Applications, pp. 141, #1 & #2 only.

Lesson 18

Your *OBJECTIVES* for this lesson will be to be able to...

( ) explain the saying "less is more"
( ) list in detail, steps to be taken to select issues

Read Chapter 18, pp. 143-147.

1. What does the amatuer tend to ignore when he takes on too much? 143.3, 143.4, 144.1

2. Detail-outline the passage on issue selection, p. 144.2

ANSWERS...

1. 143.3--
2. 1. Examine all aspects of the topic.
   a. who
      what
      when
      where
      how
      why
   b. Practicality
      effects
        advantageous
        disadvantageous

obligations
served
violated
principles
values

2. Decide which issues we are concerned with.
   interests
   occassion or purpose of analysis
   resources
     time
     space
3. Express the issues in a clear, carefully focused question.

Complete the Application, p. 147.

Lesson 19

In this lesson, you will be expected to meet the following *OBJECTIVES:* to be able to...

( ) tell what inquiry is
( ) distinguish between two kinds of inquiry
( ) list five sources of information in addition to personal experience

Read Chapter 19, pp. 149-155.

1. What is inquiry? 149.3, 149.4, 150.1

2. What are the two basic kinds of inquiry? 149.3, 149.4, 150.1

3. The state of human knowledge is perfect.

4. Everybody's opinion is of equal value.

5. The study of difficult issues is hopeless.

6. What can being alert to the relevance of our experience give us?
   A. Valuable ideas
   B. Suggest important questions
   C. Provide us with better direction
   D. All of these
   E. B & C only

7. Outline the guide to information-sources listed on pp. 152-154.

ANSWERS...

1. 149.3--Inquiry is...
2. 149.3--There are...
3. False
4. False
5. False
6. D
7. Information Sources
   I. Background on the issue
      A. Good encyclopedia-eg. Encyclopedia Americana, Encyclopedia Britannica
      B. Special encyclopedias
   II. Facts & statistics--Almanacs
   III. Information about people--Biographical dictionaries & encyclopedias

IV. Articles in newspapers, magazines & journals
   A. *Reader's Guide*
   B. *Social Science and Humanities Index*
   C. Other indexes
   D. Check subsequent issues for reader-responses

V. Books--Card catalog

Complete the Applications, pp. 155-156.

Lesson 20

Your *OBJECTIVES* for this lesson will be to be able to...

( ) tell what the phrase "interpreting evidence" means
( ) list steps to be taken in interpreting evidence
( ) describe important distinctions to be made

Read Chapter 20, pp. 157-162.

1. Which of these gives the meaning of the term "interpreting evidence"?
   A. Decide what it means
   B. Decide how significant it is
   C. address questions raised by it
   D. All of these
   E. None of these

2. The more scientific the procedure, the less need for interpretation.

3. What should you ask about evidence? (see p. 158.3)
   Give your answer in outline form.

4. List distinctions to be drawn when interpreting evidence. (see p. 161.2)

5. Familiarity of an idea is a test of its being reasonable.

6. Facts are what they are regardless of their palatabliity.

7. The test of an idea is its relation to relevant evidence.

8. When two interpretations of evidence are equally good, we should flip a coin in order to get an immediate answer.

ANSWERS...

1. D
2. False
3. 1. Evidence from your own experience
      a. Accuracy?
      b. Typical? Exception to rule? Unusual circumstances?

2. Others' experience
   a. Direct observation or report?
   b. Reporter's reputation?
   c. Cross-check?
3. From research?
   a. Consistent with other evidence?
   b. Reputation of publication?
   c. The writer--careful of fallacy? Impartial?
   d. Important details?

4. 1. Between persons & ideas
   2. Between what is said & the way its said
   3. Between why a person thinks something & whether he's correct

5. False
6. True
7. True
8. False

Complete the Application on p. 163.

Lesson 21

Your *OBJECTIVES* for this lesson will be to be able to...

( ) give the steps involved with analyzing a position
( ) tell how to raise questions

Read Chapter 21, p. 163-167.

1. What lies beyond inquiry & interpreting facts? 163.3, 163.4, 164.1

2. List the steps (pp. 164.1-165.3) in outline form, involved in analyzing a position.

3. What should we do after you're summarised an article? 166.1, 166.2, 166.3

4. What are the benefits of systematic question-raising? 166.3, 166.4, 167.1

ANSWERS...

1. 163.3--In such cases...
2. Analysing a position
    1. identify all assertions
    2. notice qualifying words
    3. notice connections between words
    4. notice conditions
    5. decide which assertions are the main ones
3. 166.3--After we have...
4. 167.2--First, it gets us...

Complete the Applications, pp. 168-171.

Lesson 22

At the end of this lesson, you should have achieved the following *OBJECTIVES:* being able to...

( ) tell what a judgement is
( ) list the characteristics of a careful judgement

Read Chapter 22, pp. 173-178.

1. Judgements are conclusions that are arrived at through...
    A. thorough examination of evidence
    B. after carefull reasoning
    C. Both A & B
    D. Neither

2. .How should we view the strategy descussed in Chapters 16-22? 174.1, 174.2, 174.3

3. List (in outline form) the characteristics of a careful judgement. (See pp. 175.1-176.4)

ANSWERS...

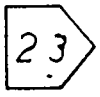
1. C
2. 174.2--The entire strategy...
3. Characteristics of a careful judgement:
    1. Specific subject
    2. judiciously-chosen predicate
    3. contains appropriate qualifications

ACHTUNG! READ THIS!

At this point, you have completed almost all of the coursework in Ruggiero's *Beyond Feelings*. The remaining portion may be used later in working for a grade of "A".

We now introduce a new way to look at problem-solving strategy. What is offered in it doesn't conflict with Ruggiero, but rather *extends* the view of problem-solving strategies and treats with some new details.

The reading assignments are presented compactly in this syllabus in Appendix A. Each lesson's reading assignment is indicated in the margin by a number (the lesson number) shown thus:



Appendix B contains a list of the solutions to the reading exercises.

There are two purposes for the reading-exercise format used in Lessons 23-31. The first is to present information--information which should extend your view of problem-solving and critical thinking. The second purpose of the format is to accustom you to reading--the kind you must do well in order to study logic, mathematics, and science. Actually, few people really master this kind of intensive reading, although it isn't particularly hard.

We shall accomplish this by giving you some text to read. Every sentence has a key word or phrase left out and numbered blank inserted in its place. The omissions are listed in random order at the bottom of the page--and a few extras are thrown in, just to make the task a bit more difficult.

As you read, *pencil* in the word or phrase that you think in what the author intended. It will help to mark out (very tentatively) the word or phrase given at the bottom of the page.

Here is a sample text. . . .

There are a number of ways to (1)_____. For (2)_____ and "popular works," speed reading is probably the best. Intensive reading, the kind you are now learning, is (3)_____ from light fiction. Speed reading is not an easy thing to (4)_____. Neither is the skill of (5)_____.

Popular reading is highly repetitive: in contrast, logic, mathematics, and scientific texts are (6)_____, literal, and abstract. Therefore, the reader must slow down, attend carefully to every word, and not try to (7)_____. It is not necessary to (8)_____ the text, but you should try to understand each point made before attempting to (9)_____ to the next.

This kind of reading is (10)_____ unfamiliar to you. You have done it whenever you followed a (11)_____ or instructions on how to build something. But you probably haven't done (12)_____ of this kind of reading to be really good at it. Now is your chance to develop skill (13)_____.

read--light fiction--not--memorize--read between the lines-- intensive reading--learn--intensive--terse--enough--memorize--recipe--proceed--different--black--question--Dalmatia--at intensive reading

Here are the "correct" answers...

(1) read
(2) light fiction
(3) different
(4) learn
(5) intensive reading
(6) terse
(7) read between the lines
(8) memorize
(9) proceed
(10) not
(11) recipe
(12) enough
(13) at intensive reading

Your work will probably look like this...

There are a number of ways to (1) read. For (2) light fiction and "popular works," speed reading is probably the best. Intensive reading, the kind you are now learning, is (3) different from light fiction. Speed reading is not an easy thing to (4) learn. Neither is the skill of (5) intensive reading.

Popular reading is highly repetitive: in contrast, logic, mathematics, and scientific texts are (6) terse, literal, and abstract. Therefore, the reader must slow down, attend carefully to every word, and not try to (7) read between the lines; it is not necessary to (8) memorize the text, but you should try to understand each point made before attempting to (9) proceed to the next.

This kind of reading is (10) not unfamiliar to you. You have done it whenever you followed a (11) recipe or instructions on how to build something. But you probably haven't done (12) enough of this kind of reading to be really good at it. Now is your chance to develop skill (13) at intensive reading.

~~read~~--~~light fiction~~--~~not~~--~~memorize~~--~~read between the lines~~-- ~~intensive reading~~--~~learn~~--intensive--~~terse~~--~~enough~~--~~memorize~~--recipe--~~proceed~~--~~different~~--black--question--Dalmatia--at intensive reading

Lesson 23

In this lesson, you should achieve the following *OBJECTIVES:* you should be able to...

( ) list from memory and use, linguistic clues for interpreting statements in English (or another natural language)
( ) explain in your own words, the difference between algorithm and heurism, recognizing instances of each when they occur and giving examples of each from your own experience.

READ:

ON LINGUISTIC CUES

There are four major categories of linguistic cues which will be of use to you in the reading exercises that are assigned in Lessons 23-31:

Syntactic: rules of grammar
Semantic: conventions about what kinds of words "go together"
Usage: arbitrary assignments of meaning
Common sense: (more said later)

Syntactic cues

Much of the meaning of a sentence is encoded in the syntax used. After all, there's quite a difference between...

Don slugged Dick.

and

Dick slugged Don.

The sentence-order tells who got the lump.

You've encountered dead giveaways on multiple-choice tests such as...

5. To cross the Atlantic Ocean, Columbus needed a _____.
   A. almanac
   B. ship
   C. equerry
   D. octopus
   E. elephant

Since the article "a" precedes the blank, rather than "an", you know that the correct answer must begin with a consonant. And furthur, since choice B is the only one with an initial consonant, you could get that answer easily, even though you didn't know anything about the substance of the question.

Semantic Cues

In all natural languages, there are a second-order of rules--not usually stated or studied--which prohibit word combinations that don't "go together" Consider the statement...

Alfred wrote a *tree*.

Semantic rules of English state that the verb "write" (and all its inflections) cannot take a direct object which isn't created by putting pencil to paper (or like acts). One can...

write a poem
write a check
write an exam
or write an apologetic letter to an irritated girlfriend.

Likewise, you can do other things to trees, such as...
plant a tree
prune a tree
curse a tree
even write an essay about a tree
or write on a tree with an appropriate instrument

But you just aren't allowed to talk about...
writing a tree.

Usage cues

Despite the fancy cues given by syntactic and semantic rules, you'll not be able to use them to answer this one:

The smallest naval unit is a _____.
A. squad
B. flotilla
C. regiment
D. battalion
E. corpuscle

Of course, if you're a military type, you'd know that the answer is B: flotilla, but if you're not, you'd probably have to go to a dictionary to find out.

Common sense

Common sense--"gumption", if you must--involves noting regularities of the particular writer's language. For instance, you'd not expect a logician to welcome a statement like:

Keep your nose six feet under water.

although a logic teacher notorious for handing out homework might be prone to say...

Keep your nose to the grindstone.

Thus, when confronted with this problem...

Keep your nose _____.

(six feet under water, to the grindstone)

You'd probably choose the latter option.

In deciphering coined words, you'd probably use a commonsense tactic of looking up word-roots, suffixes and prefixes to try to patch together meanings.

To meet the second objective, complete the reading-exercise beginning in the appendix (p. A.1) and check your answers on page B.1.

Lesson 24

Your *OBJECTIVES* for this lesson will be to be able to....

( ) reproduce the flow diagram of the psychosynthetic process (p.W.) from memory
( ) discuss briefly what happens at each stage in your own words

Assignment: Reading exercise in the appendix.

Lesson 25

Your *OBJECTIVES* for this lesson will be to be able to tell three major ways that problems present themselves.

Assignment: reading exercise for this lesson is in the appendix

Lesson 26

Your *OBJECTIVES* for this lesson will be to be able to...

( ) tell what the phrase "empirical knowledge" means
( ) distinguish between particular and general statements
( ) explain in your own words why knowle gable problem-solvers do the following things:
--keep track of their sources of information
--amass information in orderly collections, even if the order is arbitrary

ASSIGNMENTS:

1. consult the *Oxford English Dictionary* for the following terms:
   empirical (4)*
   particular (1a, b, c)
   general (5a, b, c)
2. Reading exercise in the Appendix; check your answers

Lesson 27

Your *OBJECTIVES* for this lesson will be to be able to...

( ) recognize problems which are amenable to solution by sequences of approximations
( ) explain in your own words what features in a problem-situation must be present in order to make the sequence-of-approximation tactic appropriate

---

* the numbers in parentheses designate which definition (among the several offered) is to be considered; the initials OED abbreviate "Oxford English Dictionary".

( ) tell what an isomorph is and give examples from your own experience

ASSIGNMENT:

1. consult the OED for the following terms:

artificiality (1)	isomorphic (2)
artisan (1)	artificial (1, 6, 7, 8. 9)
artful (2, 3, 4)	artifact

2. complete the reading exercise for this lesson and check your results.

Lesson 28

Your *OBJECTIVES* for this lesson will be to be able to...

( ) tell what these terms mean and give examples of each
cartogram
event-sequence
quantitative graph
( ) distinguish between arrays of objects and symbolic arrays

ASSIGNMENT: reading exercise.

Lesson 29

Your *OBJECTIVES* for this lesson will be to be able to...

( ) tell in your own words, what a selective signal is.
( ) specify what the terms of object language and metalanguage are
( ) give in your own words, an explanation of how philosophers and grammarians differ in their contemplation of language
( ) explain what gives literal language its meaning and how it differs from the means by which figurative language is significant

ASSIGNMENT...

1. Read the following...

ABOUT OBJECT LANGUAGE AND METALANGUAGE

Object language is talk about things, people, events in the physical world (among other things), Examples:

Don and Dick have had an argument over music.
Someone has stolen my hat again.

Metalanguage is talk about other talk. Examples:

"Don" has three letters in it.
Political propaganda is an unreliable sourse of information.

2. Now, read the following...

Let us now turn to developing a working knowledge of language as a problem-solving tool.

Language has two functions: (i) we use it to communicate to other people: (ii) we use it to represent problematic situations of ourselves while searching for the action that will dispel the difficulty. Sometimes these two usages coincide, and sometimes they don't. But even when they coincide, we can think about the problem-solving function by itself.

And when we get straight about waht our language does do for us, our problem-solving efforts are more prone to succeed.

For instance, many young people, when trying to make an occupational choice, make lists of their preferences before they spend a long time, randomly looking for jobs. They are doing this, they feel, so that they can fix in their minds, the relevant factors upon which they intend to make their decision. This methodical approach seems preferable to waiting for the "right job" to just turn up by sheer luck.

When such lists are used, it's clear that the writer isn't trying to communicate with someone else as much as he is trying to use language as a problem-solving tool.
When working with people, it helps to know how they're using language--and when they're using it erroneously.

Language is older than our species. The species homosapiens didn't invent language. We inherited it from pre-human ancestors. True--man has sharpened this tool and made it a more useful instrument. More interesting we have created languages deliberately.

Many philosophers find that just "playing around" with language concepts is a fun game. We hope you do too...

3. Finally read and check the exercise in the appendix for lesson 29.

Lesson 30

In completing this lesson, you will have achieved the ability to...

( ) tell what the words 'affective', 'directive', and 'empirical' mean.

Complete the reading exercise for this lesson and check it.

Lesson 31

Your *OBJECTIVES* for this lesson will be to be able to...

( ) characterize formal logic in terms of its relationship to other usages and in terms of the kind of problems for which it is useful
( ) distinguish between a definiendum an a definiens
( ) describe several different methods of definition
( ) tell the difference between natural and artificial language
( ) list and describe the parts of a recursive definition

ASSIGNMENT: complete the last reading exercise and check your work. Then read the following...

RECURSIVE STATEMENTS

In these few paragraphs, I'd like to tell you about *recursive statements*.

To the untutored eye, these statements appear to violate an old rule about circularity in definitions. And this can be a bit confusing:

Recursive statement are used in stating rules and definitions in logic, set theory, and mathematics--therefore, it is important for you to be able to recognize recursions by their form and to to interpret them easily.

In the reading exercises--page A.29--almost in the middle of the page--you'll see a passage marked with an asterisk (*). The footnote asks you if the statement isn't circular.

A recursive statement's grammatical form is its definitive characteristic. The structure is...

name of definiendum or subject	*verb* eg. is, is defined, follows these rules...	1. *initial clause* 2. *reiteration clause*

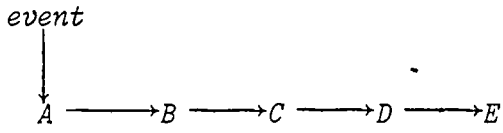
thus, the example in the reading exercise, the example we've cited breaks down this way...

a report	is either	1. the result of the speaker's direct observation
	OR	2. something he knows about through a report

To be correctly constructed, recursive statements must follow these rules:

A. the subject or definiendum cannot be named in the initial clause, but may appear in the reiteration clause provided that...
B. the reiteration clause may always applied in a finite number of times to arrive at one application of the initial clause.

Continuing the example...



The direction of the arrow indicates the sequence in which knowledge generating the report flows. We can account for our claim that the example is, indeed, a recursive statement, conforming to the rules by noting that the word 'report' does not occur in the initial clause (that takes care of A) and that by beginning with any individual except *A*, and proceeding against the direction of the arrows, we'll arrive at *A*'s direct knowledge of the event--thus, we conform to rule B.

You are now ready for the examination over the "core" of the course. This will be an open-book, multiple-choice, no-time-limit test. For it you'll need:

paper
pencil
textbook and syllabus

Most students complete the test in about an hour.

To review for the test, double-check each lesson objective for the course. If you're not sure about your mastery of the objective required, go back over the assignment.

When you feel that you're ready for the test, contact the instructor.

UNIT IV

In completing Units I-III, you've completed the "core" of the course. In this unit, you'll select your own materials from among those listed in The Phile--about 35 hours' work among the projects listed. If the collection you would like to do adds up to a few hours more, the excess can be applied to requirements for "A" project.

During Unit IV, you will still be required to meet all scheduled conferences--and turn in completed projects as you go.

Before starting on Unit IV, discuss the projects you've selected with the instructor. Once your selection has been made, you should set reasonable targets for each project's completion. Please write out your project-list and completion plan on the next page.

Fill out these columns as you begin Unit IV

Fill in these columns as you complete each project.

Title	Identification Number In Phile	Average Completion Time (hr)	Date Planned to Complete	Actual Time Required (hr)	Actual Completion Date
	Total		*Should equal 35 hours; 45 hours if you're using projects to reach a agrade of "A".*		

THINKING, LOGIC, AND SCIENCE

23

Some problems have an effective procedure for their (1)_____ --that is, one can write down, in advance, (2)_____ for gaining a sure solution. Such directions -- guaranteed directions -- are called algorithms. An example of an (3)_____ is the formula for converting inches to centimeters.

☐ centimeters = ☐ inches times .3937

This formula (4)_____ you exactly what to (5)_____ in order to compute the equivalent centimeter measurement from an inch measurement and is (6)_____ to work (provided you don't goof in your arithmetic).

But there are many problems for which you cannot furnish an (7)_____. If Don wants to make an impression on a certain girl, we cannot furnish him with a (8)_____. But short of that we might (9)_____ that he try flattery. We know that flattery (10)_____, but it does in many cases and it's worth a try.

Such advice is called (11)_____. On the basis of past experience with similar problems, we have a possible approach, but we (12)_____ results. A heurism says: try so-and-so. . . .it may work, but don't be (13)_____.

Some problems can be solved by reference to an (14)_____ which guarantees results; but all problems can be the subject of (15)_____ advice, you cannot be sure of getting results.

What happens when we (16)_____ our old habits to meet a new situation?

1. When our habitual behavior is (17)_____ by a situation that requires thinking, we begin by imagining what it would be like not to have the (18)_____ we are facing.

2. We look for (19)_____ elements in the situation.

3. Having found something familiar, we attempt to (20)_____ it with new parts of the situation. When this is done, we consider (21)_____ our old habits.

4. We then try out our (22)_____ of approaching the situation.

5. If the new pattern does not work, we (23)_____ and work over the things we have done before to try something else.

modifying--new way--problem--heuristic--disappointed if it doesn't--algorithm--heuristic--suggest--recognize--won't always work--do--cannot guarantee--go back--tells--familiar--solution--connect--guaranteed--directions--called--sure-fire method--algorithm--frustrated--algorithm--reorganize

If it does work, we make the new pattern another (24)_____way to deal with things.

Doesn't it bother you to have a pronoun flapping in the breeze without an antecedent? What does the word "we" mean? Well, it means Checkers, the cocker spaniel; Alfred E. Newman; white mice; Albert Einstein; and, most important; (25)_____.

Of course, there are some (26)_____. Most important, Dr. Einstein and you (sometimes Mr. Newman) use (27)_____in thinking, whereas animals don't. Also, the more intelligent forms of animal life can make (28)_____ and can delay their responses longer. Let me show you what I mean.

Albert Einstein and you can use symbols in your (29)_____ -- that is what makes you (30)_____. That is why you can solve (31)_____ problems. Consider the problem Archimedes faced --

24

Archimedes was an early (1)_____, who lived in the Greek city of Syracuse. The king, Heiron, called Archimedes to court one day and placed a (2)_____ before him. It seems that a goldsmith had been commissioned to make a crown of pure gold. Sometime after the crown was finished, delivered, and paid for, a rumor went around to the effect that the crown was not made of pure gold and King Heiron had been gypped. Since Heiron was one to insist on getting his (3)_____, he wanted Archimedes to (4)_____ whether the crown was really pure gold or a phoney alloy.

So, Archimedes took the crown back to his (5)_____ and went to work on it. And just because he was a human being, working on a (6)_____, he was probably muttering to himself. . .

"It sure looks like gold, by golly. Same (7)_____. But I know you can make an alloy that would (8)_____ experts. But how about hardness -- no, if the mixture has enough lead in it, it would be (9)_____ too. . . ." And so it went. One possibility after another. Each (10)_____ that Archimedes could try would come out the same. (11)_____ could be made that would behave like gold. But he had a (12)_____ that the rumor was true and the crown-maker was a rascal.

To take a (13)_____ from his labors, he went down to the public baths. The Ancients had rather elaborate public facilities which resembled an indoor (14)_____. As Archimedes was paddling about, he noticed that his

finer distinctions--swimming pool--symbols--habitual--you--break--differences --soft--color--hunch--human --test--thinking--scientist--complex --human--problem--money's worth--fool--determine--laboratory--something else

body floated, and he idly (15)_____ if another human body would have the same buoyancy as his own. (16)_____ that they did not, he noticed also that the fat ones floated, whereas the skinny ones had a tendency to sink. Then -- a (17)_____ came to him!

"Eureka!" he cried, "I've got it!" And, in his enthusiasm, he dashed out of the bath and back to the laboratory. (Legend has it that he forgot his clothing, and shocked the good citizens of Syracuse by making the trip in the altogether.) The (18)_____ that he had been looking for was that each substance has a unique (19)_____ about its weight. If you weigh it and then weigh the amount of water that it displaces, you have two weights that can be (20)_____ like this:

$$\frac{\text{weight of object}}{\text{weight of displaced water}}$$

This (21)_____ is unique for each substance. In the case of the crown, it proved that the stuff it was made of was not gold. This (22)_____, called Archimedes' Principle, was a major breakthrough in chemistry; and incidentally, the downfall of the rascally crown maker.

Besides being an amusing tale; this event was an example of PSYCHOSYNTHESIS. The word, made of Greek fragments meaning --

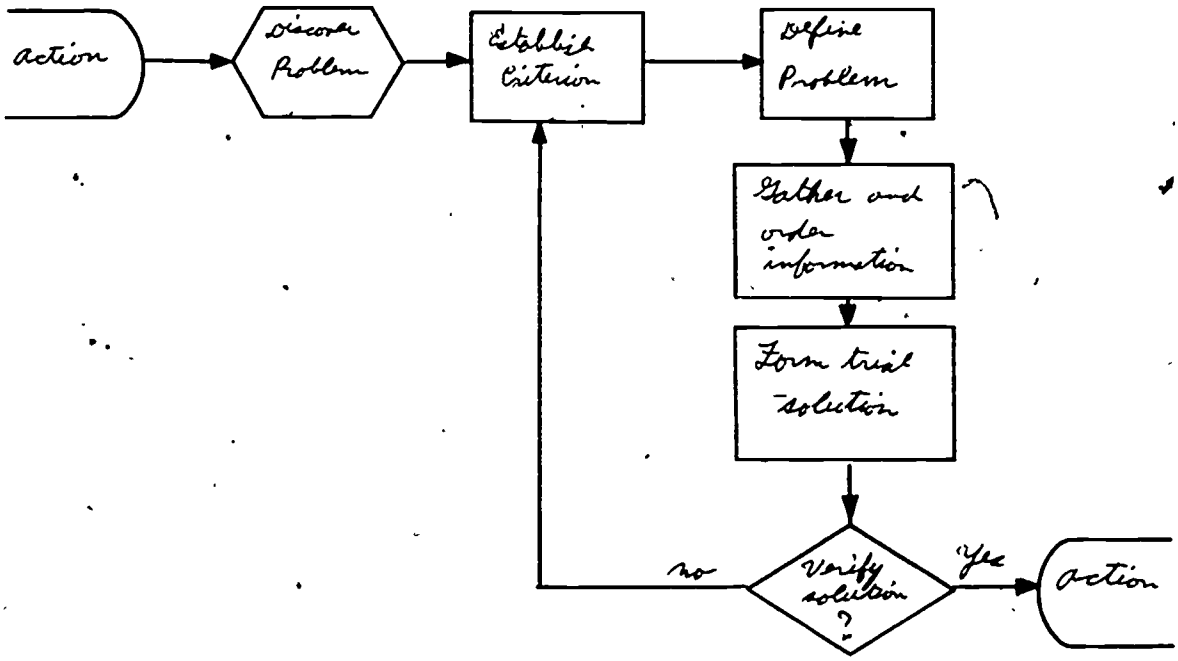
psychos -- (23)_____
syn -- together
thesis -- (24)_____

Here is a list of the processes that go on during a psychosynthesis:

1. (25)_____ there is a problem at hand.
2. (26)_____ just what the problem is.
3. (27)_____ what an acceptable solution is.
4. (28)_____ information and setting it in order.
5. (29)_____ a trial solution.
6. (30)_____ the trial solution.
7. (31)_____ the solution.

Steps 4 and 5 are sometimes called (32)_____ and (33)_____ because much of this activity is unconscious and the results seem to pop out uncontrollably. Compare this list and the flow-chart below. Do you see any similarity? (Next page)

forming--wondered--clue--"illumination"--using--defining--mind--ratio--
putting an idea down--expressed--observing--thought--"incubation"--
establishing--verifying--discovering--gathering--characteristic--discovery



Now you know what the study of heuristic is about. It's about this (34)_____ process. Let's look at it closely now.

25

1. Perceiving problems. I used to work for a newspaper. In the managing editor's office there was a sign that read:

ANYONE WHO CAN REMAIN CALM IN THE MIDST OF
ALL THIS CONFUSION SIMPLY DOESN'T UNDERSTAND
THE SITUATION.

Some people can go through life without ever meeting a (1)_____, simply because they weren't (2)_____ enough to see them. How many people have sat idly watching things fall to earth without being troubled by the matter. It troubled Newton. It (3)_____ Einstein. And out of this alertness, we have a great deal of scientific (4)_____.

discovery--alert--psychosynthetic--problem--troubled

Have you considered this. . . the author of this book is trying to train you about your (5)_____.

-------How do you know that he's not up to something strange?

-------How do you know that he is (6)_____ to talk of such matters?

Perhaps you'd better (7)_____ what you are reading carefully to be sure you are not being fed a bunch of bunk!

Just how do we run into (8)_____? There are three ways I can think of:

a. The most common (9)_____ in which problems arise is when we are busily engaged in some activity, when BOOM! Something gets in our way. We have to stop and think our way out of the situation. This is called an (10)_____ TO ACTION.

Example: Penelope is going to call Abigail on the telephone. When she dials the number, nothing happens. No ringing signal, no busy signal -- just nothing. Now she must think. . . is the phone working? Is the cord broken? Is something wrong with Abigail's phone? Perhaps father has forgotten to pay the phone bill. . . '

b. Another kind of situation in which problems arise is (11)_____ of school. The problem is first perceived or even made up by someone else and dropped into your lap. This is called the (12)_____ PROBLEM.

c. The third kind of problematic situation is the (13)_____ PROBLEM. People sometimes cuss (14)_____. It is said to have killed the cat. The truth of the matter is that cats that are (15)_____ often find things out that are useful -- but at any rate, they have a lot of fun looking into things!

2. Defining problems. Before you can find a satisfactory solution to a problem, it is necessary to get in mind just what the problem is. This seems painfully obvious, but you'd be surprised how many people go through life solving the (16)_____ problems!

A (17)_____ problem often goes a long way toward solving itself.

-------Properly thought out, a problem-statement will give clues to the

problems--curious--communicated--wrong--examine--typical--intriguing--thinking process--competent--curiosity--obstacle--well-founded--situation--well-formualted

kind of solution required.
-------A good problem-statement indicates the kind of (18)_____ needed in finding a solution.
-------A clever statement of a large problem often shows how the task can be broken up into (19)_____ parts.

A bus is travelling down the street with eighteen passengers on it. It stops and discharges five passengers; two people get on. At the next stop, six people enter the bus, four get off. Further down the street, twelve people get off the bus. From this point, there are four more stops before the end of the line. At each of these stops, a single passenger is discharged.

a. How many passengers are in the bus when it comes to the end of the line?

b. How many times does the bus stop before it reaches the end of the line?

Not only does problem (a) require different information from (b), (numbers of people as opposed to number of stops); problem (a) requires a different technique of solution from problem (b).

The process of (20)_____ is sometimes called FORMULATION. A formula is made of (21)_____. Some problems can be formulated in (22)_____ symbols, ordinary words. Others are more conveniently formulated in (23)_____ terms. Many students run into trouble in mathematics courses when faced with "word problems." Let us explore this business and see what can be (24)_____ from it.

Observation: when working with problems (word problems), most students find that the hardest part of the task is in understanding what (25)_____ are to be performed with which numbers.

Observation: once the task is laid out in terms of the arithmetic operations, the (26)_____ is usually a rather straightforward task.

Conclusion: when dealing with numeric quantities, ordinary English is a crummy way to (27)_____; (28)_____ language is a better way to formulate number problems.

Just because this is so, you are given word problems to develop your ability to pose number problems in mathematical formulation.

pose a problem--mathematical--computation--learned--arithmetic operations--numeric--symbols--everyday language--defining a problem--simpler--information

Your study of algebra will include a number of fancy ways to formulate problems which would be difficult to do in "ordinary English" but which are quite simple to do with (29)_____. People are sometimes (30)_____ by higher-level mathematics because they look at the difficulty of the problem involved; what they miss is that difficult problems can be (31)_____ by the application of mathematical techniques.

Now when trying to define a problem, you have to make a (32)_____; this decision is about the ideas or objects that you are working with. Here is the choice:

-------Am I to (33)_____ something before me already?

OR

-------Must I (34)_____something not how before me ?

The first of these (35)_____ applies to this kind of question: How do I get a point on my pencil? The second of these possibilities (36)_____ to this: What kind of writing instrument will draw a perfect circle?

a. Operations on given objects and ideas.

AUGMENTATION: adding to (numbers)
extending (physical objects)
improving (processes and techniques)

(37)_____ subtracting from (numbers)
removing from (physical objects)
restricting (processes and techniques)

(38) _____ multiplying by (numbers)
duplicating (physical objects)
reiterating (processes and techniques)

(39)_____ division (numbers)
fragmenting (physical objects)
analyzing (processes and techniques)

and so forth. . . .

b. Providing an object or idea. When you meet this kind of (40)_____ _____, you need to get a clear and distinct idea of where you are going.

diminution--come up with--operate on--replication--applies--frightened--partitioning--requirement--possibilities--simplified--decision--algebraic methods

3. Establishing criteria. Now, let's talk about establishing a problem's criterion of (41)_____. After all, it would be nice to know when you have had done with a problem.

Consider the following Roman numerals which represent the number nine. . .

IX

How would you convert them to the number six by adding one letter to them?

What is peculiar about the criterion of satisfaction for this problem?

You will notice that the criteria of different problems will change according to the circumstances (42)_____ arise. Let us take, for example, the problem of finding the quotient of 563 divided by 21. The number of fractional places that you carry the computation to will be set by the circumstances that you encounter the problem in.

--------If this is a (43)_____, the degree of accuracy will be specified by the textbook or the teacher.

If you are dividing 563 peanuts among 21 people, you may distribute 26 peanuts to each and quietly (44)_____ the remainder.

--------If you are just idly dividing numbers for the sheer (45)_____ _____ of it, you might well carry out the computation to umpteen decimal places.

26 4. Gathering and ordering information.

--------Chances are, if you are working on a problem, you find that other people have worked on the same or (1)_____ problems. Libraries, reference books, etc., often contain just the information you need. I shall abjure telling you how to use them, but warn you that just because something is printed, doesn't warrent (2)_____ it.

--------If you can't find recorded information to (3)_____, or if you don't trust what you read, you can conduct your own (4)_____ study. An empirical study is based on your own direct observations--(5)_____

trusting--suit your needs--similar--satisfaction--school problem--entertainment--under which the problems--empirical--munch--difficult

in the case of historical problems, but not so difficult in other cases. Penelope, who has never met Don, was told that he was handsome. However, her source of information was Little Andrea, whose ideas of masculine good looks were (6)_____. So, the next time she had a chance, Penelope inspected Don (7)_____. She was making an empirical study rather than accepting an (8)_____ of information.

Information comes in two forms: PARTICULAR and GENERALITY. Penelope's study of Don yielded some (9)_____ information. Generalities are (10)_____ like:

BEES STING.

Perhaps you have been (11)_____ that generalities are untrustworthy. I'll bet you take the generality about bees (12)_____!

When you gather information:

a. Record large amounts in written form; memory is a (13)_____ thing. How many homework assignments have you forgotten?

b. Keep your recorded data in some sort of (14)_____, so that you can pick out any piece of it without (15)_____ through the whole collection.

c. Record (16)_____ of information when it is not the result of your own empirical study. Some written sources are (17)_____ _____. Detectives on the police force make a (18)_____ between information from stool pidgeons and solid citizens.

5. Forming a trial solution. There are a number of general solution-patterns which (19)_____ on a problematic situation. I offer them only as heuristic advice, since I read an article by (20)_____. Mr. Godel, by using a tricky kind of argument, has proved that one can not offer a (21)_____ for the solution of all problems.

a. SYNOPTIC CONSTRUCTION. Let's bust up the word "synoptic" into its Greek roots:

syn- (22)_____
-optic (23)_____

algorithm--sight--can be tried out--tricky--questionable--wrong--particular --orderly pattern--distinction--seriously--together--Mr. Kurt Godel--sources --searching--warned--indirect source--for herself--statements--questionable

The phrase "synoptic construction" says "putting something together while seeing everything involved."

Number-series problems are a curious kind of thing. You are given a series of numbers and then are asked to name the next number. For instance:

3, 6, 9, 12, The next number is 15. These numbers are generated by adding 3.

2, 4, 8, 16, The next number is 32. These numbers are generated by multiplying by 2.

Your problem, this time, is to find the next number in this series:

8, 5, 4, 9, 1,

Hints: The number is less than 9.
Try writing these numbers in longhand, in a column.

* * * * * * * * * * * * *

When using this approach, we often use the (24)_____ part of our mind -- but only if sufficiently (25)_____ in the problem. Because the subconscious mind is a pretty wacky thing, the results of these synopses require (26)_____ explanation to others before they make sense.
When applying this procedure, it is extremely unlikely to (27)_____ a mere determination to "see a solution."

b. EXHAUSTION AND ELIMINATION. During a basketball practice, someone was injured slightly and the coach sent Don after the first-aid kit, saying, "It's in the desk drawer." When Don got to the coach's office, he was slightly annoyed to find that there were three drawers in the coach's desk. He (28)_____ by opening all three drawers of the desk. The kit, of course, was in the last drawer he looked in.

In essence, Don (29)_____ all possibilities.

The key to this method is to be sure that all possibilities have been (30)_____. Many times, have I started out in the morning for school and have discovered that I don't have my keys. I then go dashing

responded--interested--eliminated--careful--thought of--subconscious--implement

through the house, looking in all of the drawers, the cabinets, and table-tops. Sometimes my daughter points out to me that the keys are hanging in the ignition-lock of my car.

The fallacy I have committed in this case is that I have not (31)_____ _____ thought of all the possible places that keys could be in.

c. ANALYZING THE DESIRED RESULT. A clearly-stated description of the problem and its criterion of satisfaction, as we have already learned, is often the next thing to having the problem (32)_____. Battle-scarred veterans of the mathematical word problem know to read the (33)_____ first, then the information given.

A room must be painted on the walls and ceiling with a type of paint that covers 250 square feet per gallon. There are three 24" x 36" windows and an 80" x 36" door which (obviously) are not ot be painted. Exactly how much paint will be required? The room is 10' high and the walls are 20' and 30' long, respectively.

The question calls for a quantity of paint; this is a number of square feet to divided by 250. The first formualtion of the problem is:

some square feet/250 = how much paint

The (34)_____ mentioned here will be:

ceiling
four walls less door and windows

square feet = (20 x 30) + two times (20 x 10) + two times
(30 x 10) - door and windows

And (35)_____ is all that remains. The key to the problem was in picking out the (36)_____ to be answered and "working backwards" to the known measurements.

d. HYPOTHESES AND TEST. In (37)_____, this is a pretty rugged method to make work -- in science, it is a very good one. It consists of guessing at a general cause of the desired (38)_____ and then trying it out. If the result doesn't come out right, then we must try

square feet--solved--exhaustively--question--mathematics--effect--working out the arithmetic--question

something else -- but at least we have (39)_____ something from our guess-and-trial. The trick is to learn as (40)_____ _____ from things that don't work to specification.

One evening, after supper, Penelope was assigned the distasteful task of scouring the roasting pan, upon which a thick, greasy gump had been baked -- burnt, even. Being (41)_____, she decided to try to remove it with the least application of (42)_____.

Her first guess was that soaking would soften the gump enough for (43)_____, so she soaked it for half an hour. At the end of the soaking period, however, the gump was still there, unyielding as ever.

The next (44)_____ was that the roughest scouring pad in the kitchen would remove the gump without too much effort on her part; but alas, the scouring pad just slid on the surface without doing a thing to the gump.

Straightforward methods failing, she then contemplated (45)_____ _____. Placing the pan in the sink and covering it with strong lye water resulted in a rather dramatic (46)_____. The pan was aluminum. Penelope (47)_____ at this point: that one shouldn't apply strong lye to aluminum.. (It had nothing to do with the gump problem, but it is a (48)_____.)

After washing the lye water off the pan and down the drain, Penelope (49)_____ the problem further. By this time, her parents had left for a PTA meeting, and she had the house to herself. After some further thought, she took the pan to her father's garage workshop, where she applied the wire brush of dad's electric drill.

The pan was (50)_____ when Penelope's mother examined it the next morning, and Penelope gained much praise for her industry and application. (Her father, the next week, remarked that he had a mysterious black gump on his wire brush attachment, and he had no idea where it came from.)

The essential element in Penelope's approach to the problem was that she made shrewd guesses about what would work, and one of them finally paid off.

27

We have examined several general-process techniques with some reference

bright, smooth, and clean--learned--easy removal--hypothesis--guesses--chemical reaction--pondered--elbow grease--learned something--handy thing to keep in mind--a more drastic method--intelligently lazy--much as possible

to abstract models. The following are more specialized patterns.

THE SEQUENCE OF APPROXIMATION. In order to show you what a sequence of approximations is like, I shall ask you to stop reading and get a dictionary. ********Got it? I shall now show you a very (1)_____ way to find words in a dictionary -- if you use it you will save more time than all these reading exercises have taken.

We are going to locate the word "paper." One method would be to start at the front of the dictionary and keep turning each page until you get to the right page. This would take quite a while to accomplish, but it would work.

Then, of course, you could just guess at where to open the book. Your chances of hitting the right page are about one in a thousand; not very good prospects, are they? (Of course, you might be lucky and save time.)

The approximation method is as follows:

First, open the dictionary right in the (2)_____. Then decide which half of the dictionary contains the correct page -- the one with "paper" on it. It will be the half in your right hand.

Second, release the half in your left hand and (3)_____ the right-hand half of the book down the middle. While holding both quarters, look at the page where you have the book opened. This time, you will probably find that the word "paper" is in the (4)_____ of the book that is in your left hand.

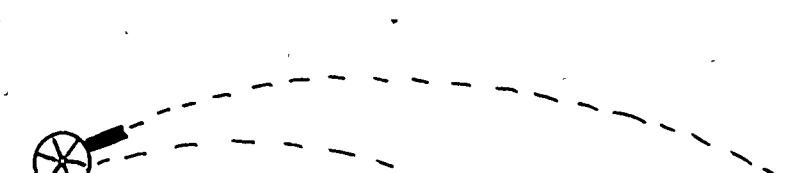
Third, release the quarter of the book which does not contain the page with the word "paper" on it. Split the remaining quarter and examine the (5)_____ -- and so on until you have one page left with the word "paper" on it.

You will notice that while this process has a number of "wrong" openings of the book, each opening or splitting narrows down the (6)_____ to be examined. In fact, to get at any word in a standard-sized dictionary will take not more than eleven openings to get the (7)_____ page.

quarter--middle--desired--efficient--split--remaining pages--eighths

The (8)_____ of problem which often yields to the approach of approximation is the type where you want to locate something in a (9)_____ and you have some (10)_____ between which to work. In the case of the dictionary, the limits are the front and the back covers, and the sequence is the alphabetic order of the words within the dictionary. It's a little difficult to apply this method if you (11)_____ alphabetic order. Numbers are easier sequences to work with. . .

In the Army, the field artillery uses the same pattern to aim big guns at targets. It's not too difficult to find the right direction to point the things; the problem is to determine the right angle (up and down) to (12)_____ the barrel of the gun.



Within some limits, the distance the gun will shoot is (13)_____ to the angle the gun makes with the horizon. The artilleryman has the (14)_____ of finding the correct muzzle elevation. The "bracketing method" often used, consists of taking a pot shot at the target and (15)_____ whether the shell falls short or overshoots. He then raises or lowers the muzzle to get on target. He now takes an (16)_____ of the limits of the muzzle-elevations and takes another shot. He watches this third fall and (17)_____ whether it is over or short. This gives him a (18)_____. And so forth. . . Eventually, he gets close enough that, while he might be an inch off target, the (19)_____ is a hit.

The method of approximation has a number of mathematical (20)_____, particularly in programing computers. Other examples are: square root computation, calculus.

decides--tilt--special type--task--related--practical result--limits--don't know--observing--average--well-ordered sequence--closer limit--applications

ISOMORPHS. Before we find out what this (21)_____ is, let's tell a tale.

Don's mother has recurrent spells of (22)_____ the furniture around the living room. Dad has learned that this moving which Mother does involves a lot of (23)_____. Furthermore, Mother has to try different arrangements before she can make up (24)_____ as to which she likes best; Dad has discovered that most of the work involves the (25)_____ rather than the final arrangement.

One evening, Dad said to Don, "Old chum, I can see the signs; you wait, next week-end, Mother will have us re-arranging the furniture."

"But, Father, dear Father," said Don, "we were going fishing next week-end. If Mother re-arranges the furniture, we'll be (26)_____ from moving it that we won't be able to hold our fishing rods."

"Fear not, son of mine," said Dad, "this time, science and wisdom have triumphed over ignorance and superstition." And with that, he unveiled (27)_____ which he had concealed under an old bedsheet. It was (28)_____ of the living room and all the furniture in it.

Fiction to the contrary, men do have good (29)_____ about women's moods. At the appropriate time, Dad introduced Mother to his (30)_____. Mother, delighted with the model, was able (31)_____ all combinations of furniture she wanted. When finished, she summoned the men of her life who quickly re-arranged the living room furniture to her (32)_____ before zipping energetically off to their secret fishing-place. Thus it was that Don and Dad were able (33)_____.

Dad had liberated himself and his admiring heir from the heaviest part of the task by using a (34)_____ to allow relationships to be seen. A scale model is only (35)_____ of ISOMORPH. Let's do some more Greek roots.

iso-	same
morph	shape, pattern, form

so exhausted--to avoid a great deal of furniture-moving--scale model--her mind--moving--specification--to try--a scale model--trials--one kind--scale model--masculine muscle--an object--intuitions--special pattern

Isomorphs are ways to represent (36)_____ of things. They are useful, because they leave off (37)_____.

The problem of the living room and its furniture was (as the two males well understood) the (38)_____ of the furniture. This is what the model (39)_____. The relative size and (40)_____ of things were preserved, and this was what Mother had to see before she could come to a (41)_____ about arrangement.

As you have gathered about me, I am a bug about (42)_____. I collect them like (43)_____ collect stamps. When I visit a new city, I sometimes head for the city library to see if there are any (44)_____ on the subject there that I haven't read. If you have ever visited a strange city and asked where the library is, you probably know that your chances of finding (45)_____ who knows where the library are very small. Most people don't (46)_____. But if you do find someone who knows, I'll bet you have difficulty (47)_____ of his directions. Take my (48)_____. Get a (49)_____. A good map usually (50)_____ you much more about getting around town than an inarticulate native can.

28

Abigail's family, being wealthy people of leisure, decided to take a (1)_____ on a luxury liner. As they neared the equator, the Captain (2)_____ the matter over the speaker system. Sweeping the horizon with a pair of (3)_____, Abigail complained that she could see no equator. A passing deck-hand, overhearing her complaints, and eager to see that the passengers were happy, decided on a (4)_____ _____. He snatched a hair from his head and stretched it across in front of the field glasses. To his horror, he saw a flea clinging to the hair, moving across the girl's field of vision.

"There's the equator," cried Abigail excitedly, "and I can see an elephant walking on it, too."

A fancy phrase sometimes used to describe a map is (5)"_____ _____." Let's look at the roots of these words. . .

topo	place
-logical	speech, knowledge
carto-	sheet of paper
gram	abstract, symbolic picture

A TOPOLOGICAL CARTOGRAM, then, is a sheet of paper (or the like) upon which (6)_____ present information about places. Note, particularly, that a map is made of (7)_____ symbols. Abigail didn't seem to be aware that the notion of an equator is represented by a line which is an abstract symbol. The kind of symbol I have in mind for you to be thinking of is like the map-symbol for schools like --

symbols--trip--some aspects--problem-solving techniques--other people--other aspects--tells--know--advice--purely abstract--topological cartogram--someone --course of action--weight and bulk--left out--proportion--decision--books--making sense--map--announced--field glasses

This is the conventional map-symbol for a school. Does your school look like this? Probably not. This does not mean that the map is (8)_____. It simply points up the fact that maps are not (9)_____.

You know that there are other topological cartograms besides maps, for instance--

(10)_____ -- symbolic descriptions of how to build houses, ships, airplanes, etc.

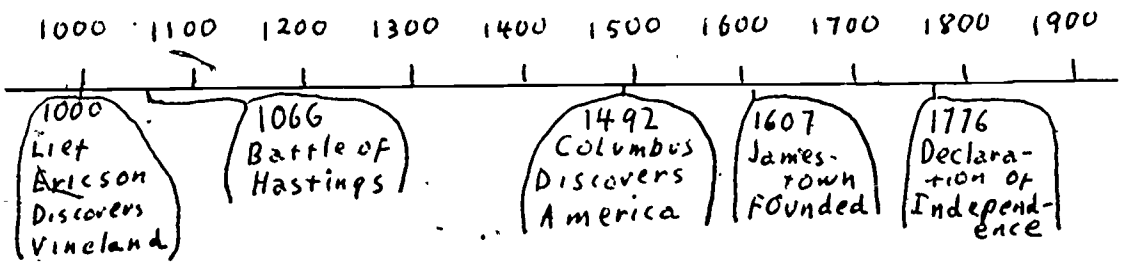
(11)_____ -- symbolic descriptions of how electrical and electronic equipment is to be constructed.

Floor plans, cargo-loading plans,. . .

The common elements found in all these cartograms are:

(a) they are (12)_____on a flat plane;
(b) they are not pictures, but collections of (13)_____, usually representing (14)_____.

But space relationships aren't the only things that can be (15)_____ on a flat plane. Time, also, is amenable to (16)_____. Here is one way to represent time and historic events that you've probably studied --

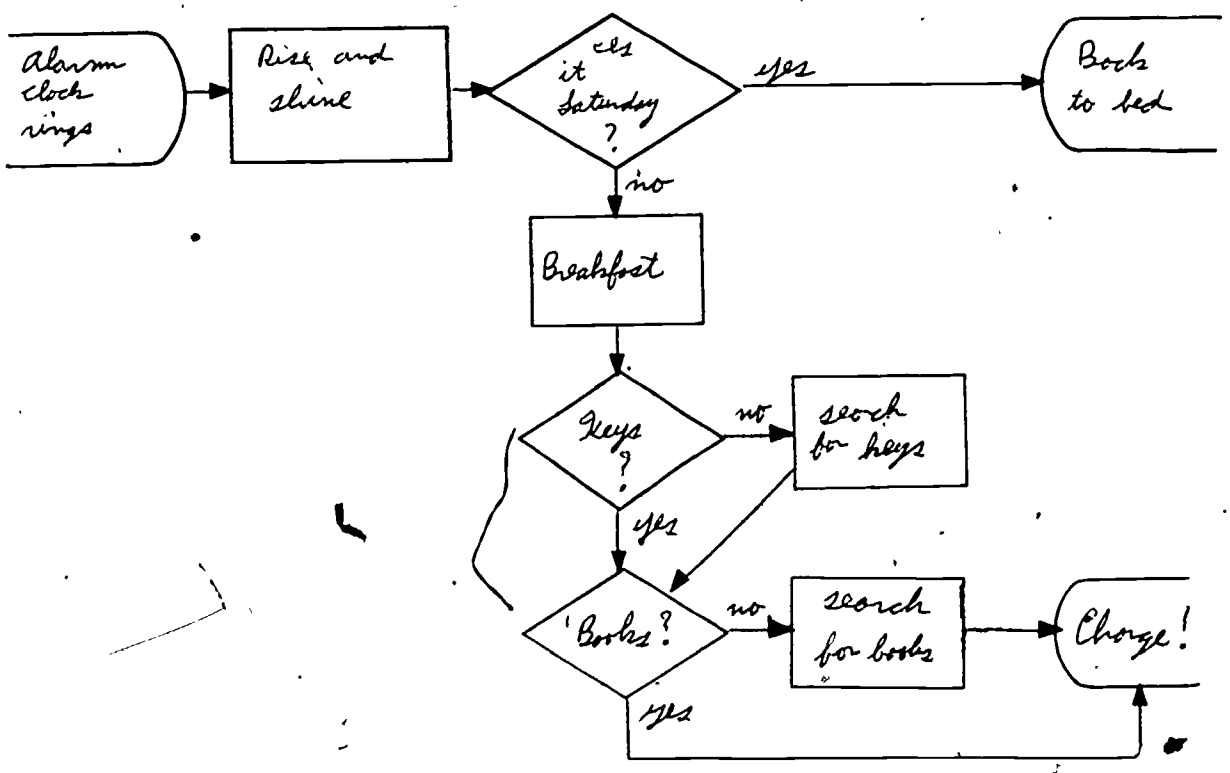


Did you (17)_____ that as much time passed between Ericson's visit to our continent and Columbus' as between 1492 and the present? History students use (18)_____ to represent the spacing of events along time. This helps us to get a (19)_____ for the amounts of time involved.

Time-lines aren't the only way to (20)_____. Another (21)_____ representation technique is the FLOW DIAGRAM.

wiring diagrams--symbol--represented--space relationships--photographic pictures--abstract symbols--planar representation--time lines--feel --show events in a sequence--blueprints--incorrect--event sequence--realize--represented--show events in a sequence

Flow diagrams are used in depicting a series of events or (22)_____ that must be repeated and in which decisions must be made as to (23)"_____ _____." They (24)_____ often by engineers and computer programmers, but they have a use in everyday life. The following is a description of how I get off to school in the morning. . . .

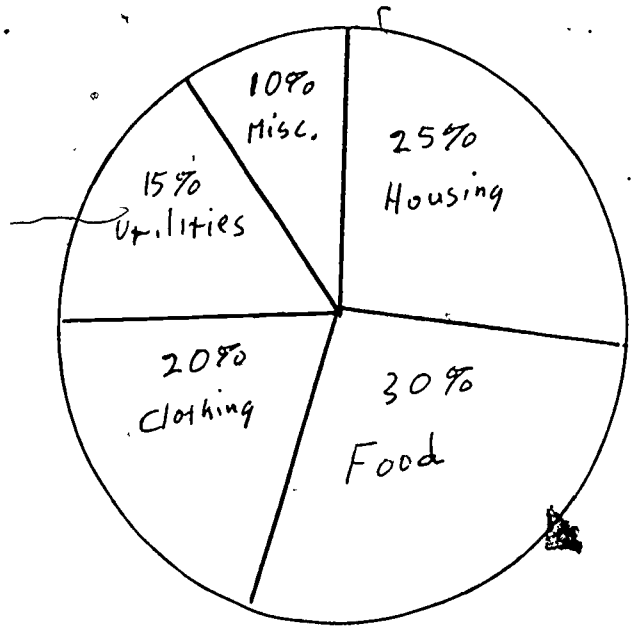


Notice that the entries and exits to the process are opened (25)_____, operations are in (26)_____, and decisions are in (27)_____ _____ boxes.

So far, we have discussed a few (28)_____; special patterns to be used when the problem concerns (29)_____. The two isomorphs we have mentioned are CARTOGRAMS, used for representing space and position; and EVENT SEQUENCES, used for representing events and time. We now

are used most--diamond-shaped--processes--rectangles--which way to go--isomorphs--ovals--representing things

turn to a third kind of ISOMORPH, namely, (30)_____. I suspect that you are quite familiar with some kinds of graphs. The first kind I shall talk about is the (31)_____.



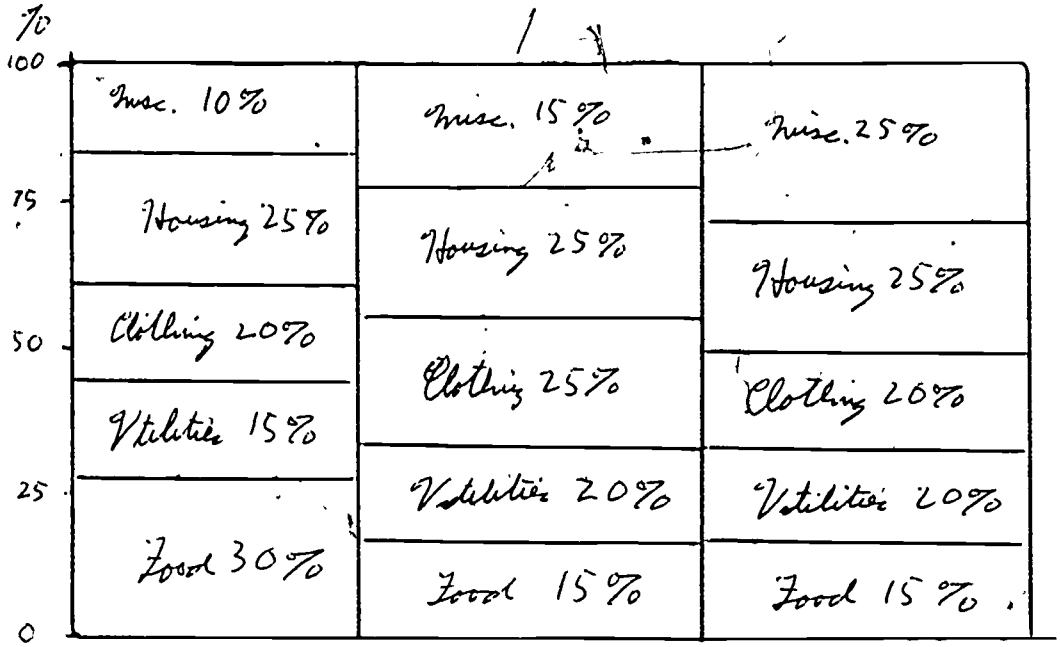
This circle graph represents the budget of a family for a certain year. Every elementary math book has a whole batch of such percentage-representations. (Don't panic. We won't have you doing any of that stuff in the study of logic.)

One reason why the circle graph is an easy representation is that it shows (32)_____ pretty clearly.

But the circle graph has a decided (33)_____. It can represent only one state of affairs at a (34)_____. The (35)_____ can be used to represent a series of similar, but changing situations. The following page has an example that depicts the same information as the circle graph above, and two more years' (36)_____ at the same time. You can see (37)_____ the situation changes, as well as (38)_____ it changes.

If you compare the circle graph with the histogram, you should appreciate that histograms have two advantages over circle graphs: the amount of information and the usability.

fractions of a whole--data--time--circle graph--that--how--disadvantage--histogram--courage--quantitative graphs--more



It happens that this family moved out of the city to a small farm early in 1961. (Dad got a look at the food bill and decided to grow his own.) But clothing, utility bills, and other expenses were slightly higher in 1961, because, for instance, city pants are not especially appropriate for plowing. The following year, when the cost of fixing up the house was done, money was, however, available for other things.

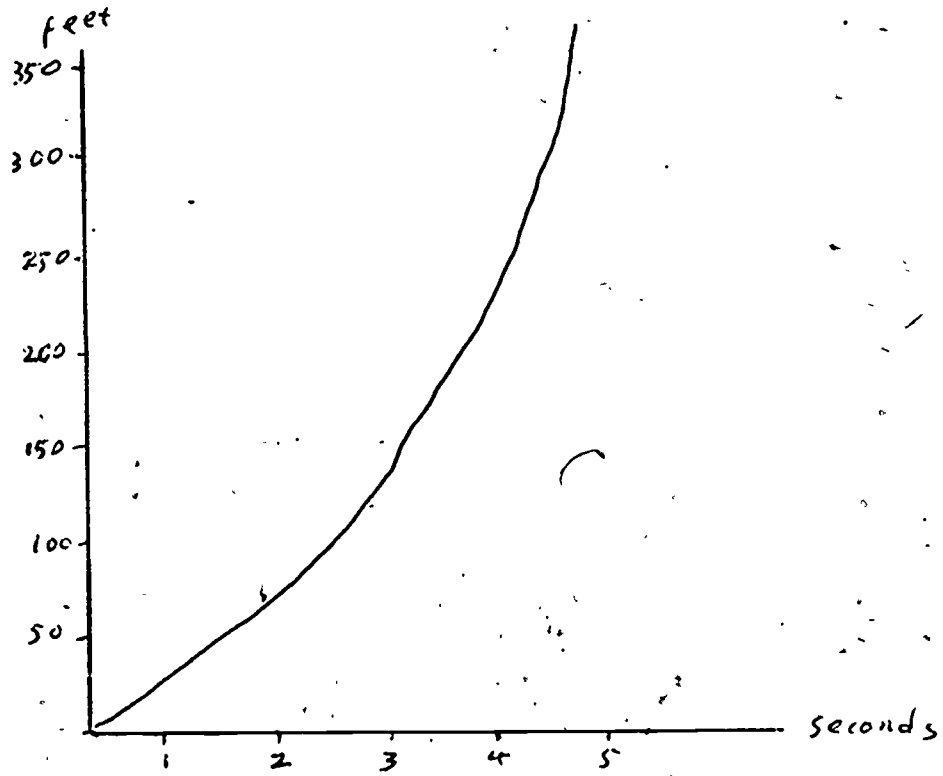
The most widely used method of representing numbers on a graph is the (39)_____ system. This system, perfected by the French soldier-philosopher-mathematician, Rene Descartes, is used in analytical geometry, trigonometry, and higher mathematics. This method of representing (40)_____ helps scientists to (41)_____. The following (42)_____ shows how far an object falls in relation to the time it is given to drop. The formula which describes this (43)_____ is:

distance (in feet) = 16.1 x time (in seconds) squared

or

$$d = 16.1\ t^2$$

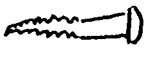
relationship--coordinate graph--Cartesian coordinate--information about quantity --report their findings

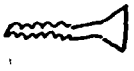


The graph shown here makes it clear that the (44)_____ an object has to drop, the (45)_____ it picks up. You will find that examining such graphs as these makes it clearer what the (46)_____ _____ are.

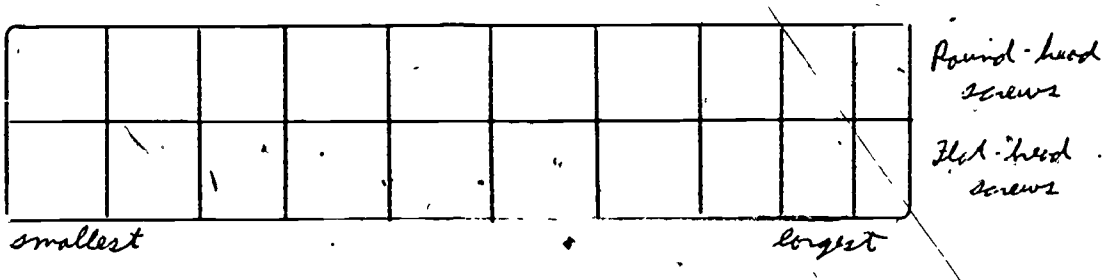
Having considered various kinds of graphs -- circle graphs, histograms, and cartesian coordinates -- we note that they all involve (47)_____ _____. You have seen a number of (48)_____ charts, also.

In the town I live in, there is a hardware store that stocks a large number of wood screws of different sizes. The heads of the screws have two major shapes:


round-head screws


flat-head screws

So that people can find the kind and size of screws they want, conveniently, the store has (49)_____ them in a set of bins like this:



several varieties--numeric representation--more speed--easier to understand --relationships involved--longer--non-numeric--arrayed

This is an (50)_____. Libraries array their books by subject matter, according to one of two popular systems: the (51)_____ System and the (52)_____ System. The latter is used at this school. The advantage of these arrays is that you can (53)_____ an object among similar objects without having to examine all of them. Well-run households (unlike mine) store linens and towels in the closet in an array; it helps to have all the towels arranged according to size and use.

Besides arrays of objects, there are (54)_____ -- which arrange and classify concepts. These kinds of arrays (55)_____. Consider this one which summararily presents the (56)_____ discussed in the foregoing $7\frac{1}{2}$ pages. . . (There are others, of course!)

Cartograms	Event-sequences	Graphs	Arrays	Misc.
Maps Blueprints Wiring diagrams Floor plans Loading charts	Time lines Flow diagrams PERT Charts	Circle graphs Histograms Cartesian coordinates	of objects of symbols	Scale models

Now, a general word about isomorphs. Their purpose is to represent things or arrange them so that they can be (57)_____. It is inconsiderate to inflict a sloppy presentation on someone else; it is (58)_____ to construct a poor isomorph for your own use.

29

Let's back off and get our bearings. . .we are still exploring (1)_____ for problems. We have examined some (2)_____ patterns, and are now looking at some patterns which apply to (3)_____. For locating things, we use the (4)_____. We next take up something called the SELECTIVE SIGNAL. Let's look at an example. . .

My family goes camping in the woods in the summertime. Most of our camping gear came from Army surplus; it was camoflaged, and the result is that our camp sites often got (5)_____. We met the situation by (6)_____ some of the gear with large red-and-white stripes; other pieces were trimmed with phosphorescent paint that glows in the dark. These devices are called (7)_____ -- prominent physical markings used to pick out important elements in the situation.

You have used another selective signal when you (8)_____ in a book with a piece of paper. Publishers of dictionaries furnish you with

indicate relations of concepts--symbolic arrays--painting--special cases--method of approximations--representing and organizing--isomorphs--array of objects--Library of Congress--arrayed--isomorphs--thought about--marked your place--trial solutions--Dewey Decimal--generally useful--flags--locate--pattern--self-torture--lost in the woods

a selective signal when they (9)_____ their books along the edge every so often, making it easier to (10)_____ a certain section. Such devices are called (11)_____.

For work on maps and charts, people sometimes use pins or racks to (12)_____ specific points of interest that are important to locate quickly.

I once worked for a (13)_____ who was studying the boiling points of liquids. To keep from having to (14)_____ the liquids as they heated, he connected a thermometer to a buzzer which sounded (15)_____ the temperature reached a certain level -- just below where expected boiling occurred. This is an example of a (16)_____. Many radios and phonographs have little lights that (17)_____ that the set is on, even if there is no sound issuing. These signals tell us about something happening (18)_____ the fact that a buzzer is sounding or a light is burning.

Here is an array of selective signals:

FLAGS	CONDITION ALARMS	MECHANIZED RESPONSE
Physical marks Index tabs Pointers Color-coding	Meter-and-audible Meter-and-visual	Keysort devices Phonograph record changers Electronic card-sorters

A few general remarks about selective signals. . .

Mechanized response signals not only "recognize" a condition, but they (19)_____ set things into motion which (20)_____ to the situation. Automated factories, which use very few men to do the work -- including controlling the production -- are vast (21)_____ of selective signal devices.

Flags and condition-alarms that are interpreted by people can get too confusing, if (22)_____ signals are set up. If you mark one or two places in a book with slips of paper, it is (23)_____ to find what you marked; but if you marked fifty places in the same book, the (24)_____ of your selective signals is diminished.

About the matter of verification, I shan't, in this present volume, dwell. Please note, however, that you make a serious mistake if you pass up this part of the heuristic process!

* * * * * * * * * *

too many--condition signal--as--tabs--find--index-cut--also--easy--chemist--mark--beside--indicate--watch--complexes--value--respond--attitudes

We now take up the study of PRAGMATICS. In the foregoing perusal of heuristic, we explained the (25)_____ approach to problems. One thing that was repeatedly emphasized was that when humans solve problems, they almost always use (26)_____. For one thing, symbols are easier to shove around than (27)_____. Admit it: when the subject of rattlesnakes is brought up at the dinner table, it's poor etiquette -- but we'd rather (28)_____ it than have one crawling around on the table!

Words and mathematical symbols, (29)_____, can make finely-drawn (30)_____. They leave off inconvenient aspects of the real thing, and make thinking (31)_____ _____. But note, please, that I said if the words were (32)_____ _____. And (33)_____ a bullfrog had wings, his journeys wouldn't be so rough!

One way to keep your words from getting scrambled is to study English (34)_____. But grammar, alone, is not enough. We need to examine some other ways we (35)_____ the language we use. The study of PRAGMATICS is a logician's way of looking at (36)_____ -- not at what somebody thinks is correct, but at the way people (37)_____ _____ when using language effectively.

"Sticks and stones will break my bones, but names will never harm me." -----Is this old saying true?

Not if the name is "murderer" and it applied to you by a (38)_____.

Since most (39)_____ thinking involves the use of language -- words and other symbols -- we must look closely at the way we use these (40)_____. Nobody in his (41)_____ would think of driving nails with a saw, no matter how good the saw. It just isn't the appropriate instrument. Yet, quite often, people use the wrong kind of language to (42)_____.

There are many ways to (43)_____ language. Grammarians have several useful (44)_____ for classifying language; for instance, sentences are classified by (45)_____ -- declarative, interrogative, imperative, and exclamatory. Words are classified by (46)_____: substantives, verbs, connectives, etc.

tools--classify--alone--talk about--properly used--psychosynthetic--things--productive--grammar--right mind--schemata--properly used--structure--easier--function--symbols and language--psycho-synthetic--jury--if--think about--language--actually behave--accomplish their purposes--isomorphs

In the study of logic, we are quite concerned, initially, with the (47)_____ the speaker, or writer, has in mind. Part of the trouble in communicating with people is that the listener, or reader, doesn't (48)_____ to the purposes of the speaker and thus fails to interpret what is said in the way it was (49)_____. Things get downright silly when the speaker is (50)_____, but it happens once in a while this way!

Probably one of the oldest logical distinctions in language is between FIGURATIVE and LITERAL language. See how you like the following characterization of the distinction:

LITERAL LANGUAGE IS THE KIND OF LANGUAGE THAT SAYS JUST WHAT IT MEANS AND NOT SOMETHING ELSE. FIGURATIVE LANGUAGE IS JUST THE OPPOSITE.

Isn't that helpful? Just like throwing a drowning man (51)_____!

Let's try a more lengthy explanation. . .

Take a look at the following and decide if they are the same or not. . .

$+8/4$ 2 $1 + 1$ $5 - 3$ $4 \times \frac{1}{2}$.

If you say they are different, you'd better review your mathematics!

If you say they are the same, you'd better get your eyes examined!

You can't win. . . Isn't that annoying?

If you have decided that I was being facetious with you, you're perfectly right. The question "are they the same or not?" is a (52)_____. It (53)_____ over something. The (54)_____ are not the same, but the (55)_____ of the symbols is, viz., the number of ears a person has -- provided he's normally equipped.

A long time ago, people had this meaning to express when they were talking about. . .

a (56)_____ of boots
(57)_____ babies
a (58)_____ of geese
a (59)_____ of people

It took many generations to realize that the meaning of all these (60)_____ was the same, numerically. Please look the word "tautology" up in the dictionary, now. . .

Now, could you ever have figured out the meaning of that word from the

talking to himself--both ends of the rope--expressions--when--purpose--referent--twin--symbols--couple--correct--pay enough attention--intended--brace--sophism--glosses--pair

look or the sound of it? Certainly not. The word, like all others, gets its meaning by (61)_____. We fix meanings by (62)_____ -- or more correctly, several meanings -- on our symbols. Note that there are two (63)_____ meanings customarily attached to the word "tautology." It is up to you to discover which meaning the speaker intends by means of (64)_____. When you are talking to a logician or a mathematician, "tautology" is a (65)_____; to a grammarian, an (66)_____.

30

LITERAL language depends on the words' being interpreted according to their (1)_____ -- the description given in a dictionary. But what about FIGURATIVE language? After all, poets claim that their stuff has (2)_____, too.

Don had a falling-out with his girlfriend. Later, he went over to her house to try to patch things up. That evening, Dick asked him how the affair went.

"I was about as welcome as a skunk at a grand opera."

Surely, no amount of literal, conventional description of the situation could match that for (3)_____, (4)_____ of meaning, and all. Instead of appeal to custom, it makes the hearer think in (5)_____ imagery.

Of course, figurative language often fails when we want (6)_____ and exact information. I once ran (7)_____ of a recipe that called for a "tweak of black pepper." I gave up on it, thinking that my "tweak" might be another fellow's torch. An expression like "half a teaspoon" would have made the recipe a little more attractive as a culinary venture. I (8)_____ what "half a teaspoon" is (9)_____.

Figurative language depends on such tricks of expression as (10)_____ -- _____

MY LOVE IS LIKE A RED, RED ROSE. . .

But does this mean that she has long, skinny, green stems -- does she have thorns -- if you don't spray her, does she get bugs? To suggest it would be to invite disaster!

It is sometimes dangerous to (11)_____ figurative language too far. For the (12)_____, perhaps it would be better to stick to exact and prosaic literality and (13)_____ the fancy stuff!

tradition--pretty little word--half a teaspoon--eschew--new--like--customary meaning--unexpected turns--simile and metaphor--precise--clarity and brevity--meaning--custom--related--contextual clues--afoul--trust--abomination--symbols--know--complex and difficult

The next way we shall classify language is by usage.

As Penelope crossed the campus one afternoon, she passed a rather tall, smooth-featured, muscular type that made her catch her breath a little. As he passed, she murmured under her breath, "He's nice!"

Now who was Penelope talking to ? Nobody but (14)_____. Was she telling anybody (15)_____? Not particularly. Even if there had been another girl to hear it, she (16)_____ needed to be told that the boy was "nice."

In fact, Penelope was using (7)_____ language. Emotive language is used to express feelings that are socially unacceptable if expressed physically. Language probably got its (18)_____ in this usage. Our ancestors' cries of fright, for instance, could have been simple (19)_____ _____ to danger -- but a (20)_____ to others, nevertheless.

Whereas emotive language is spontaneous, (21)_____ language is somewhat more given to custom and tradition. Ceremonial language furnishes (22)_____ responses to situations that would otherwise be a little puzzling. When you have nothing else to say to a person, you gotta say someting. How about (23)_____? Isn't it odd to say, "Good morning!" when it's raining pitchforks outside?

Why? Certainly you're not (24)_____ on the weather. You are simply opening up (25)_____. Some skillful communicators can (26)_____ a good deal with that little phrase.

We use ceremonies and ritual to convey a good deal of meaning:

Do you solemnly swear to tell the truth. . .
I pledge allegiance to the flag. . .
Do you take this man to be your. . .

On some of the most solemn occasions of our lives, we (27)_____-- in ceremonial language.

On afternoon, Penelope and her mother were discussing Penelope's choice of boyfriends. After some time, the subject of Don came up. Don is a rather intelligent type; he makes the honor roll regularly; he wears clean shirts and doesn't let his beard grow -- you know, the kind that mothers are wont to like their daughters to be dating. (28)_____ comment was that . . "Don's nice." Now Mother is (29)_____ emoting over Don -- she's (30)_____ _____ Penelope to choose more Don-type boyfriends and fewer of the other kind. Mother is using (31)_____ language. Still concerned with emotions, affective language is neither spontaneous nor custom-bound;

perform rituals--ready-made--anything--herself--warning--Mother's--attempting to get--wouldn't have--emotive--reactions--warning--reporting--"Good morning!" --convey--not--emotions--communication channels--ceremonial--function--start--affective--attitudes

affective language is an attempt at getting at other people's (32)_____. Now logicians are as emotional as anyone else, but their (33)_____ is the other three uses of language: directive, empirical and formal language.

DIRECTIVE language is the way we talk when we tell people (34)_____ _____. This kind of language is needed to (35)_____ people's actions toward common goals and keep us from (36)_____ each other. As a rule, directive language ("do thus-and-so") is accompanied by some affective sounds ("please"). But in the military service, and in some unfortunate school situations, this nicety is often suppressed. Or when the highway department wants to convey a simple command, uncluttered for fear that tact will obscure, their signs read simply:

STOP
SLOW TRAFFIC KEEP RIGHT
CAUTION

These are (37)_____ -- kept simple deliberately. In sixty-mile-an-hour traffic, tact is less (38)_____ than simple actions.

Directive language can be (39)_____ into two smaller categories:

(40)_____ -- unconditional commands, for example: traffic direction, moral codes, military commands;

(41)_____ -- directions which allow the hearer some choice as to whether he wants to do a thing or not. Permissives can be further broken down into:

OPTIONARIES -- which simply grant leave to do certain things, e.g., "You may fire when ready, Gridley."

PRESCRIPTIVES -- advice or instructions about (42)_____ _____ you might want to do, e.g., recipes, "how-to" books. As you know, prescriptives can be further divided into algorithm and (43)_____.

Prescriptive, permissive, directive language contains information that we can use in (44)_____. It tells you that (45)_____ you want to accomplish this, (46)_____ do that. Hopefully, it is based on the speaker's knowledge of the subject. (But how do you really know that this will lead to that?)

stock-in-trade--non-cognitive--simple commands--running over--important--to do things--coordinate--suppressed--heuristic--if--broken down--how to do something--permissives--then--imperatives--will lead--solving problems--non-cognitive--attitudes

Up to now, we have been discussing language types to which the judgments (47)_____ don't seem to apply with much cogency. Try these non-cognitive fragments on for size:

OUCH! -- True or false?
HOWDY! -- True or false?
KEEP SMILING! -- True or false?

Or even this cognitive fragment:

DON'T PLAY ON THE FREEWAY! -- True or false?

While you might, in some way, approve of such symbol-strings, it is difficult to see how a person would, in literal language, call them "true." The word "true" is reserved for statements about facts (or better, what (48)_____ facts.) These are (49)_____ statements. They express beliefs about what's going on in the (50)_____.

Please note that I did (51)_____ say that EMPIRICAL statements convey facts. If I conveyed to you the fact of a wet cat, you'd be (52)_____. Empirical statements are finely drawn (53)_____ that represent aspects of things. (And I can think of few more inconvenient things than wet cats!)

There are (at least) two kinds of empirical (54)_____:

- REPORTS -- descriptions of specific (55)_____ events that the speaker has direct knowledge about or knows about, through a report.* Unless the event is still going on, you cannot (56)_____ a report by direct observation. Tempus fugit. At best, you can corroborate by checking witnesses or looking for effects that tend to support the report.

GENERALIZATIONS -- descriptions of a (57)_____ of objects or events. These can be verified by (58)_____ the observations of the speaker or his sources. The best means of discovering and verifying generalizations is the method of the (59)_____.

Empirical generalizations have these common characteristics:

(a) they (60)_____ a number of reports, but their subject-matter is not restricted to just those reports;
(b) they (61)_____;
(c) the investigation that led to their verification can be (62)_____.

predict--summarize--"true"and "false"--are supposed to be--not--isomorphs --statements--single--repeated--collection--verify--repeating--sciences--empirical--pretty badly chewed up--careful--world

*Heads up! Does this remark seem circular?

31

And now for the final (1)_____ -- FORMAL ANALYSIS. Most of the discussion of language in this book, up until now, has been a kind of formal analysis. We have been looking at how language is (2)_____, and developing (3)_____ for talking about the way we talk.

One morning, Penelope was summoned to the office from class. Since she hadn't been doing anything to merit disciplinary action, she was a bit puzzled. But she was relieved to learn that she had been called out of class to be interviewed by a visiting research worker, a (4)_____, who was studying how high school students used language.

The interviewer asked her what she (5)_____ by the word "nice." She walked over to the window and (6)_____ to two boys, saying "The one on the left is nice. The other one isn't." She was (7)_____ _____ she attached to the word "nice."

FORMAL language (the analysis of the form of language) is divided into (8)_____.

----DEFINITIONS tell what we mean by words and other symbols. There are two kinds of definition:

(9)_____definition is used in pointing to examples of the referent of a word. Penelope's analysis of the word "nice" is such a (10)_____. She pointed to the nice boy, and (11)_____ him with the one that wasn't nice. Of course the interviewer (12)_____ _____ whether whe was referring to the way he looked or the way he acted. This is the (13)_____ with ostensible definitions -- you can never be sure that the listener is looking at the (14)_____of the object that you are thinking about.

(15)_____ definitions use symbols that are already (16)_____ by the hearer to render the meanings of other symbols. This works fine, (17)_____ that the hearer understands the symbols being used. The symbol or word being defined is called the (18)_____ _____; the symbol or words used to give the meaning of the definiendum is called the (19)_____. The hearer understands (20)__ _____ the operational definition works.

LEXIOGRAPHIC definitions; a (21)_____ of operative definition; tells us how to interpret symbols of one system of language (22)____ _____ another -- how to "read" the definiendum.

linguist--analyzing the meaning--definition--pointed--concepts and vocabulary --ostensible--contrasted--hazard--only if-- species--definiendum--in terms of-- definiens--language use--used--meant--definition and argument--couldn't know-- aspect--operative--known--provided that

The following is an example of lexiographic definition. It gives a method for (23)_____ from English-language expressions to mathematical symbols.

DEFINIENDUM	DEFINIENS
=	Any form of the verb "to be" and "to have"
+	"and" between substantives of quantity, "plus," "the sum of," "the total of."
-	"less," "minus," "difference," "what is left," "after"
x, ·	"times," "of," "multiplied by," "product"
$\frac{\cdot}{\cdot}$, /	"quotient of," "per," "divided by," "for," "rate of," "ratio," "proportion of"

(24)_____ definition (another species of operative definition) indicates (25)_____ a symbol is to be used, but leaves the interpretation to the (26)_____. This is done by giving the definiens in terms of the same language-system as the definiendum. Here is how syntactic, operational definition is done in logic and mathematics:

X - Y = Z =df X + Z = Y

The abbreviation " =df " stands for (27)_____ or "has a meaning equivalent to."

In learning an artificial language, like mathematics, it is good to learn both syntactic and lexiographic definitions as you encounter new symbols.

Well, that's enough of (28)_____ for the time being; let's turn to argument. . .

----(29)_____ is another form of (30)_____. By the word "argument" I don't mean simply a coffee-shop contention, but rather; (31)_____ the sort done by a (32)_____.

argument--formal language usage--translating--how--"means by definition"--syntactic--reader--definitions--lawyer or mathematician--tight reasoning--function--isomorph--definitions

"Argument," as logicians use the word, designates a (33) ______________ which begins from certain starting-point statements, called PREMISES, and tries to (34) ________________ what other statements, called CONCLUSIONS, can be drawn. This is the method which you will use in the study of (35) ____ ____________________.

- -

A note to the student:

If you have reached this point in these reading exercises without going nuts, you are to be congratulated. A look-see at the following pages should encourage you -- there isn't much left of this fill-in-the-blank Mickey Mouse.

-----Complete the tree-analysis on page A.34 before working on blank 49.

- -

For the logician, the scientist, and the philosopher, it is the cognitive uses of language which are most interesting. We have seen two overlapping ways to classify language. I hope you realize that there are many cases in which there is more than one use intended by the speaker and that there are many other cases that are somewhere between these hazily-defined categories.

A third means of classifying language specimens is by the (49) __________ ____________________. Let us briefly examine the (50) ______________ languages -- English, German, Russian, and (51) ____________. These are the languages of (52) ________________________. They are flexible, well-known, and adapted to the (53) ______________ problems of people.

The natural languages were built up by (54) ________________ people. Our own English is an outgrowth of a language, called Indo-European by linguistic anthropologists, which developed in eastern Europe about ten thousand years ago. Most European and Indic peoples (55) ____________ outgrowths of Indo-European.

The natural languages, originally used for running the affairs of primitive peoples, have grown and adapted to the (56) ____________________ needs of modern, technological society with its complicated politics and economics. But you can stretch the thing (57) ____________________ ________________.

Imagine what would happen if a (58) ____________________ ______________ had to tell his musicians, in verbal English, what to do.

everyday use--history of its origin--Coptic--Stone Age--just so far before it pops--speak--increasingly complex--symphony orchestra conductor--lawyer or mathematician--process of inference--formal logic--ascertain--natural--ordinary

The length and diversity of musical parts of --say, a Beethoven symphony -- would make it necessary for him to talk and talk and talk, and perhaps even then, not say everything that had to be said. So, somewhere around the 14th century, musicians started (59)_____ directions -- about how to play musical compositions -- in a peculiar way: (60)_____ _____.

Musical notation is an example of ARTIFICIAL language. Nobody ever (61)_____, but it is a language, nevertheless. It has a regular (62)_____ of spots dabbed on lines. Musicians, when they read it, interpret this language (63)_____ toots, plunks, and bangs on their instruments.

One characteristic of the artificial languages is that they were contrived by fairly (64)_____ peoples for rather (65)_____ purposes. Musical notation is fine for telling musicians what to do, but it isn't worth a hoot for (66)_____ what Dr. Einstein said with:

$$E = mc^2$$

When we talk about (67)_____, we use mathematical language. The old bugaboo, the mathematical word problem, points up the nifty (68)_____ of mathematical language; (69)_____ you were furnished the same information in mathematical language that textbook problems provide in English, the job would be a snap!

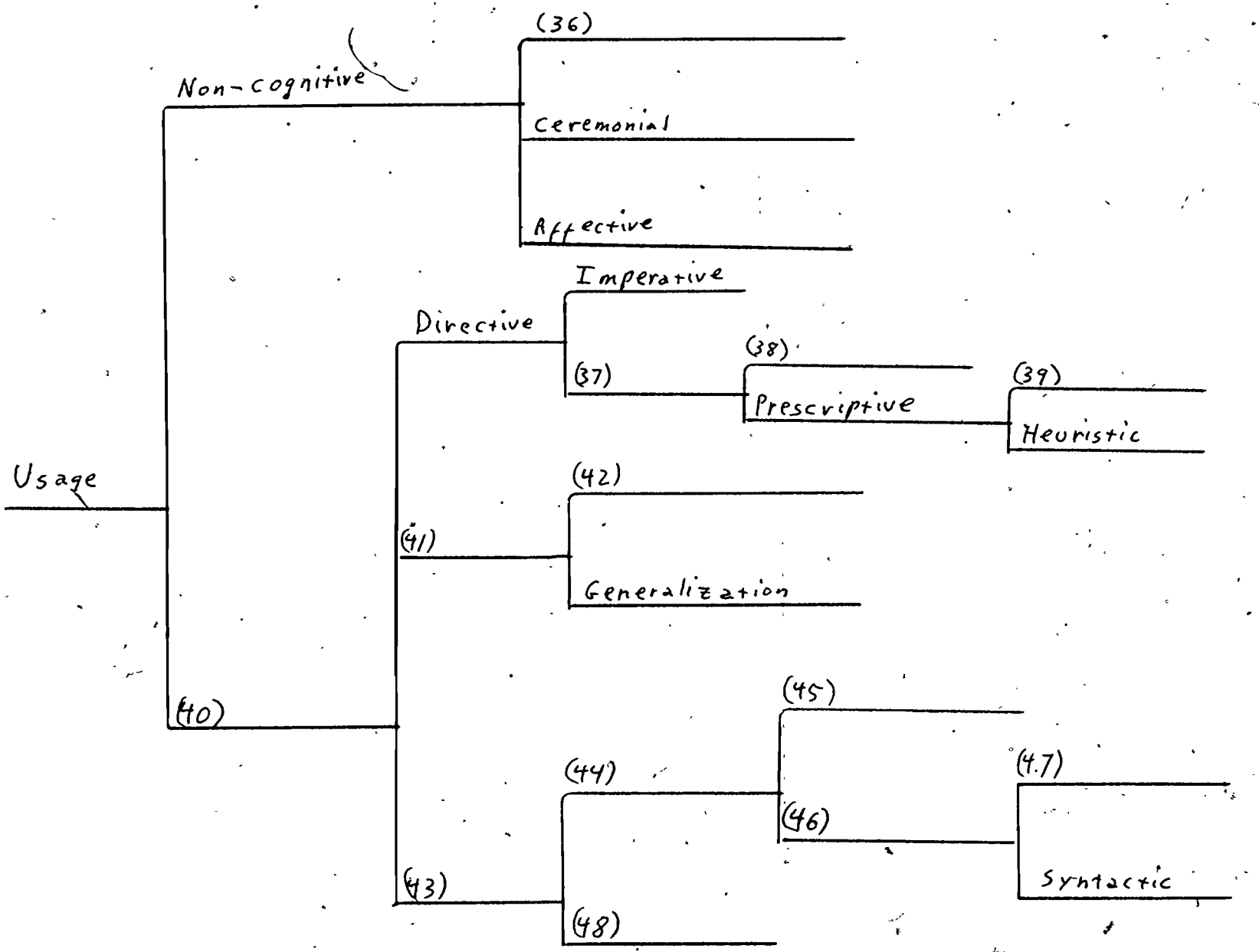
When you take up the study of formal logic, you will discover that logicians have developed their own artificial language, (70)_____ _____. Just as Arabic numerals and mathematical operation-signs have been judiciously picked to make numeric (71)_____ _____ easier, logical symbolism has been picked to make argumentation more straightforward.

Now, a bit of advice. When you formulate a problem, persuade a jury, or write a book, you are using language for a purpose. Your choice of how you say something can make or break your project. If you choose an inappropriate kind of language, you will be like the person who tries to drive a nail with a saw. As Carl Sandburg advises --

Choose your words wisely,
Like an old woman choosing apples . . .

reads it verbally--modern--musical notation--writing down--logical symbolism --restricted--if--numbers and quantities--in terms of--quality--computation and reasoning--vocabulary--expressing--ordinary

A Tree-analysis of Language Usage



APPENDIX B: CORRECT ANSWERS TO READING EXERCISES

23.

(1) solution
(2) directions
(3) algorithm
(4) tells
(5) do
(6) guaranteed
(7) algorithm
(8) sure-fire method
(9) suggest
(10) won't always work
(11) heuristic
(12) cannot guarantee
(13) disappointed if it doesn't
(14) algorithm
(15) algorithm
(16) reorganize
(17) frustrated
(18) problem
(19) familiar
(20) connect
(21) modifying
(22) new way
(23) go back
(24) habitual
(25) you
(26) differences
(27) symbols
(28) finer distinctions
(29) thinking
(30) human
(31) complex

24.

(1) scientist
(2) problem
(3) money's worth
(4) determine
(5) laboratory
(6) problem
(7) color
(8) fool
(9) soft
(10) test

(11) something else

(12) hunch

(13) break

(14) swimming pool

(15) wondered

(16) observing

(17) thought

(18) clue

(19) characteristic

(20) expressed

(21) ratio

(22) discovery

(23) mind

(24) putting an idea down

(25) discovery

(26) defining

(27) establish

(28) gathering

(29) forming

(30) verify

(31) using

(32) incubation

(33) illumination

(34) psychosynthetic

25. (1) Problem

(2) alert

(3) troubled

(4) discovery

(5) thinking process

(6) competent

(7) examine

(8) problems

(9) situation

(10) obstacle

(11) typical

(12) well-formulated

(13) intriguing

(14) curiosity

(15) curious

(16) wrong

(17) well founded

(18) information

(19) simpler

(20) defining a problem

(21) symbols

(22) everyday language

(23) mathematical

(24) learned

(25) arithmetic operations

(26) computation

(27) pose a problem

(28) numeric

(29) algebraic methods

(30) frightened

(31) simplified

(32) decision

(33) operation

(34) come up with

(35) possibilities

(36) applies

(37) partitioning

(38) replication

(39) diminution

(40) decision

(41) satisfaction

(42) under which the problems

(43) school problem

(44) munch

(45) entertainment

26.

(1) similar
(2) trusting
(3) suit your needs
(4) empirical
(5) difficult
(6) questionable
(7) for herself
(8) indirect source
(9) questionable
(10) statement
(11) warned
(12) seriously
(13) tricky
(14) orderly pattern
(15) searching
(16) sources
(17) wrong
(18) distinction
(19) can be tried out
(20) Mr. Kurt Godel
(21) algorithm
(22) together
(23) sight
(24) subconscious
(25) interested
(26) careful
(27) implement
(28) respond
(29) eliminated
(30) thought of
(31) exhaustively
(32) solved
(33) question
(34) square feet
(35) working out the arithmetic
(36) question
(37) mathematics
(38) effect
(39) learned
(40) much as possible
(41) intelligently lazy
(42) elbow grease
(43) easy removal
(44) guess
(45) a more drastic method
(46) chemical reaction
(47) pondered
(48) handy thing to keep in mind
(49) pondered
(50) smooth and clean

27. (1) efficient
(2) middle
(3) split
(4) quarter
(5) eighths
(6) remaining pages
(7) desired
(8) special type
(9) well-ordered
(10) limits
(11) don't know
(12) tilt
(13) related
(14) task
(15) observing
(16) average
(17) decides
(18) closer limit
(19) practical result
(20) applications
(21) special pattern
(22) moving
(23) masculine muscle
(24) her mind
(25) trials
(26) so exhausted
(27) an object
(28) a scale model
(29) intuitions
(30) scale model
(31) to try
(32) specification
(33) to avoid a great deal of furniture moving
(34) scale model
(35) one kind
(36) some aspects
(37) other aspects
(38) weight and bulk
(39) left out
(40) proportion
(41) decision
(42) problem-solving techniques
(43) other people
(44) books
(45) someone
(46) know
(47) making sense
(48) advice
(49) map
(50) tells

28. (1) trip
(2) announced
(3) field glasses
(4) course of action
(5) topological cartogram
(6) symbols
(7) surely abstract
(8) incorrect

(9) photographic pictures

(10) blueprints

(11) wring diagrams

(12) represented

(13) abstract symbols

(14) space relationships

(15) represented

(16) planar representation

(17) realize

(18) time lines

(19) feel

(20) show events in a sequence

(21) event sequence

(22) processes

(23) which way to go

(24) are used most

(25) ovals

(26) rectangles

(27) diamond-shaped

(28) isomorphs

(29) representing things

(30) quantitative graphs

(31) circle graph

(32) fractions of a whole

(33) disadvantage

(34) time

(35) histogram

(36) data

(37) how

(38) that

(39) Cartesian coordinate

(40) information about quantity

(41) report their findings

(42) coordinate graph

(43) relationship

(44) longer

(45) more speed

(46) relationships involved

(47) numeric representation

(48) non-numeric

(49) arrayed

(50) array of objects

(51) Library of Congress

(52) Dewey Decimal

(53) locate

(54) symbolic arrays

(55) indicate relations of concepts

(56) isomorphs

(57) generally useful

(58) self-torture

29

(1) trial solutions

(2) trial solution

(3) special cases

(4) method of approximations

(5) lost in the woods

(6) painting

(7) flags

(8) marked your place

(9) index-cut

(10) find

(11) tabs

(12) mark

(13) chemist

(14) watch

(15) as

(16) condition signal

(17) indicate

(18) beside

(19) also

(20) respond

(21) complexes

(22) too many

(23) easy

(24) value

(25) psycho-synthetic

(26) symbols and language

(27) things

(28) talk about

(29) properly used

(30) isomorphs

(31) easier

(32) properly used

(33) if

(34) grammar

(35) think about

(36) language

(37) actually behave

(38) jury

(39) productive

(40) tools

(41) right mind

(42) accomplish their purposes

(43) classify

(44) schemata

(45) structure

(46) function

(47) purpose

(48) pay enough attention

(49) intended

(50) talking to himself

(51) both ends of the rope

(52) sophism

(53) glosses

(54) symbols

(55) referent

(56) pair

(57) twin

(58) brace

(59) couple

(60) expressions

(61) tradition

(62) custom

(63) related

(64) contextual clues

(65) simile and metaphor

(66) abomination

30.

(1) customary meaning
(2) meaning
(3) clarity and brevity
(4) unexpected turns
(5) new
(6) precise
(7) afoul
(8) know
(9) half a teaspoon
(10) simile and metaphor
(11) trust
(12) complex and difficult
(13) eschew
(14) herself
(15) anything
(16) wouldn't have
(17) emotive
(18) start
(19) reactions
(20) warning
(21) ceremonial
(22) ready-made
(23) "Good morning!"
(24) reporting
(25) communication channels
(26) convey
(27) perform rituals
(28) mother's
(29) not
(30) attempting to get
(31) affective
(32) attitudes
(33) stock-in-trade
(34) to do things
(35) coordinate
(36) running over
(37) simple command
(38) important
(39) broken down
(40) imperatives
(41) permissives
(42) how to do something
(43) heuristic
(44) solving problems
(45) if
(46) then
(47) "true" and "false"
(48) are supposed to be
(49) empirical
(50) world
(51) not
(52) careful
(53) isomorphs
(54) statements
(55) single
(56) verify
(57) collection
(58) repeating
(59) sciences
(60) summarize
(61) predict
(62) repeated

31.

(1) language use
(2) used
(3) concepts and vocabulary
(4) linguist
(5) meant
(6) pointed
(7) analyzing the meaning
(8) definition and argument
(9) ostensible
(10) difinition
(11) contrasted
(12) couldn't know
(13) hazard
(14) aspect
(15) operative
(16) known
(17) provided
(18) definiendum
(19) definiens
(20) only if
(21) species
(22) in terms of
(23) translating
(24) syntatic
(25) how
(26) reader
(27) "means by definition"
(28) definitions
(29) argument
(30) isomorph
(31) tight reasoning
(32) lawyer or mathematician
(33) process of inference
(34) ascertain
(35) formal logic
(36) emotive
(37) permissives
(38) optimaries
(39) algorithum
(40) cognitive
(41) empirial
(42) reports
(43) formal analysis
(44) definitions
(45) ostensible
(46) operative
(47) lexiographic
(48) argument
(49) history of its origin
(50) natural
(51) Coptic
(52) everyday use
(53) ordinary
(54) Stone Age
(55) speak
(56) increasingly complex
(57) just so far before it pops
(58) symphony orchestra conductor
(59) writing down
(60) musical notation

APPENDIX C: FRAGMENTS

I thought you'd like these...

Walt Cook

Descartes' "Discourse on Method"

The following is extracted from Rene Descartes' "Discourse on the Method of Rightly Directing One's Reason and of Seeking Truth in the Sciences" in Anscombe, Elizabeth and Geach, Peter Thomas: Descartes' Philosophical Writings. Thomas Nelson and Sons, Ltd., Edinburgh, 1963. The original French text from which it was translated was published in 1637.

I. The first. . . never to accept anything as true if I had not evident knowledge of its being so; that is, carefully to avoid precipitancy and prejudice, and to embrace in my judgment only what presented itself to my mind so clearly and distinctly that I had no occasion to doubt it.

II. The second, to divide each problem I examined into as many parts as was feasible, and as was requisite for a better solution.

III. The third, to direct my thoughts in an orderly way; beginning with the simplest objects, those most apt to be known, and ascending little by little, in steps as it were, to the knowledge of the most complex; and establishing an order in thought even when the objects had no natural priority one to another.

IV. And the last, to make throughout such complete enumerations and such general surveys that I might be sure of leaving nothing out.

Little Fragments

Now, brethren, if I come to you speaking in tongues, how shall I benefit you unless I bring you some revelation or knowledge or prophecy or teaching?... So with yourselves; if you in a tongue utter speech that is not not intelligible, how will anyone know what is said? For you will be speaking into the air.
---I Corinthians 14: 6,9 .

A man who has committed a mistake and doesn't correct it is committing another mistake.
---Confucius

A thinking man is the worst enemy the Prince of Darkness can have.
---Thomas Carlyle

The aim of education is to develop intelligence of an independent and effective type -- a disciplined mind.. We state emphatically that, upon its intellectual side, education consists in the formation of wide-awake, careful, thorough habits of thinking.
---John Dewey

Test on Units I-III, Informal Logic --
Walter A. Coole, Skagit Valley College

This is not a timed test. You may use your textbook, syllabus, dictionary, and notes.

DO NOT WRITE IN THE TEST BOOKLET. Write your answers on a sheet of notebook paper.

In order to standardize what is "true" for objective scoring, we shall take the text and syllabus for truth, even though we may know better.

1. Which of these are the main topic(s) of Ruggiero's *Beyond Feelings*?

   A. fallacies
   B. contexts of thinking
   C. psychosynthesis
   D. all of these
   E. none of these

2. T-F. A good thinker can control, manage, and direct mental activities, whereas a poor thinker cannot.

3. T-F. The degree of conviction one feels is a measure of knowing.

4. List Bacon's "idols"...

   A. _____
   B. _____
   C. _____
   D. _____

5. Locke identified three error-prone types of people; those who...

   A. _____
   B. _____
   C. _____

6. T-F. Because everyone is subject to "mine is better" errors, we cannot control them.

7. T-F. To determine the merits of a new idea, we should appraise it carefully and unemotionally.

8. T-F. The wise person is selective in his conformity.

9. T-F. Face-saving, though an interference with critical thinking, does aid the development of self-awareness.

10. T-F. Stereotyping is simply faulty generalization.

11. T-F. Commonsense wisdom can be regarded as entirely reliable.

12. Most of us can avoid oversimplification if we realize that...

A. _____

B. _____

13. When does a person have insufficient evidence?

_____

_____

_____

14. Which of these should be done about assumptions?

A. search and seize
B. seek and destroy
C. identify and evaluate
D. label and catalog
E. none of the above

15. How does Ruggiero suggest that we become more observant?

A. improve efficiency of observation
B. improve accuracy of observation
C. look for the significance of things
D. all of the above
E. (A) and (C) only

16. T-F. The saying that "less is more" is a slogan in favor of depth of investigation as opposed to breadth.

17. T-F. Everybody's opinion is of equal value.

18. T-F. The familiarity of an idea is a valid test of its reliability.

19. List the steps of analyzing a position:

A. _____

B. _____

C. _____

D. _____

E. _____

20. List four linguistic cues for interpreting communications:

A. _____ C. _____

B. _____ D. _____

21. Which of the following kinds of directions guarantee the results if followed correctly?

A. algorithmic B. heuristic

22. What does establishing a problem's solution-criterion have to do with testing the solution?

_____

_____

23. Consider the present test as a problem. Which of these categories most satisfactorily describes its origin?

A. obstacle to action
B. intriguing problem
C. communicated problem

24. T-F. Man-made isomorphs are artifacts.

25. T-F. Most retail stores display their merchandise as arrays of objects.

26. Which of these is an example of metalanguage?

A. navigation charts
B. dictionaries
C. parts-lists
D. instructions on how to interpret catalogs
E. both (B) and (D)

27. When explaining a general principle to someone learning it, it is usually better to...

A. give a poetic example
B. give an instance in literal language

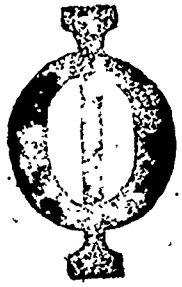
28. In the usual context of a high school classroom, which of the following descriptors apply most aptly, when a teacher says, "It's time to get serious now."?

A. affective
B. directive
C. empirical

29. T-F. Formal logic is concerned with good etiquette.

30. Which of these is an artificial language?

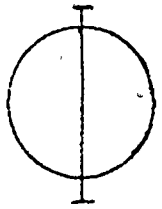
A. English
B. Coptic
C. Musical notation
D. German
E. Bantu



Answers to "Test on Units I-III, Informal Logic"
--Walter A. Coole, Skagit Valley College

1. D
2. True
3. False
4. A: Tribe
   B: Cave
   C: Market Place
   D: Theater
   } 1 point for each, any order
5. A: seldom reason for themselves
   B: let passions rule
   C: lack overall good sense
   } 1 point for each, any order
6. False
7. True
8. True
9. False
10. False
11. False
12. A. There are many issues that can't be answered in either/or terms
    B. We don't have to be totally in agreement or
    } 1 point for each, any order
13. There is insufficient evidence when there are two or more possible conclusions and the evidence doesn't clearly favor one or the other.
14. C
15. E
16. True
17. False
18. False
19. A. identify all assertions
    B. notice qualifying words
    C. notice connections between words
    D. notice conditions
    E. decide which assertions are the main ones
    } 1 point for each; must be in this order
20. A. syntactic
    B. semantic
    C. usage
    D. common sense
    } 1 point for each, any order
21. A
22. The criterion determines--or at least suggests--what the test is to be.
23. C
24. True
25. True
26. E
27. B
28. A
29. False
30. C

Total possible score: 43
Passing score: 38



→ 0/1 → Introduction

This packet is a listing of all current Phile units used in the Informal Logic sequence of the Philosophic-Heuristic Instruction program. Although masters are supplied on 8½" x 11" stock, copies may be cut to 5" x 8" sheets to meet access and filing needs.

These sheets are easily re-arranged for special needs of the reader, whether he is a student, open classroom teacher, or counselor.

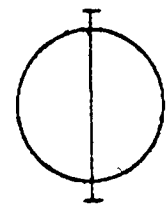
The modules described herein are used in:

--Unit IV of the "core" course (35 hours)
--A-projects (10 hours)
--additional independent study in problem-solving and critical thinking (40 hours/credit)

At the top of each card, a sequence number appears. The first digit (followed by a slash) designates file section, assigned as follows.

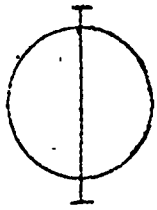
0. Introduction

1. Principles [theory, psychology & strategy]
   The outline of "Thinking, Science & Logic" has been adapted to form the 2-digit numbers which organize this section thus:
   .00 General
   .10 Prior actions leading to problem-encounters



→ 0/2 →

.20 Problem-encounter
  .21 Practical Problems
  .22 "Academic" problems
  .23 Curiosity
.30 Criterions
.40 Problem-definition
  .41 Operations on the given
  .42 Provision problems
.50 Information
  .51 Acquisition
  .52 Ordering
  .53 Processing for entailments
  .54 Other
.60 Trial solutions
  .61 Synopsis
  .62 Exhaustion & elimination
  .63 Criterion Analysis
  .64 Specialized Tactics
.70 Semiotic
  .71 Syntactics (including symbolic logic, etc)
  .72 Semantics
  .73 Pragmatics



THE PHILE

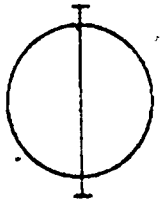
2. Applications

The 3-digit numbers following are Dewey numbers corresponding to subject matter. Major divisions are:

000 General
- 010 Bibliographies & catalogs
- 020 Library science
- 030 General encyclopedic works
- 040
- 050 General periodicals
- 060 General organizations
- 070 Newspapers & journalism
- 080 General collections
- 090 Manuscripts & book rarities

100 Philosophy & related
- 110 Ontology & methodology
- 120 Knowledge, cause, purpose, man
- 130 Pseudo & parapsychology
- 140 Specific philosophic viewpoints
- 150 Psychology
- 160 Logic
- 170 Ethics (moral philosophy)
- 180 Ancient, Med., Oriental philos.
- 190 Modern Western philosophy

200 Religion
- 210 Natural religion
- 220 Bible
- 230 Christian doctrinal theology
- 240 Christ. moral & devotional theol.
- 250 Christ. pastoral, parochial, etc.
- 260 Christ. social & eccles. theol.
- 270 Hist & geog. of Chr. church
- 280 Christ. denominations & sects
- 290 Other religions & compar. rel.



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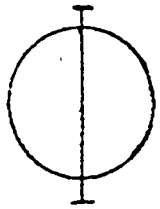
300 The social sciences
- 310 Statistical methods & statistics
- 320 Political science
- 330 Economics
- 340 Law
- 350 Public administration
- 360 Welfare & association
- 370 Education
- 380 Commerce
- 390 Customs & Folklore

400 Language
- 410 Linguistics & nonverbal lang.
- 420 English & Anglo-Saxon
- 430 Germanic languages
- 440 French, Provencal, Catalan
- 450 Italian, Romanian, etc.
- 460 Spanish & Portuguese
- 470 Italic languages
- 480 Classical & Greek
- 490 Other languages

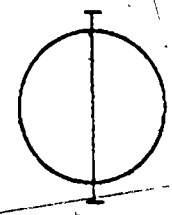
500 Pure Sciences
- 510 Mathematics
- 520 Astronomy & allied sciences
- 530 Physics
- 540 Chemistry & allied sciences
- 550 Earth sciences
- 560 Paleontology
- 570 Anthropolog. & biol. sciences
- 580 Botanical sciences
- 590 Zoological sciences



600 Technology (Applied sci.)
- 610 Medical sciences
- 620 Engineering & allied operations
- 630 Agriculture & agric. industries
- 640 Domestic arts & sciences
- 650 Business & related enterprizes
- 660 Chemical technology etc.
- 670 Manufactures processible
- 680 Assembled & final products
- 690 Buildings

700 The Arts
- 710 Civic & landscape art
- 720 Architecture
- 730 Sculpture
- 740 Drawing & decorative arts
- 750 Painting & paintings
- 760 Graphic arts
- 770 Photography & photographs
- 780 Music
- 790 Recreation (Recreational arts)

800 Literature & rhetoric
- 810 American literature in English
- 820 Engl. & Anglo-Saxon literature
- 830 Germanic languages literature
- 840 French, Provencal, Catalan lit.
- 850 Italian, Romanian etc. literature
- 860 Spanish, & Portuguese literature
- 870 Italic languages literature
- 880 Classical & Greek literature
- 890 Lits. of other languages

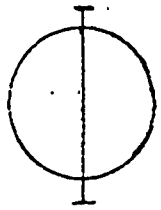


900 General geog. & history etc.
- 910 General geography
- 920 General biog., geneal, etc.
- 930 Gen. hist. of ancient world
- 940 Gen. hist. of modern Europe
- 950 Gen. hist. of modern Asia
- 960 Gen. hist. of modern Africa
- 970 Gen. hist. of North America
- 980 Gen. hist. of South America
- 990 Gen. hist. of rest of world

3. Fallacies

The 3-digit numbers in this section are adapted from Burton's impressive schedule; see Burton, Kimball & Wing: Education for Effective Thinking. (Appleton-Century-Crofts) for details.

000 General
100 Sources of error
- 110 Resident in the agent
  - 111 Intellectual equipment or training
  - 112 Impulsive emotional nature
  - 113 Attitudes
  - 114 Physical & mental health
  - 115 Other

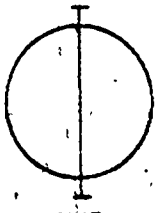


120 Enviornment of the agent
- 121 Nature of the problem
- 122 Distractions
- 123 Language limitations
- 124 Social & political
- 125 Other

200 Errors & Fallacies
- 210 Attitudinal
- 220 Methodological
- 230 Interpretation
- 240 Identifying & defining problem
- 250 Hypothetical errors
- 260 Logical
  - 261 Inductive
  - 262 Deductive
- 270 Rhetorical Devices
- 280 Other

4. Local Modules

5. Local courses



The third digit in the control number is an accession number (within the classification). A fourth digit is sometimes used to indicate that several sheets pertain to the same project--usually to spell out extensive directions.

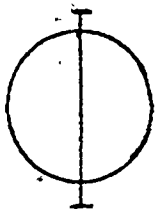
Beside the control number, you'll see the module's title, author, and his/her parent institution. Entries without author-credits were originated by me. Users are invited to send me items to add to the collection.

Listed below are performance objectives given in summary form; student materials contain more detailed objective statements.

Following the objectives, you'll find prerequisites, other than the core course. Time Time is given in clock hours' work for the average student. Sources: (i) publishers' data (ii) student reports (iii) despearing guesses by the unit's author.

Under Student materials, we have listed items that the student must purchase in addition to normal equipment: pencil, paper, notebook, etc.

"Other materials" lists items provided by the publisher or available through PHI distribution.



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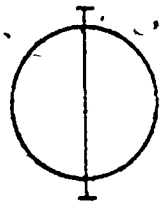
→ 0/9 →

The comment entry suggest passing test scores, curricular relations or specific assignments to accomplish the learning objective(s)--which are not inherent in the student materials.

In general, the student should be required to not only conduct problem-solving operations and show first-level critical thinking; he/she should also demonstrate some discursive competence--discussing his/her project:

--generically
--in light of principles operating
--and its social or moral significance

Walter A. Cooke
Open Classroom
Skagit Valley College
Mt. Vernon, WA 98273



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→ 1/00.1 → Scientific Method

Performance objective(s): undefined

Prerequisite: (i)extensive background in philosophy & science (ii) Thorough familiarity with Wilson's Introduction to Scientific Research (see 2/500)

Time:

Student materials: Feigl & Brodbeck: Readings in the Philosophy of Science. Appleton-Century-Crofts, Inc. 440 Park Ave, New York, NY 10016

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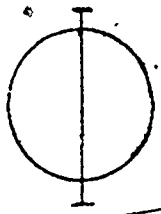

→ H/00.2 → Basic Logical Thinking

Performance objective(s): perform minimally acceptable analysis, criticism and argument of classically educated person.

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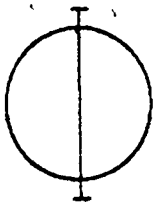
Prerequisite:

Time: 100 hrs

Student materials: Durtill, Richard L.: Logical Thinking. Harper & Row, Publishers. 49 East 33rd St. New York, NY 10016 $3.00

Student should outline the text & work all exercises.



→ 1/30.1 → Goal Analysis

Performance objective(s): (1) establish solution criteria
(2) define practical problems

THE PHILE

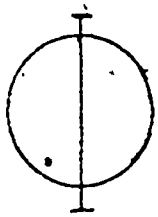
Prerequisite:

Time: 6 hrs

Student materials: Mager, Robert F.: Goal Analysis. Ferron Press, 6 Davis Drive, Belmont, CA 94002 $3.00

Student should read the text thoroughly; then, using the steps outlined in Part III, state and analyze three of his/her own goals. To complete this module, the student must complete his/her own version of the exercise in Chapter 11.

For 5" x 8" format, cut along dotted lines. For current update, consult: Greenbook Abstract



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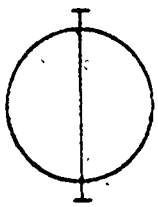
→ 1/54.1 → How to Use Theories

Performance objective(s): (1) distinguish parts of a theory (2) state theories (3) instantiate theories in given cases (4) apply theories (5) argue for theoretical usages

Prerequisite: none *Time:* 5 hrs

Student materials: Hard, Hazel & Jensen, Margaret: Theory Without Pain. Brigham Young University Press, Provo, Utah 84602 $2.25



THE PHILE

→ 1/70.1 → The Concepts of Semiotic

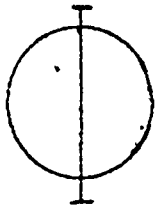
Performance objective(s): organize & present information within a framework of the classical concepts of semiotic

Prerequisite: (i) familiarity with Hayakawa: Language in Thought & Action (ii) background in formal logic *Time:* 30 hrs

Student materials: Morris, Charles W. Signs, Language & Behavior. Prentice-Hall, Inc. Englewood Cliffs, NJ 07632

Student should submit detailes outline of text in partial fulfillment of module's requirements.

For 5" x 8" format, cut along dotted lines. For current update, consult: Greenbook Abstract



THE PHILE

→ 1/73.1 → General Semantics

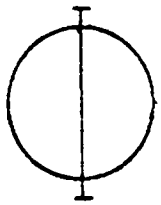
Performance objective(s): Variable

Prerequisite: English Composition

Time: 4½ hrs/chpt.
17 chapters

Student materials: Hayakawa, S.I.: Language in Thought & Action. Harcourt, Brace & Jovanovich. 757 third Ave, New York, NY 10017 $5.00

Student should complete each chapter in sequence. He/she should read each chapter before completing work prescribed in "Applications".



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→ 2/000. → Applying the Peter Prescription

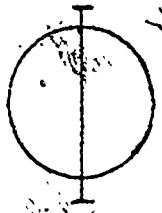
Performance objective(s): student should be able to avoid bac conclusions of the operation of the Peter Principle and improve the quality of his life.

Prerequisite:

Time: 10 hrs.

Student materials: Peter, Laurence: The Peter Prescription. William Morrow & Co, INc. 105 Madison Ave., New York, NY $5100.

Student should read the text, state a goal to achieve, select one of the sixty six prescriptions, and apply it systematically, discussing progress & achievement periodically. Additional experiments may be undertaken for negotiated credits.



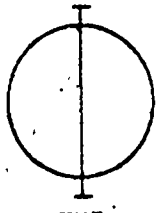
→ 2/100.1 → Philosophy

Performance objective(s): think critically about philosophical problems

Prerequisite: Introduction to philosophy or equivalent course, preferably with familiarity with Williams' Man Asks Why. *Time:* 75 hrs

Student materials: Cornman, James & Lehrer, Keith: Philosophical Problems & Arguments. Macmillan Publishing Co: 866 Third Ave. New York, NY 10022 $6.00.

Student should (i) submit an outline of the text and (ii) work all exercises.



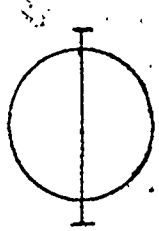
→ 2/100.2 → Evaluating Philosophical Argument

Performance objective(s): estimate the logical force of an argument

Prerequisite: course in introduction to philosophy, preferably with familiarity with Williams' Man Asks Why. *Time:* 35 hrs

Student materials: Beardsley, Monroe: Modes of Argument. Pobbs-Merrill Co., 4300 W. 62nd St.,,Indianapolis, Ind. 46268 $2.00

Student should outline all the text, including the introduction and answer questions at the end of each selection. Finally, he/she should memorize "A Guide for the Study of Arguments", p. 64



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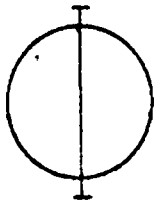
→ 2/160.1 → Symbolic Logic

Performance objective(s): (i) to translate from simple English sentences into SC & PC formulations (ii) construct SC truth tables

Prerequisite: none *Time:* 7 hrs.

Student materials: Schagrin, Morton L. The Language of Logic. Random House, 201 E. 50th St. New York, NY 10022 $4.00.

Other materials: Examination for Schagrin's Language of Logic.



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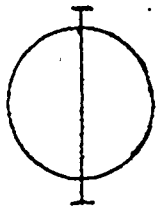
→ 2/500. → The Experimenter's Bible

Performance objective(s): (i) describe in extensive detail, how professional research workers conduct investigations (ii) be able to follow explainations of a complex research projects

Prerequisite: considerable scientific background; current involvement with research activity *Time:* 30 hrs

Student materials: Wilson: Introduction to Scientific Research. McGraw-Hill, Inc. Princeton Rd, Hightstown, NJ 08520 $3.00.

Student should submit a detailed outline of the text.



THE PHILE

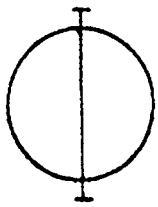
→ 2/650 → OPSEARCH

Performance objective(s): undefined

Prerequisite: extensive background in large-institution management

Time: variable

Student materials: Churchman, Ackoff & Arnoff: Introduction to Operations Research. John Wiley & Sons, Inc. 605 Third Ave. New York, NY 10016



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→ 3/000 → Do-It-Yourself Fallacies

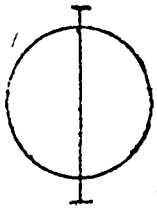
Performance objective(s): (i) construct deceptive, fallacious arguments (ii) avoid being suckered by same

Prerequisite: none

Time: 15 hrs

Student materials: Capaldi, Nicholas: The Art of Deception. Donald W. Brown, Inc. Publishers, 60 East 55th St, New York, NY 10022 $3.00.

Student should outline text and commit to memory, the list presented on pp. 185-186.



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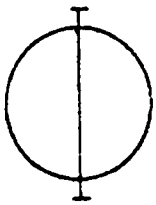
→ 3/124.1 → Pseudo-scientific Fads

Performance objective(s): (i) list several examples of pseudo-scientific fads (ii) form plausible hypotheses to account for them

Prerequisite: none *Time:* 20 hrs

Student materials: Evans, Christopher: Cults of Unreason. Dell Publishing Co. 1 Dag Hammarskjold Plaza, New York, NY 10017 $3.00.

Student should: (i) outline the text (ii) write plausible hypotheses accounting for each movement listed



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→ → *Performance objective(s):*

Prerequisite: *Time:*

Student materials:

5" x 8" format, cut along dotted lines *For current update, consult:* Greenbook Abstract