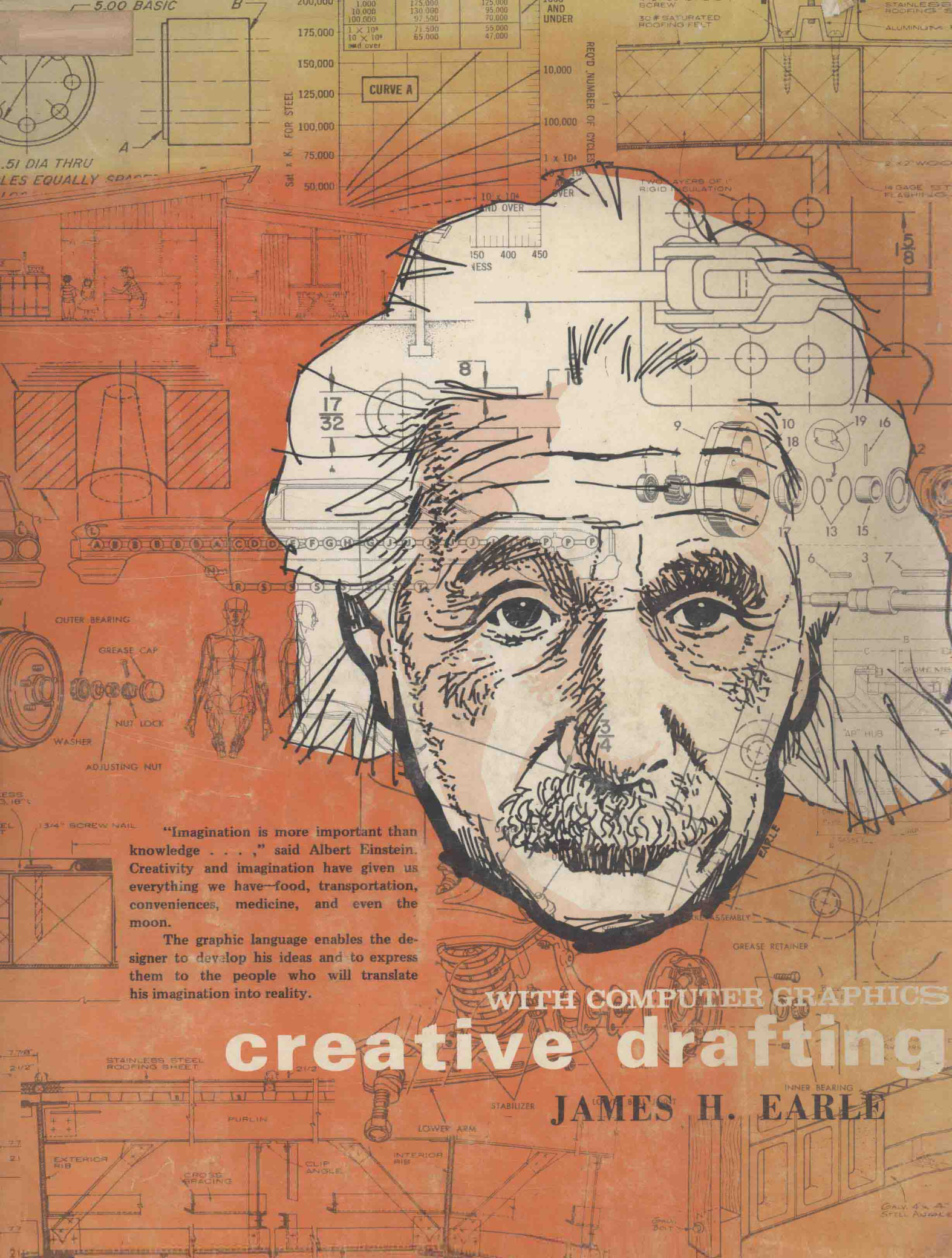
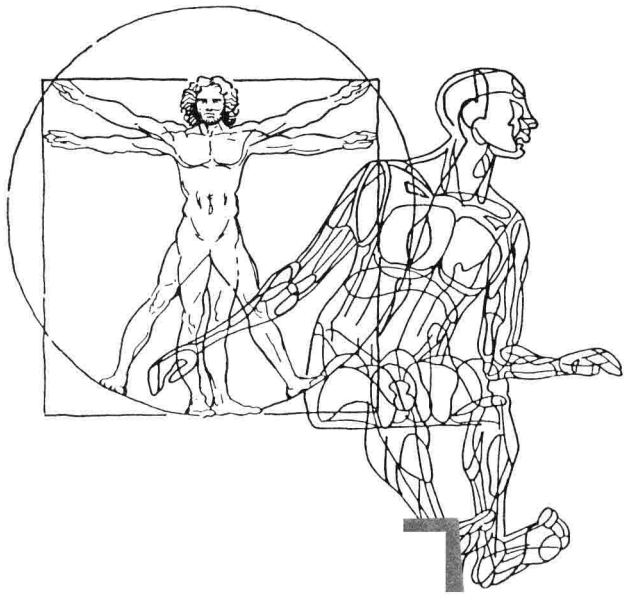

"Imagination is more important than knowledge . . . ," said Albert Einstein. Creativity and imagination have given us everything we have—food, transportation, conveniences, medicine, and even the moon.
The graphic language enables the designer to develop his ideas and to express them to the people who will translate his imagination into reality.
WITH COMPUTER GRAPHICS
creative drafting
JAMES H. EARLE



WITH COMPUTER GRAPHICS

Creative drafting

James H. Earle
TEXAS A&M UNIVERSITY

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FOREWORD

CREATIVE DRAFTING is designed to introduce the fundamentals of drafting to a beginning student whether he is in the high school or a technology program. Various examples have been taken from industry to give applications of the basic principles. Many illustrations have been included to represent recommended practices suggested by various standards. Two of the agencies supplying standards are the United States of America Standards Institute (USASI), which is now called the American National Standards Institute (ANSI), and the General Motors Corporation.

Problems in this book are expected to be sufficient for a full two-semester course at the beginning level. The average student will be able to cover more material when using these problems than when each problem is laid out on a blank sheet. This more rapid coverage of material will permit you to learn more of the field of drafting and will give you additional time for the application of these principles to comprehensive design problems.

Much emphasis has been placed on developing the creativity of all students. Creativity is especially important to the engineer, technologist, or member of the industrial team since all products and processes that we use daily must come from them. Consequently, many problems in this book are structured to have more than one solution to exercise your imagination. Some problems require that you design and present a solution that is entirely original and based on your thinking and analysis. It is almost impossible to develop an original design without a thorough understanding of drafting principles and graphical methods. Many freehand sketches and pictorials must be drawn to stimulate the creative process of developing a solution to a technical problem.

Each problem sheet should be removed carefully from the book one at a time as assigned by your instructor. When instruments must be used to solve a problem, the problem sheet should be taped to your table top for an orderly solution. If desired, you may draw a border around the edge of the sheet as part of the solution. Most industrial drawings have printed borders and title strips to save valuable drafting time.

Graded problems that have been returned to you should be maintained in a three-ring notebook for permanent reference. All grades should be listed on page iv to assist you in keeping a course average as the course progresses.

James H. Earle
College Station, Texas.

REFERENCES BY CHAPTER

TABLE OF CONTENTS AND REFERENCES BY CHAPTER
Chapters of reference books listed below

PAGE	TOPIC	1	2	3	4
1-6	Lettering	3	12	3	4
7-8	Scales	4	11	2	5
9	Instruments	4	11	2	5
10-12	Geometric Construction	5	13	4	6
13-14	Conic Sections	5	13	4	6
15-17	Tangencies	5	13	4	6
18-24	Orthographic Sketching	8	14	5	7
25	Design Sketching	6,8	4	17	2,7
26-31	Orthographics with Instruments	7	15	6	8
32-34	Auxiliary Views	10	16	7	9
35-39	Isometrics	9	26	18	19
40-43	Obliques	9	26	18	19
44	Perspectives	18	26	18	19
45-54	Sections and Conventions	11	17	8	10
55-57	Threaded Fasteners	12	18	9	11
58-70	Dimensioning	13	21	12	14
71-73	Intersections	17	32	27	20
74-77	Developments	17	32	24	20
78-81	Graphs	16	33	25	22
82	Working Drawings	14	24	15	17
83	Design Problems	6,14	9	17	2
84-98	Architectural Drafting	19	-	-	-
99-106	Metric Scales	-	11	2	4

REFERENCES

1. DESIGN DRAFTING by James H. Earle. Addison-Wesley Publishing Company, Reading, Massachusetts, 1972.

2. ENGINEERING DESIGN GRAPHICS (Fifth Edition) by James H. Earle. Addison-Wesley Publishing Company, Reading, Massachusetts, 1987.

3. DRAFTING TECHNOLOGY (Second Edition) by James H. Earle. Addison-Wesley Publishing Company, Reading, Massachusetts, 1986.

4. GRAPHICS FOR ENGINEERS (Second Edition) by James H. Earle. Addison-Wesley Publishing Company, Reading, Massachusetts, 1989.

Grade sheet

Probs.	Grades	Probs.	Grades	Probs.	Grades

WEEKLY TEST GRADES

TEST 1 ________

TEST 2 ________

TEST 3 ________

TEST 4 ________

TEST 5 ________

TEST 6 ________

TEST 7 ________

TEST 8 ________

TEST 9 ________

TEST 10 ________

TEST 11 ________

TEST 12 ________

TEST 13 ________

TEST 14 ________

TEST 15 ________

TEST 16 ________

TEST AVERAGE ________

MID-SEMESTER GRADE

DAILY AVERAGE ________

TEST AVERAGE ________

AVERAGE ________

FINAL GRADE

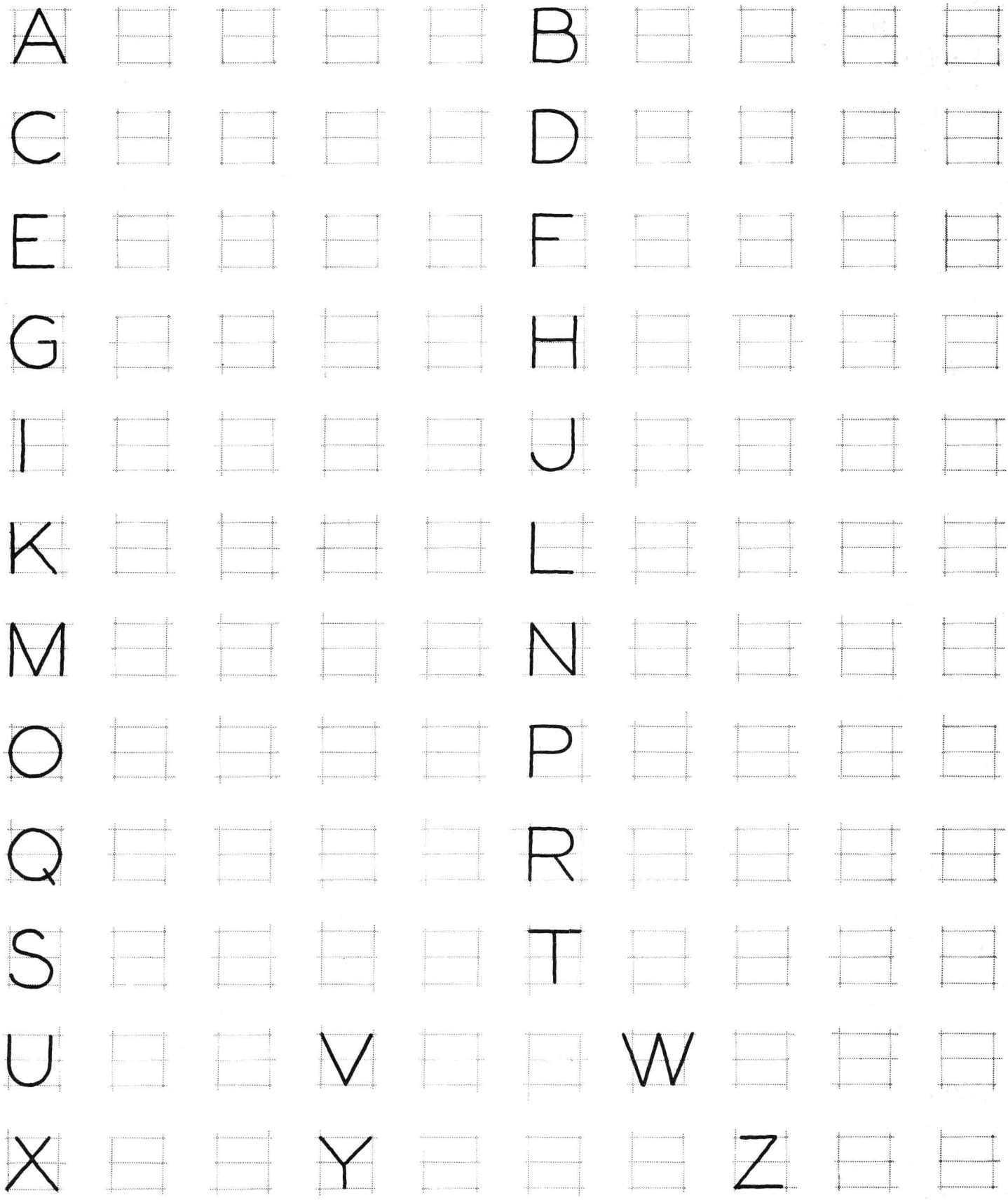
DAILY AVERAGE ________

TEST AVERAGE ________

FINAL GRADE ________

LETTERING

USING AN F OR HB PENCIL WITH A SLIGHTLY ROUNDED POINT, CONSTRUCT EACH LETTER IN THE SPACES PROVIDED. OBSERVE THE FORM AND PROPORTION OF EACH LETTER TO ASSIST YOU IN IMPROVING YOUR LETTERING IN FUTURE ASSIGNMENTS.



creative drafting

NAME
FILE NO SEC DATE

grade 1

COMPUTER GRAPHICS PROBLEMS

GENERAL: The problems given on the backs of each sheet in this problem book are designed to be solved and constructed by computer graphics. Many microcomputer graphics software packages are available that can be used for plotting these solutions. Several types of software are: AutoCAD, VersaCAD, CADplan, Drawing Processor, CADKey, and many others.

Inclusion of problems for solution by computer provides an excellent comparison between traditional graphics and graphics by computer. Schools with limited computer equipment can rotate students from computer to drafting board to permit all principles to be covered, some by computer and some by hand with drawing instruments.

LAYOUT OF PROBLEMS: An area of 6.6" X 6.6" is given on a reduced grid at the right of each sheet. This square represents the full-size area that is available at the left of the sheet for plotting the solutions. A typical drawing area for a size A sheet for a plotter is shown in Figure 1. It is suggested that each plot have an origin (P1) located at 0.4", 1.1" (10 mm, 30 mm) in order for the plot to fit within the given space. A grid of 0.2" matches the grid on which the problems are given.

When the metric units are used, the upper right corner should be changed to 165, 165. A grid of 5 mm matches the grid given for each problem.

Where multi-pen plotters are available, you should try to use two or three pen sizes in order to maintain a good contrast between lines in keeping with good plotting practices.

PROBLEM SOLUTION: Most problems are partially laid out so they will fit in the plotting area. It would be helpful if you labeled the major points of the given problems with X- and Y-coordinates in pencil on the drawing. These coordinates would make it easier for you to plot the views on your computer's screen. The heavy-line divisions on the grid represent inches which are divided into 0.2" intervals. When using the metric system, the heavy-line divisions represent 25 mm intervals that are divided into 5 mm. divisions.

In some cases you may wish to number the problems in different locations than given in the examples for better use of the space. In most examples, you will be able to use 1/8" text and numbers. However, change this size and other variables if needed.

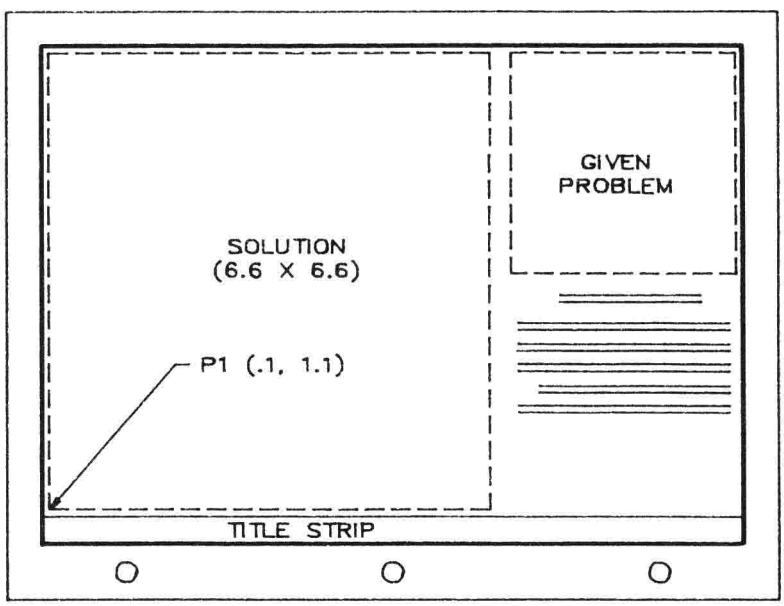


Figure 1:
The layout of a typical computer graphics sheet.

LETTERING

USING AN F OR HB PENCIL WITH A SLIGHTLY ROUNDED POINT, CONSTRUCT EACH NUMERAL IN THE SPACES PROVIDED. OBSERVE THE FORM AND PROPORTION OF EACH LETTER TO ASSIST YOU IN IMPROVING YOUR LETTERING IN FUTURE ASSIGNMENTS. NOTICE THAT FRACTIONS ARE TWICE AS TALL AS WHOLE NUMBERS.

1 2

3 4

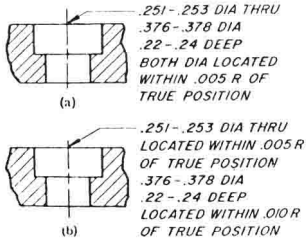
5 6

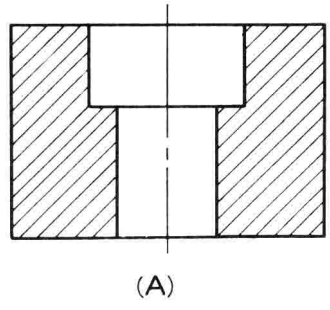
7 8

9 0

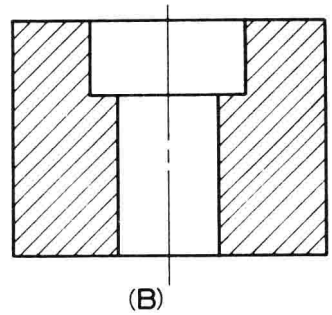
$\frac{1}{2}$ $\frac{1}{4}$ $\frac{3}{32}$

USING 1/8" VERTICAL LETTERS, REPEAT THE NOTES GIVEN BELOW IN THE SPACE AT THE RIGHT. ALLOW A 1/8" SPACE BETWEEN EACH LINE OF LETTERING. USE LIGHT GUIDE LINES MADE WITH A 4H PENCIL. LETTER WITH AN F OR HB PENCIL.





(A)



(B)

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grade 2

METRIC SCALES

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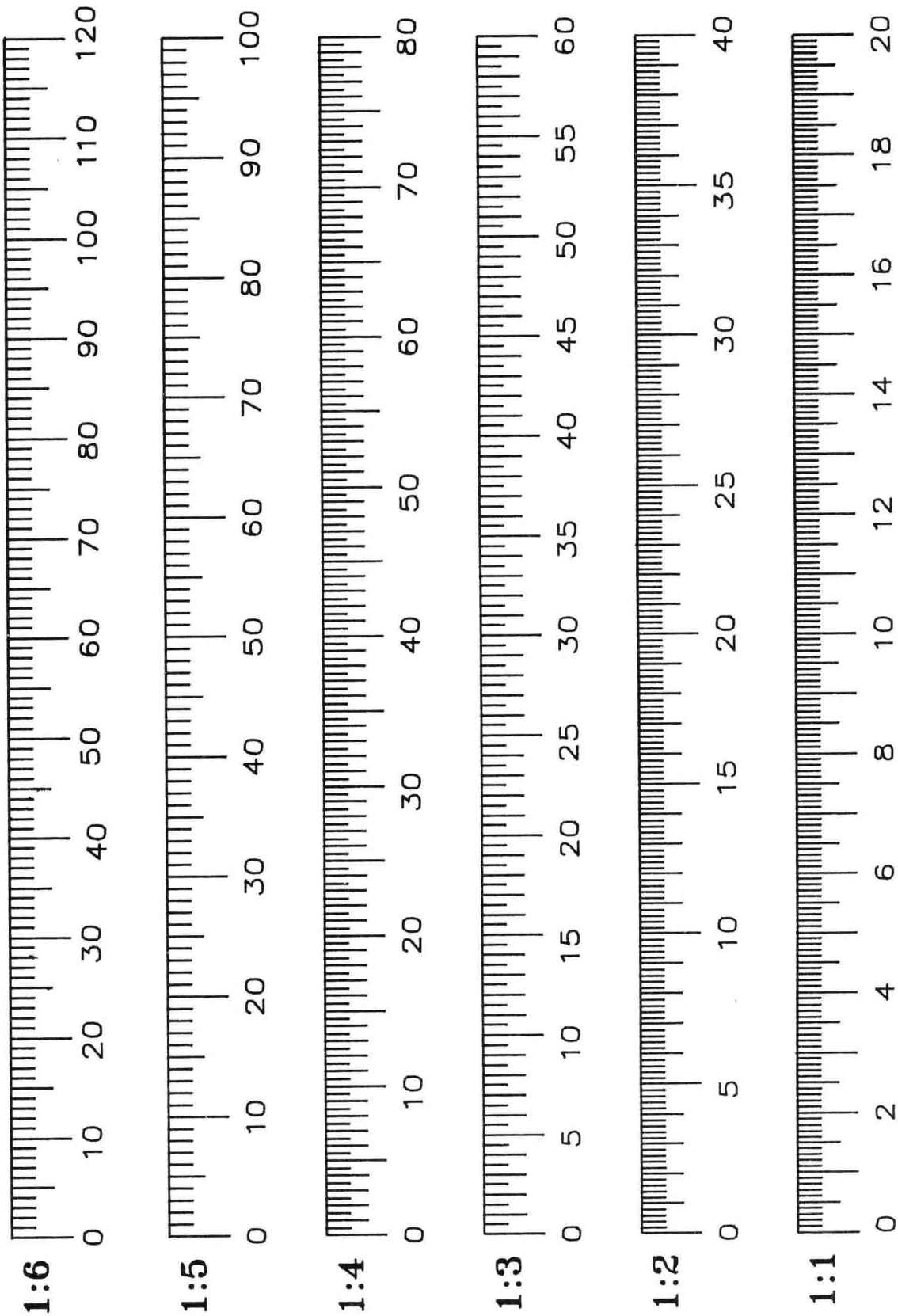

LETTERING

USING AN F OR HB PENCIL WITH A SLIGHTLY ROUNDED POINT, CONSTRUCT EACH LETTER IN THE SPACES PROVIDED. OBSERVE THE FORM AND PROPORTION OF EACH LETTER TO ASSIST YOU IN IMPROVING FUTURE ASSIGNMENTS. THESE ARE LOWER CASE LETTERS.

a	b	c
d	e	f
g	h	i
j	k	l
m	n	o
p	q	r
s	t	u
v	w	x
y	z	&

USING LOWER CASE VERTICAL LETTERING, REPEAT THE FOLLOWING SENTENCE: "ENGINEERING DRAWING IS THE LANGUAGE OF INDUSTRY THROUGH WHICH ALL DESIGNS ARE DEVELOPED." USE THE GUIDE LINES PROVIDED.

METRIC SCALES

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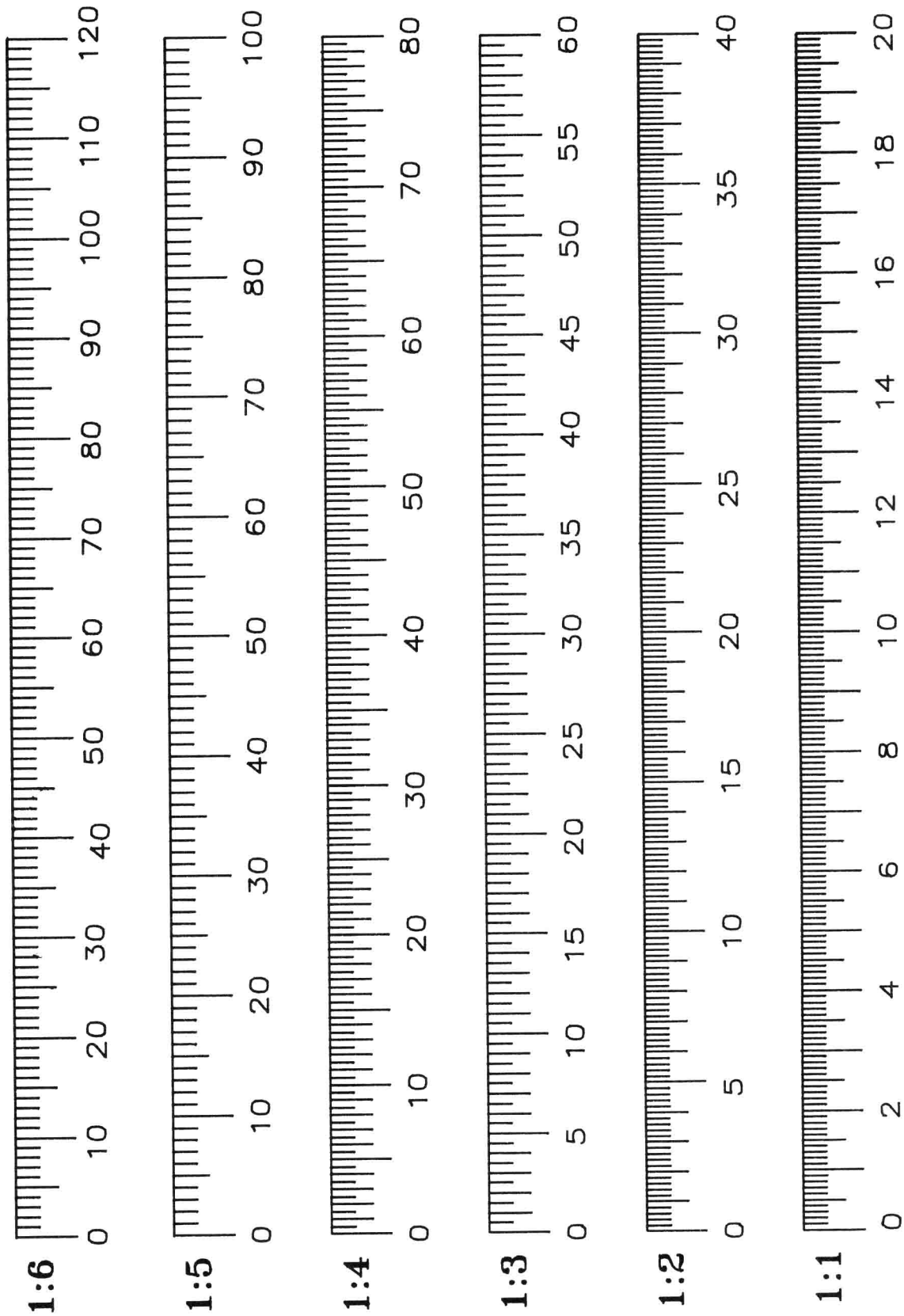

LETTERING

USING AN F OR HB PENCIL WITH A SLIGHTLY ROUNDED POINT, CONSTRUCT EACH LETTER IN THE SPACES PROVIDED. OBSERVE THE FORM AND PROPORTION OF EACH LETTER TO ASSIST YOU IN IMPROVING YOUR LETTERING IN FUTURE ASSIGNMENTS.

A B

C D

E F

G H

I J

K L

M N

O P

Q R

S T

U V W

X Y Z

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NAME
FILE NO SEC DATE

grade 4

METRIC SCALES

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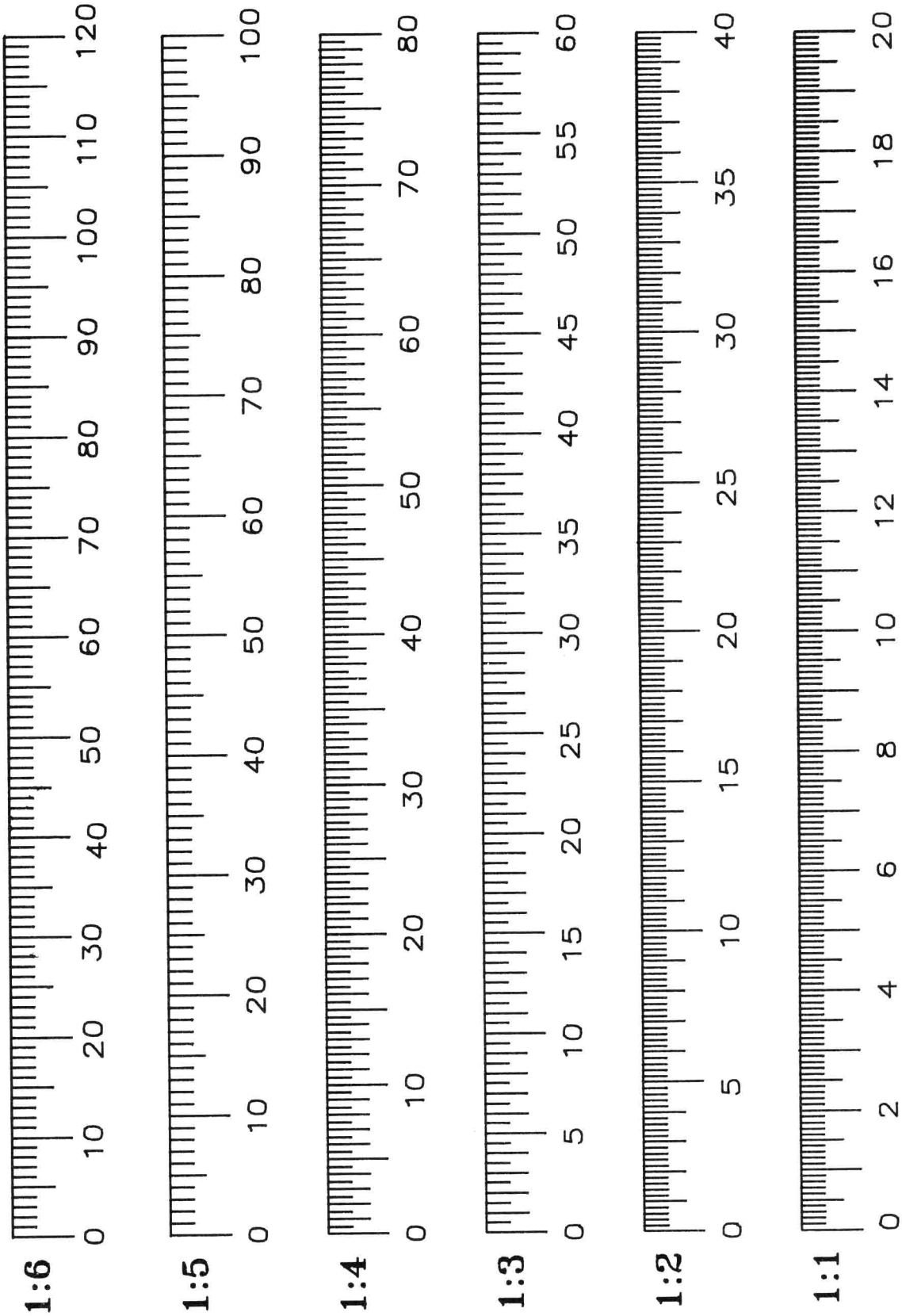


LETTERING

USING AN F OR HB PENCIL WITH A SLIGHTLY ROUNDED POINT, CONSTRUCT EACH NUMERAL IN THE SPACES PROVIDED. OBSERVE THE FORM AND PROPORTION OF EACH NUMERAL TO ASSIST YOU IN IMPROVING YOUR LETTERING IN FUTURE ASSIGNMENTS. THESE ARE INCLINED NUMERALS. NOTICE THAT FRACTIONS ARE TWICE AS TALL AS WHOLE NUMBERS.

1 2

3 4

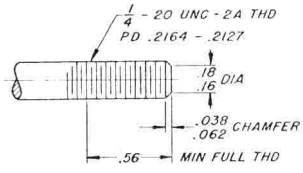
5 6

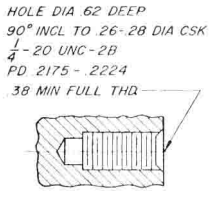
7 8

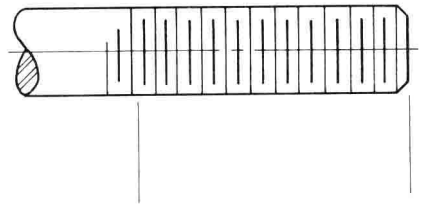
9 0

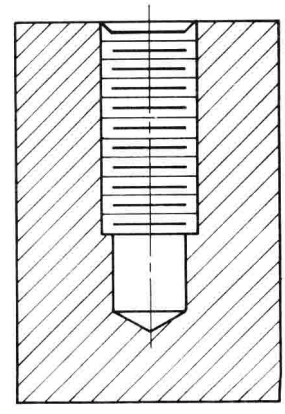
$\frac{1}{2}$ $\frac{3}{4}$ $\frac{1}{16}$

USING 1/8" LETTERS AND NUMERALS, REPEAT THE NOTES BELOW ON THE PARTS GIVEN AT THE RIGHT. CONSTRUCT LIGHT GUIDE LINES WITH A 4H PENCIL. LEAVE 1/8" SPACE BETWEEN EACH LINE. SHOW A LEADER TO CONNECT EACH NOTE TO THE PART TO WHICH IT APPLIES.









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METRIC SCALES

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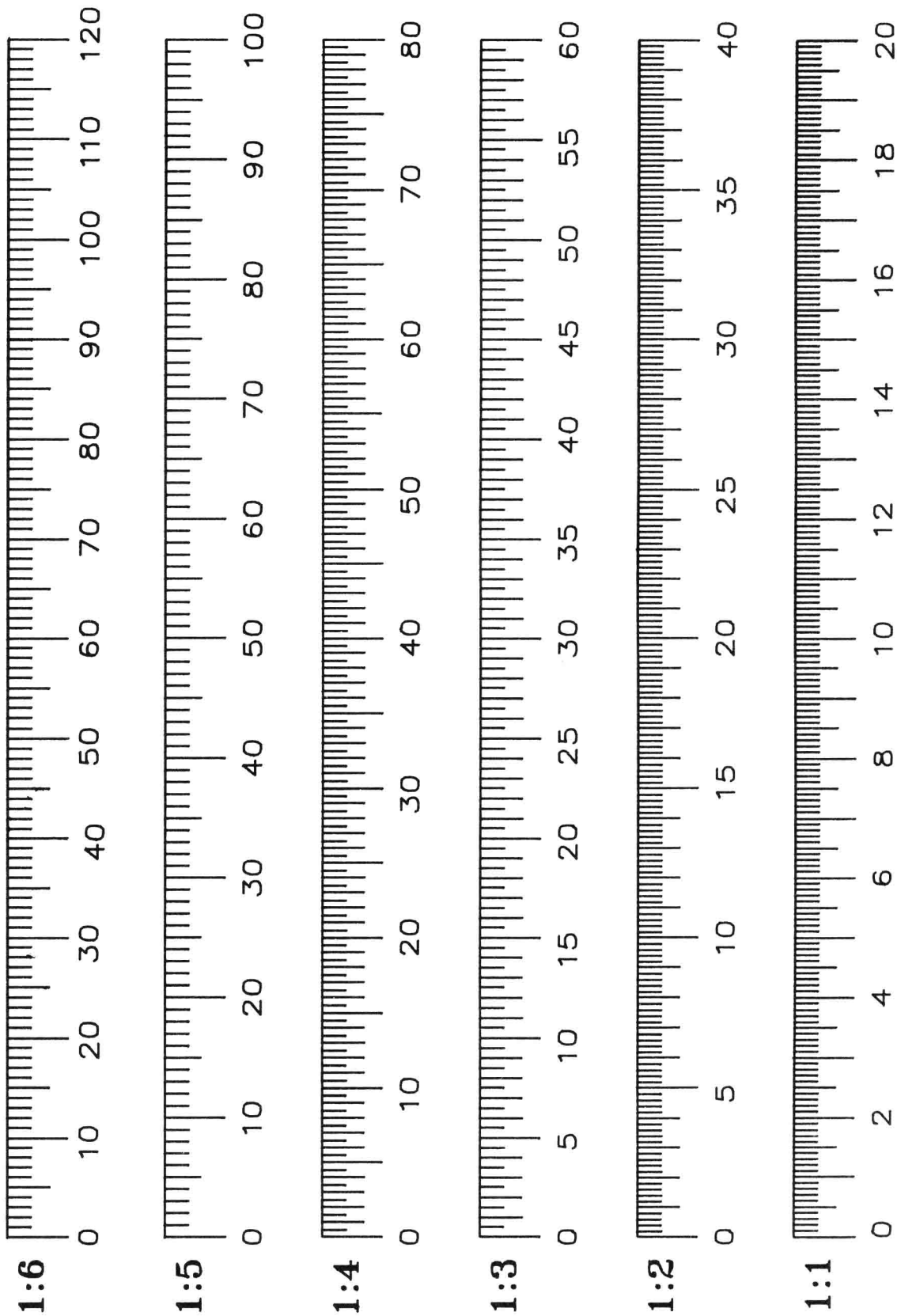
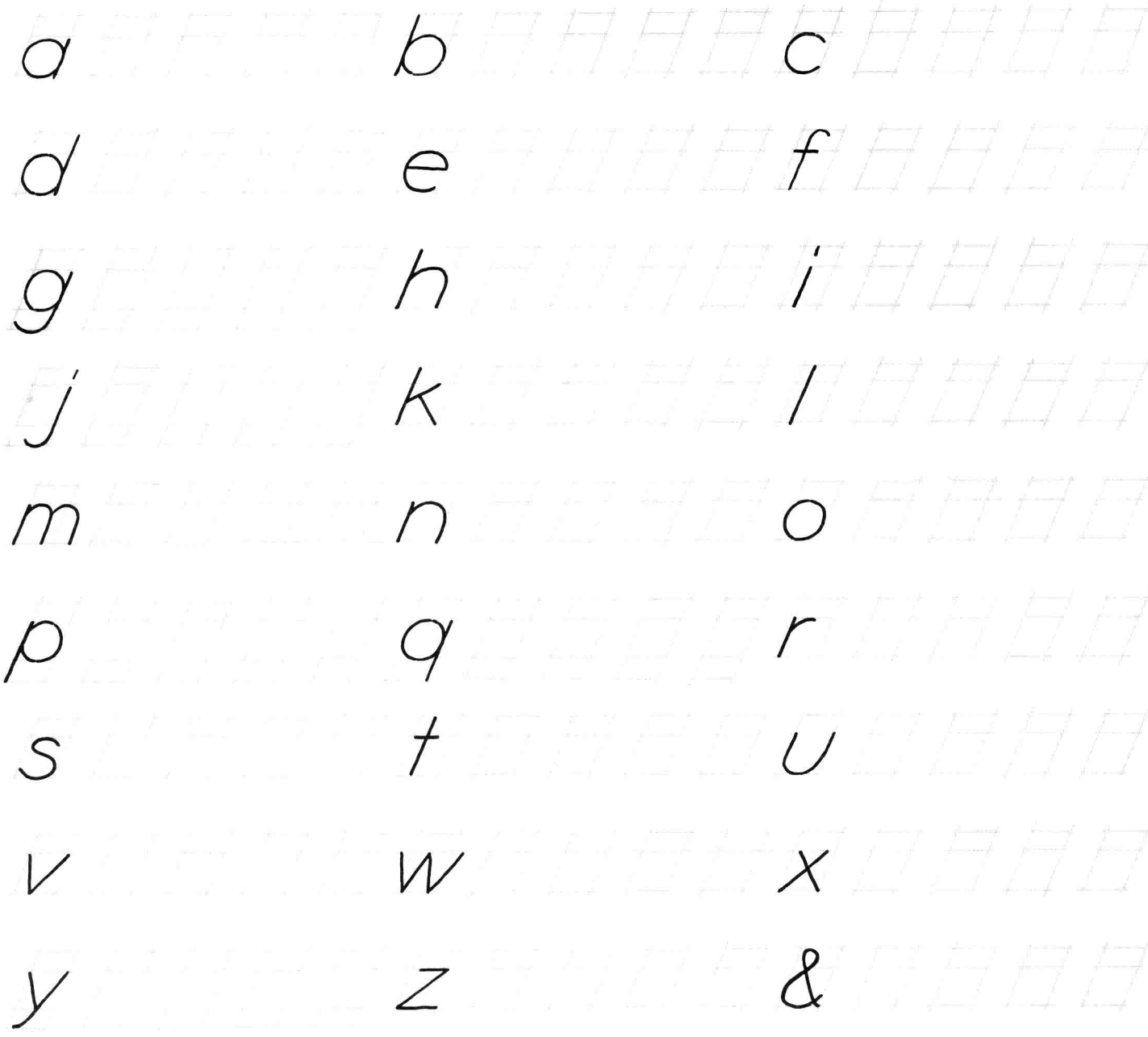


LETTERING

USING AN F OR HB PENCIL WITH A SLIGHTLY ROUNDED POINT, CONSTRUCT EACH LETTER IN THE SPACES PROVIDED. OBSERVE THE FORM AND PROPORTION OF EACH LETTER TO ASSIST YOU IN IMPROVING YOUR LETTERING. THESE ARE INCLINED, LOWER CASE LETTERS.



USING INCLINED, LOWER CASE LETTERS REPEAT THE FOLLOWING SENTENCE: "THE ENGINEER AND TECHNICIAN MUST DEVELOP THEIR ABILITY TO BE CREATIVE." USE THE GUIDE LINES PROVIDED.

METRIC SCALES

Remove this page and fold it longwise along the desired scale for making metric measurements.