UNIT IV: Basic Geometric Terms and Construction

Competency: 004.00

Explain geometric terms and apply geometric construction techniques.

Objective: 004.01

Explain selected geometric terms.

Introduction: The purpose of this unit is to give students a basic understanding of 2D and 3D geometry related to technical drawing. Emphasis should be placed on recognizing geometry that exists within objects for the purpose of creating solid models within the CAD software or creating multiview drawings. This unit covers basic geometric shapes and terms and the types of constructions necessary to create and model basic objects.

R1(102-113):R2(151-174)

A. Identify geometric shapes and terms.

1. Angle Definition
   a. acute angle - An angle that measures less than 90°.
   b. obtuse angle - An angle that measures more than 90°.
   c. right angle - Angle that measures exactly 90°.
   d. vertex - The point at which two lines of an angle meet.
2. Circle Definition
   a. radius - The distance from the center of a circle to its edge.
   b. diameter - The distance across a circle through its center point.
   c. circumference - The distance around the edge of a circle, better know as the circles rim.
   d. concentric - Two are more circles of different sizes that share the same center point.
   e. chord - Line across a circle that does not pass at the circle's center.
   f. quadrant - one fourth (quarter) of a circle.
3. Triangle Definition
   a. hypotenuse - The side of a right triangle that is opposite the 90° angle.
   b. equilateral - A triangle in which all three sides are of equal length and all three angles are equal.
   c. scalene - A triangle that has sides of three different lengths and angles with three different values.
   d. isosceles - A triangle in which two sides are of equal length.
   e. right triangle - A triangle in which one of the angles equals 90°.

4. Quadrilaterals Definition
   a. square - Four equal sides and all angles equal 90°.
   b. rectangle - Two sides equal lengths and all angles equal 90°.
   c. trapezoid - Only two sides are equal length.
   d. rhombus - All sides are equal length and opposite angles are equal.
   e. rhomboid - Opposite sides are equal length and opposite angles are equal.
5. Regular Polygons – A closed figure in which all of the sides and angles are of equal measure.
   a. pentagon - A five sided polygon.
   b. hexagon - A six sided polygon.
   c. octagon - An eight sided polygon.
   d. distance across flats - A measurement across the parallel sides of a polygon.
   e. distance across corners - A measurement across adjacent corners of a polygon.
6. Solids
   a. Prism
      i. right rectangular (box)
      ii. right triangular (wedge)
   b. cylinder
   c. cone
   d. sphere
   e. pyramid
   f. torus

B. Define the following:

1. Terms
   a. circumscribe – The process of creating a polygon that fully encloses a circle that is tangent to all of the polygons sides.
   b. inscribe – The process of creating a polygon that is fully enclosed by a circle at its corners.
   c. bisect - Divide into two equal parts.
   d. tangent - A line and arc, or two arcs that touch each other at one point only.
   e. parallel - Two or more lines that are always the same distance apart.
   f. perpendicular - At a 90° angle.
2. Geometric Shorthand Symbols Used by Drafters.

a. ∠ (angle)
b. Δ (triangle)
c. R (radius)
d. Ø (diameter) Greek letter Phi
e. // (parallel)
f. ⊥ (perpendicular)
g. □ (square)
h. ℄ (centerline)

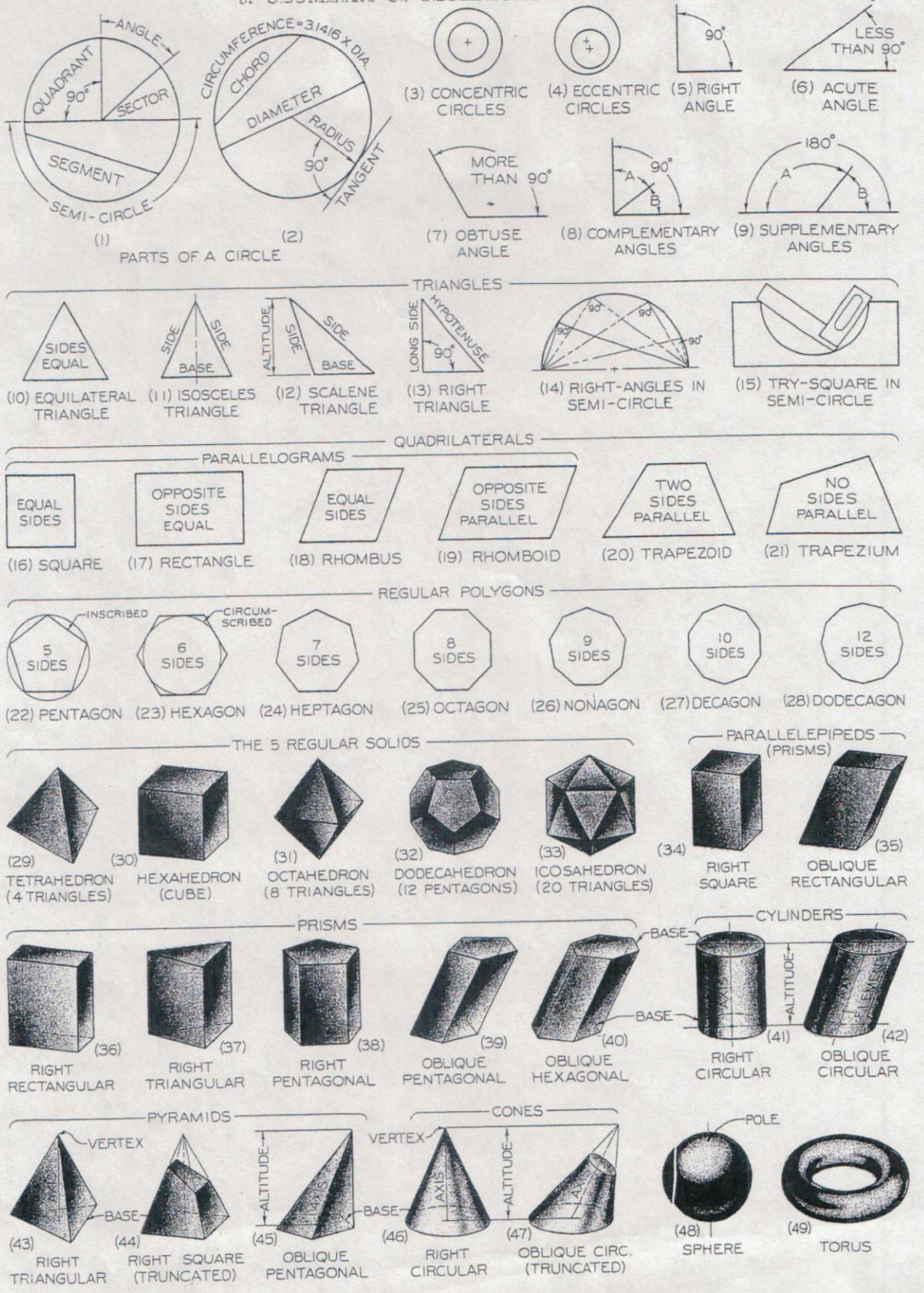

Fig. 5-1. Circles, Angles, Plane Figures, and Solids.