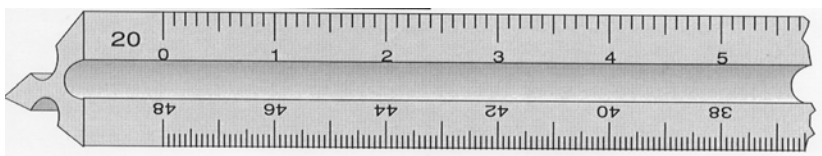
Scales

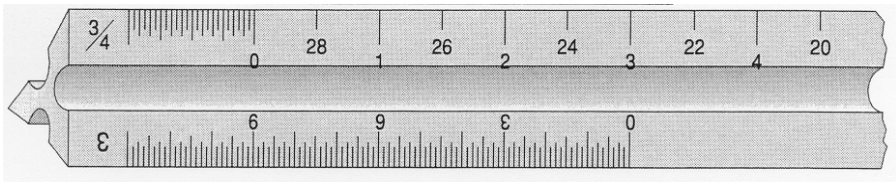
- The purpose of scales is to allow an engineer, architect, technician or contractor to determine scaled measurements from drawings or maps very quickly and easily.
- Drawings and maps are drawn to different scales such as: 1” = 100’, 1” = 1’-0” or 1:2 (half size).

Types of Scales

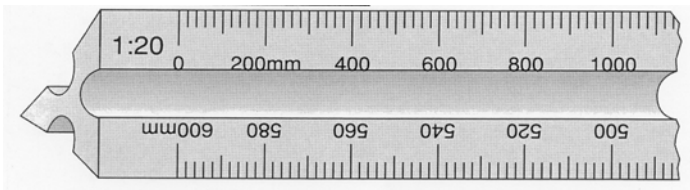
Civil Engineering Scale



Architect's Scale



Metric Scale



Civil Engineer's Scale

- **Full Divided Scale**
- **1" is divided into equal decimal units of 10, 20, 30, 40, 50, 60 and 80 divisions.**
- **For example, 1" = 100' is a typical scale used for Civil Engineering Drawings. This means that 1" on the drawing represents 100' in the real world.**

Scale & Size

- **10 scale represents full size in decimal inches. 1" on paper represents 1" in real life. Hence the name "full size".**
- **20 scale represents half scale where 1" on a drawing represents 2" in real life.**
- **40 scale represents quarter size where 1" on a drawing represents 4" in real life.**

Applications

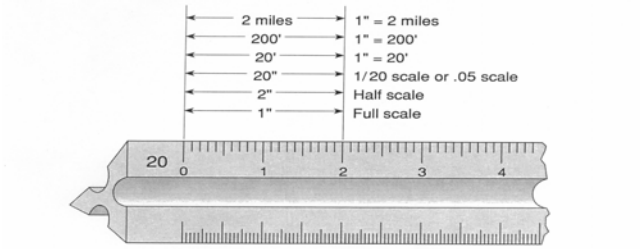
- **Civil Engineers typically design large things such as, bridges, roads, buildings, shopping centers etc. Therefore typical scales used include: 1” = 100’ for plan views of highway designs and 1” = 5’ vertical and 1” = 100’ horizontal for profile views. Section views are typically 1” = 5’ vertical and 1” = 10’ horizontal.**

Other Applications

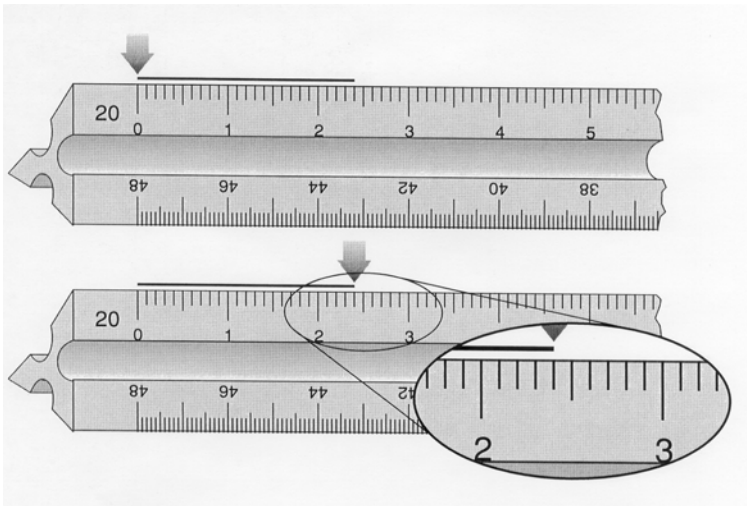
- **Sometimes scales are used to compute quantities based on a graphical analysis. When this is the case units of measurement other than length are often used. Examples include:**
- **1” = 10 kips, 1” = 2000 volts, 1” = 50 buses, 1” = 20 GHz and 1” = 40 people.**
- **Always remember that your answer will be recorded in a decimal format for the CE scale.**

How to use an Engineer's Scale

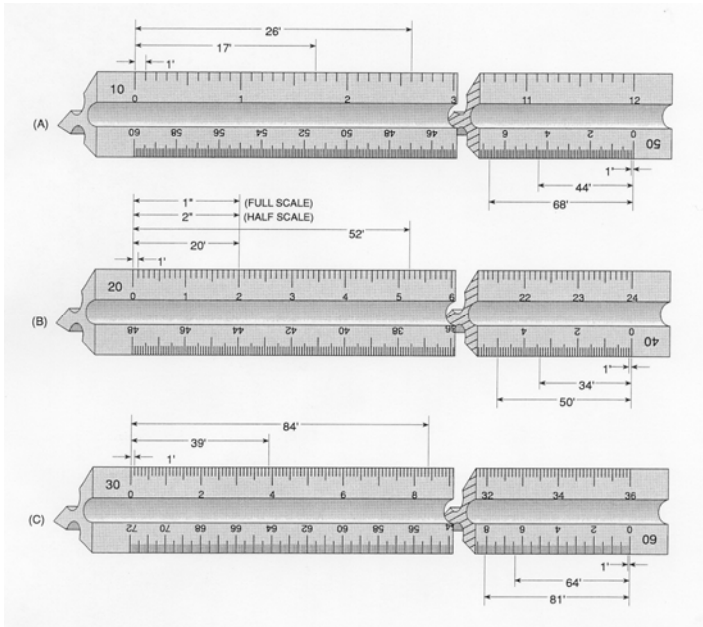
CIVIL ENGINEER'S SCALE					
Divisions	**Ratio**	**Scales Used with This Division**			
10	1:1	1" = 1"	1" = 1"	1" = 10'	1" = 100'
20	1:2	1" = 2"		1" = 20'	1" = 200'
30	1:3	1" = 3"		1" = 30'	1" = 300'
40	1:4	1" = 4"		1" = 40'	1" = 400'
50	1:5	1" = 5"		1" = 50'	1" = 500'
60	1:6	1" = 6"		1" = 60'	1" = 600'



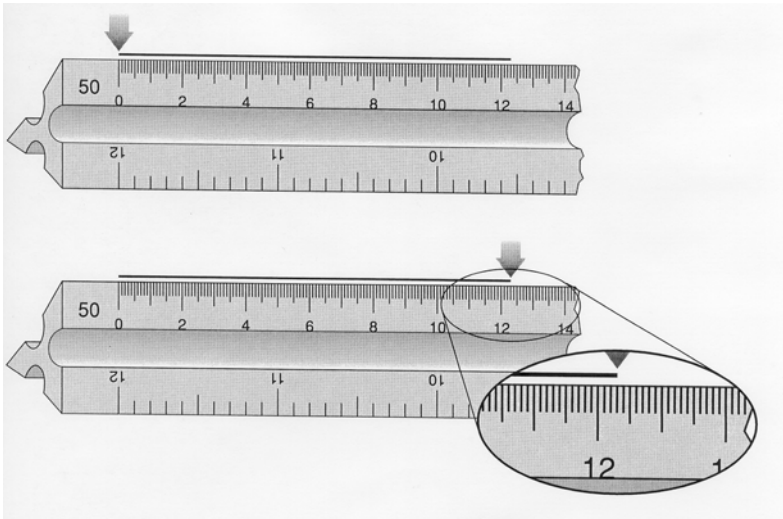
Steps in Reading CE Scale



Examples of Using the CE Scale



Reading the 50 scale



Architect's Scale

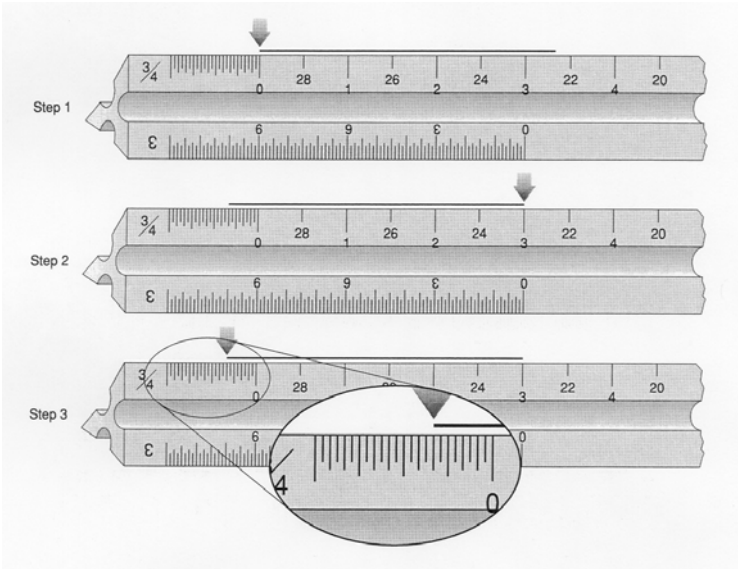
- Architects are involved in large scale projects as well as smaller scale projects. They use a wide range of different scales for their drawings.
- Many Structural Engineering detail drawings are read using the Architect's scale.
- Architect's scale always reads X" = 1'- 0"

  For example, ½" = 1'- 0" or 3" = 1'- 0".

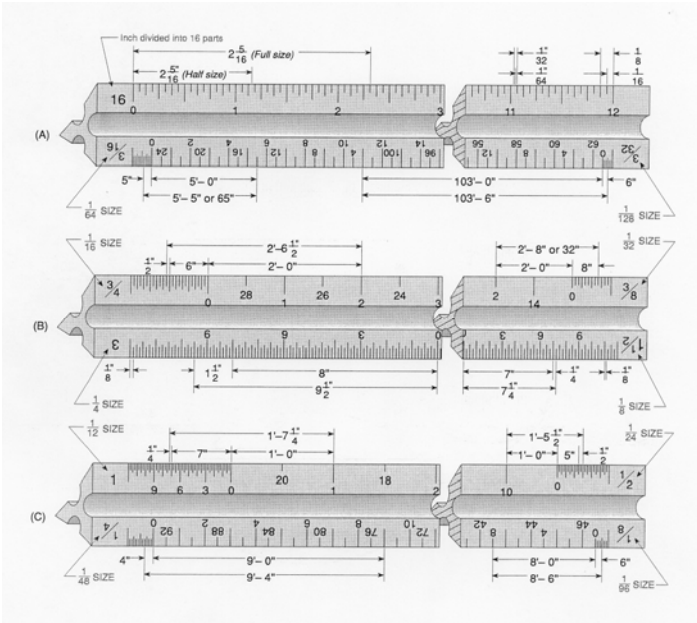
Architect's Scales and Sizes

- 16 Scale = Full Size 12" = 1'- 0". (standard ruler)
- 3"= 1'- 0" = Quarter Size (divide 3"/12" = ¼)
- 1-1/2" = 1'- 0" = 1/8 size
- 1" = 1'- 0" = 1/12 size
- 3/4" = 1'- 0" = 1/16 size
- 1/2" = 1'- 0" = 1/24 size
- 3/8" = 1'- 0" = 1/32 size
- 1/4" = 1'- 0" = 1/48 size
- 1/8" = 1'- 0" = 1/96 size
- 3/32" = 1'- 0" = 1/128 size

Reading an Architect's Scale



Examples of using the Architect's Scale



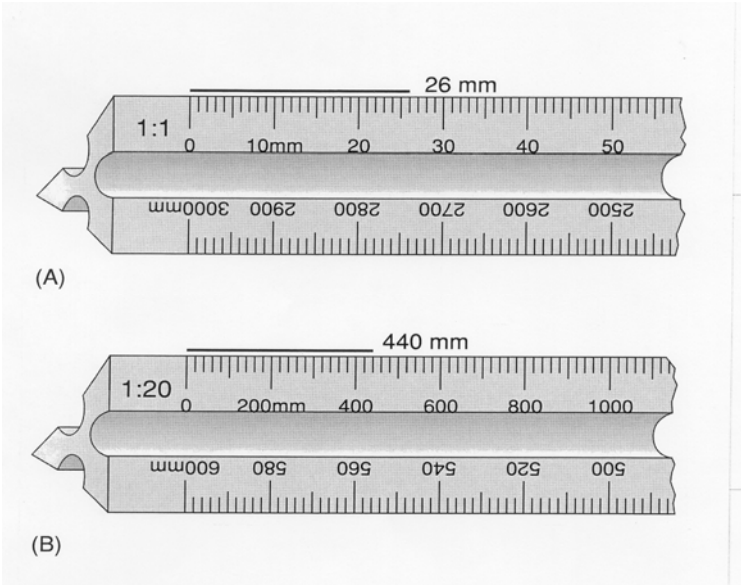
International System of Units

- Millimeter (mm) is the primary SI unit.
- Conversion: U.S. Customary 1” = 25.4 mm.
- Kilometer is used for large scale drawings.
- 1 km = 1,000 m
- 1 m = 1,000 mm
- 1 m = 100 cm
- 1 cm = 10 mm

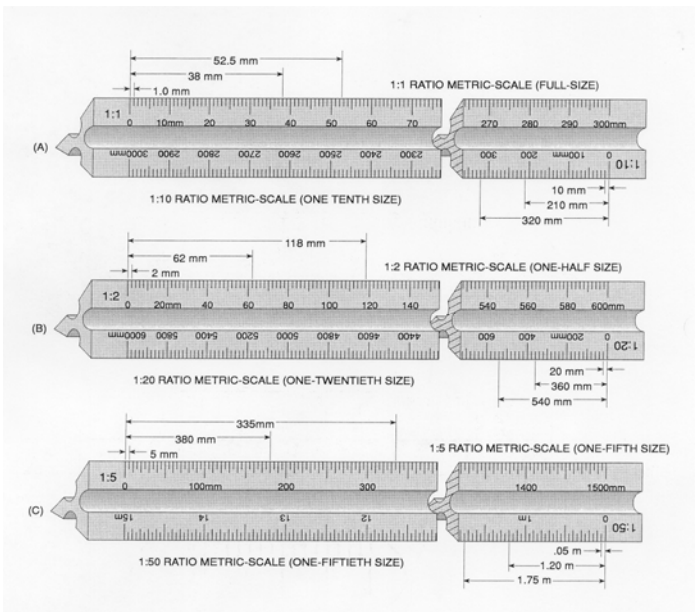
Common Metric Scales

- 1: 1 Full Size
- 1: 2 Half Size
- 1:5 1/5 Size
- 1:20 1/20 Size (can be used for 1/200 size)
- 1:331/3 LP Size
- 1:50 (can be used for 1/5 size)
- 1: 100 (can be used for full size)

Reading the Metric Scale



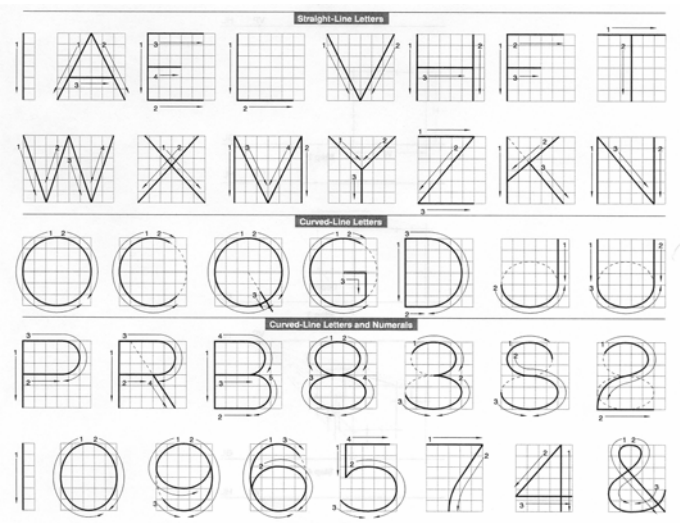
Examples of Using the Metric Scale



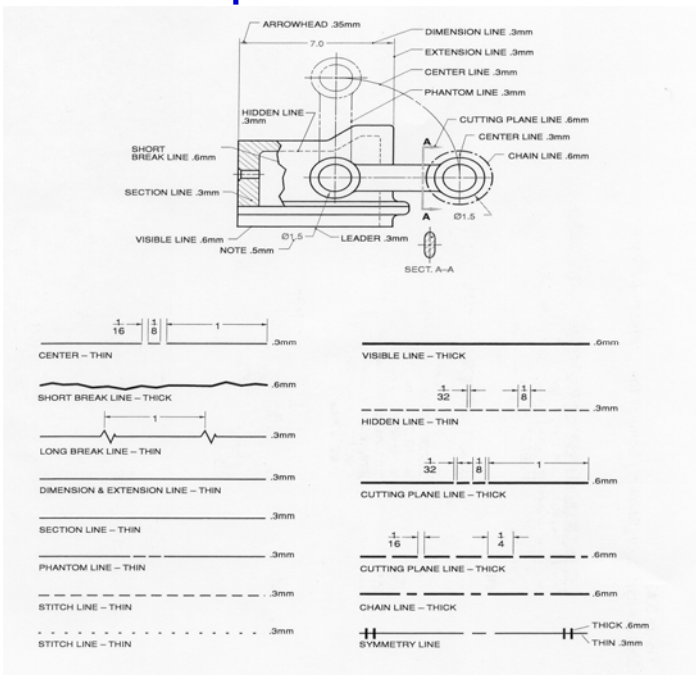
ANSI Lettering Standards

- Use Gothic Text Style Vertical or Inclined.
- Use all Capital Letters.
- Use 1/8” (3 mm) for Most Text Heights.
- Use 1/4” (6 mm) for the height of fractions.
- Determine the minimum space between lines of text by taking the text height and dividing by 2.

Vertical Gothic Lettering Guide



Alphabet of Lines



SCALES (DR-4) Completed Example

ANSWERS

24,200m	1 mm = 200 m
351 W	1" = 50 Watts
72'-4"	3/32" = 1' - 0"
14'-8"	3/8" = 1' - 0"
3'-0"	1-1/2" = 1' - 0"
8'-3 1/2"	3/4" = 1' - 0"
1,650 MI	1" = 300 miles
1'-9 1/8"	3" = 1' - 0"
570 KM	1 mm = 10 km
1,950 MI	1" = 300 m

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DR. BY: GENE McGINNIS | DATE: 9/11/02 | TITLE: SCALES
DR. FOR: CE 111 DESIGN GRAPHICS | SCALE: VARIES | DWG. NO.: DR-4