Synthetic Approach

Usually a synthetic approach is best when at least one of the following is true.

- 1. The lengths of the sides of a figure are given, rather than the coordinates of its vertices.
- 2. Angle measures other than 90 are given or asked for in the problem. (If lines are parallel or form right angles, however, then a coordinate approach using slopes may be appropriate.)
- 3. The given information or diagram involves transversals and corresponding angles; congruent lengths, angles, or figures; the areas of similar figures; or the volumes of solids.

Coordinate Approach

- 1. Usually a coordinate approach is easiest when the problem uses coordinates to name points.
 - a. To calculate lengths, use the distance formula.
 - b. To locate midpoints, use the midpoint formula.
 - c. To show lines are parallel or perpendicular, use the slopes of the lines.
 - d. To prove that lines are concurrent, show that their equations have a common solution.
- 2. Even if a problem does not use coordinates to name points, you can place the coordinate axes on the figure and assign coordinates to the vertices as was shown in Lessons 13-8 and 13-9.
 - a. If the figures involved are symmetric, place the axes so that one of them is a line of symmetry. Such a placement reduces the number of variables needed to describe the vertices.
 - b. If the figures involved are not symmetric, place the axes so that as many vertices and edges of the figures lie on the x- and y-axes as possible. Distance calculations are simplified whenever zeros appear in the coordinate pairs.

Transformational Approach

- 1. If the figure has line symmetry, try using a reflection.
- 2. If the figure has rotational symmetry, try using a rotation.
- 3. If there are congruent figures placed some distance apart, try using a translation, rotation, glide reflection or a composite of any number of such congruence mappings to map one figure onto the other.
- 4. If the problem involves similar figures, look for a center of a dilation that would map one figure onto the other. You may first have to rotate one figure so that corresponding sides of similar figures are parallel.
- 5. If the problem involves calculating the area of an unfamiliar figure, try dissecting the figure and moving the pieces around by transformations until the result is a figure whose area is easy to calculate.
- 6. Some construction problems can be solved by using reflections (constructing perpendicular bisectors) or by using rotations of angles you can construct, such as 45°, 60°, 90°, or 180°.