

Professional Certification Review Manual
CERTIFIED DRAFTER
MECHANICAL

Competency 1
General Terminology-Identification

ITEMS TO REVIEW for COMPETENCY 1:

- Metric
 - Centimeters
 - Millimeters
 - Unit breakdowns
 - Angles
 - Minutes & Seconds
 - Bisecting
 - Sum of angles in triangle
 - Ellipses
 - Polygons
 - Types
 - Lettering
 - Line types
 - Line precedence
 - Surface finishes
- Circles
- Quadrant
 - Degrees
 - Revision block
 - Drawing sheet sizes
 - CAD systems
 - Components
 - Saving
 - Software
 - Storage devices
 - Input/output devices
 - Bytes and multiples of
 - Drawing scales
 - Double size
 - Molds and castings
 - Terms

TERMS TO BE DEFINED OR IDENTIFIED FOR COMPETENCY 1:

- Centimeter
- Decimeter
- Foreshortened
- Bisecting
- Equilateral
- Concentric
- Quadrant
- Revision block
- C-size
- Operating system
- Skew lines
- Blind hole
- Bore
- Change order
- Phantom line
- Fillet
- Bevel
- Round
- Hard drive
- Plotter
- Graphics card
- Wire frame
- CPU
- Megabyte
- Lettering
- Counterbore
- Countersink
- Drill
- Fraction
- Counterdrill
- Drill
- Tap
- Chain line
- Knurl
- Chamfer
- True size

Metric System

- **ASME** (American Society of Mechanical Engineers) states the **SI** (International system of Units) linear unit is commonly Millimeters.

Metric to Metric Equivalents

10 millimeters = 1 centimeter
10 centimeters = 1 decimeter
10 decimeters = 1 meter
10 meters = 1 dekameter
100 dekameter = 1 kilometer

1000 millimeters = 1 meter

1000 meters = 1 kilometer

Inch to Millimeter Conversion

Multiply inches by 25.4
to convert inches to millimeters.

DRAFTING TERMINOLOGY

- **Fraction** - A part of a whole, such as $\frac{1}{2}$ or $\frac{1}{4}$.
- **Half scale** - 1:2
- **Double Size** – 2:1
- **Draw to scale** - Drawing an object to a set proportion such as $\frac{1}{2}$, $\frac{1}{4}$ or double its actual size.
- **Metric system** - A decimal system of weights and measures based on the meter and the kilogram.

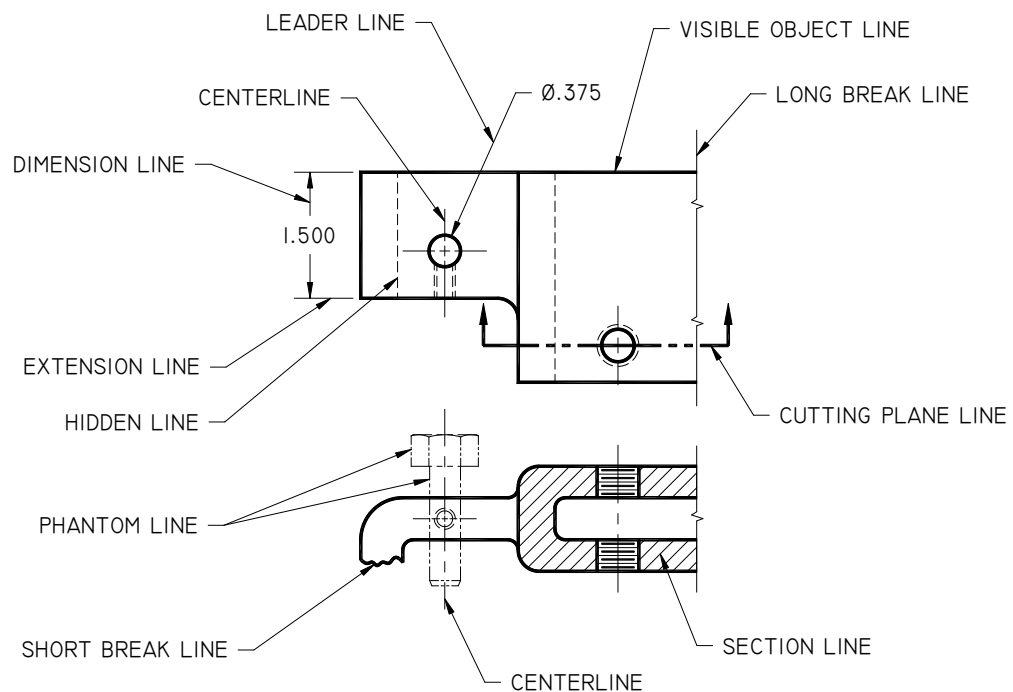
- **Bevel** - A slanted surface not at 90° to another surface.
- **Chamfer** - A beveled corner at the opening of a hole or the end of a cylindrical part to eliminate sharp edges.
- **Fillet** - An interior corner found on cast, forged or molded parts.
- **Knurl** - A diamond shaped or parallel pattern cut into cylindrical surfaced to improve gripping or bonding between parts.
- **Round** - An exterior corner found on cast, forged or molded parts.
- **Parallel Lines** – Lines that are equidistant/non-intersecting.
- **Skew Lines** – Lines that are non-intersecting, non-parallel in 3-D space.
- **Quadrilateral** - A plane figure bounded by four straight sides.
- **Trapezoid** - Two sides parallel
- **Ellipse** – A foreshortened circle having a major and a minor axis.
- **Bisect** – To divide into two equal parts.
- **Quadrant** – $\frac{1}{4}$ of a circle.
- Number of degrees found in a circle (360°), a triangle (180°).
- Number of minutes in a degree (60), seconds in a minute (60).

Hole Making Terminology

- **Bore** – To enlarge a hole to a more accurate size.
- **Blind Hole** – A hole that does not go all the way through the part.
- **Counterbore** – The enlargement of the end of a hole to a specified diameter and depth.

- **Counterdrill** – To form a conical shoulder in a drilled hole by enlarging it with a larger drill.
- **Countersink** – To recess a hole with a cone shaped tool to provide a seat for a flat head screw.
- **Drill** – A tool with a conical point used to machine holes in a part.
- **Ream** – To enlarge a hole to a more accurate size and surface finish.
- **Tap** – A tool used to cut internal threads.

Alphabet of Lines — knowledge of the function of the different types of lines used in drafting is important. Test takers should not only know the graphical characteristics of these lines, but their functions as well.



- **Visible/Object Lines**

Graphic Representation: thick line (0.6mm)

Description: Thick solid lines that represent visible edges or contours of the part.

- **Hidden Lines**

Graphic Representation: Thin (0.3mm)

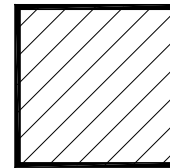
evenly spaced short lines that represent hidden edges or contours of the part.

Description: Hidden lines should always touch the visible line representing the edge where the hidden feature starts or ends. Hidden lines may be omitted from drawings for clarity purposes.

- **Section Lines**

Graphic Representation: A pattern of thin (0.3mm) straight, equally spaced parallel lines

Description: Represents the area of the part that would be cut in a section view.

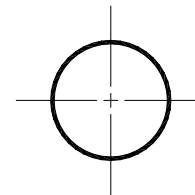


- **Centerlines**

Graphic Representation: Thin lines (0.3mm) consisting of alternate long and short dashes.

Centerlines form a cross (3mm) in the center of circles and should extend (8mm) outside the feature

Description: Represent the centers of circles or arcs, an axis of symmetry or a path of motion.



- **Symmetry Line**

Graphic Representation: Thick lines (0.6mm)

geometrically the same as a centerline with the addition of two short thick parallel lines at each end of the line.

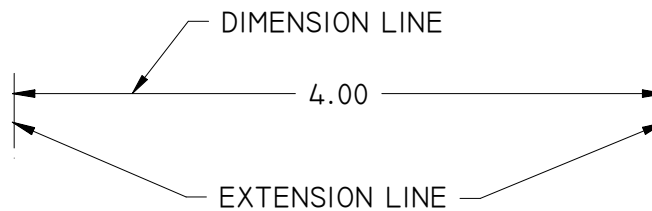
Description: Used as an axis of symmetry for a partial view.



- **Dimension Line**

Graphic Representation: Thin lines (0.3mm) terminated with uniformly sized arrowheads.

Description: Dimension lines are used to indicate the extent and direction of the dimension.



- **Extension Line**

Graphic Representation: Thin lines (0.3mm) spaced 1.5mm away from the feature being dimensioned and 3mm past the arrowhead of the dimension.

Description: Used to indicate the point or line to which the dimension applies.

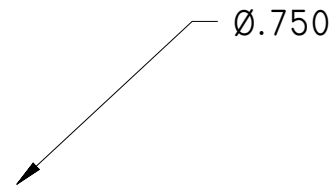
- **Leader Lines**

Graphic Representation: Thin inclined lines (0.3mm) ending with an arrowhead.

A short horizontal shoulder may extend

from the leader at mid letter height. Leaders must start from the first or last letter or number of the note. Leaders should never be vertical or horizontal. Leader arrow for circular dimension should point to center of cross hair.

Description: Used to apply dimensions, notes, item/part numbers, or symbols to a drawing.



- **Cutting Plane Line**

Graphic Representation: Thick (0.6mm) line that may be used in three different forms; a series of evenly spaced dashes, alternate long dashes and pairs of short dashes, the third would be the same as the previous examples with the dashes between the end lines left out.

Description: Used to indicate the location of the cutting plane for section views, line of sight utilizing arrows, and identifies the section through the use of letters. The letters I, O, Q, S, X, and Z are not used.



- **Viewing Plane Line**

Graphic Representation: Thick (0.6mm) line that may be used in three different forms; a series of evenly spaced dashes, alternate long dashes and pairs of short dashes, the third would be the same as the previous examples with the dashes between the end lines left out.

Description: Used to indicate the viewing position for removed views, line of sight utilizing arrows, and identifies the view through the use of letters. The letters I, O, Q, S, X, and Z are not used. Viewing plane lines do not cross over lines of a drawing while cutting plane lines will.



- **Long Break Line**

Graphic Representation: Thin (0.3mm) lines joined by zigzags.

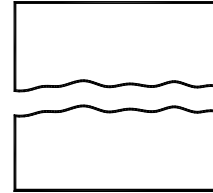
Description: Used when complete views are not required.



- **Short Break Line**

Graphic Representation: Thick (0.6mm) freehand line.

Description: Used when complete views are not required.



- **Phantom Line**

Graphic Representation: Thin (0.3mm) line comprised of alternate long dashes and pairs of short dashes.

Description: Used to show alternate position of moving parts, repeated details, adjacent positions of related parts and filleted or rounded corners.



- **Stitch Line**

Graphic Representation: Thin (0.3mm)

lines in two forms; dots of 0.3mm spaced 0.3mm apart or short dashes and spaces of equal length.

Description: Used to indicate a sewing or stitching process.



- **Chain Line**

Graphic Representation: Thick (0.6mm) line consisting of alternate long and short dashes.

Description: Used to indicate a surface to receive additional treatment or a projected tolerance zone identified through the use of geometric dimensioning and tolerancing.



SAMPLE REVIEW QUESTIONS:

1. One tenth of a meter is a centimeter.

T
F

2. An equilateral polygon must only have three sides.

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F

3. The sum of all angles making up a triangle is 180°

T
F

4. What does a revision block contain?

- a. Revision zone
- b. Letter
- c. Date
- d. All of the above

5. The software that controls the internal operation of the computer is the operating system.

T
F

6. Define "Double Size".

7. Half scale is best defined as:

- a. A part of a whole, such as $\frac{1}{2}$ or $\frac{1}{4}$
- b. Drawing an object to a set proportion such as $\frac{1}{2}$, $\frac{1}{4}$, or double its actual size.
- c. 1:2
- d. A decimal system of weights and measures based on the meter and the kilogram.
- e. 2:1

8. Drill is best defined as a tool to machine holes.

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F