Chapter 14

Summary and Vocabulary

● A **translation** is a correspondence between a figure and a slide image of the figure. On a coordinate graph, you can translate a figure by adding constant values to the *x*- and *y*-coordinates of each point on it. A **rotation** is a correspondence between a figure and its image after turning. A **reflection** is a correspondence between a figure and its mirror image over a reflecting line.

● Translations, rotations, reflections, and combinations of these are **congruence transformations** or **isometries**. Under every isometry:
(1) an angle and its image have the same measure;
(2) if one point is between two others on a preimage, its image is between the images of the others;
(3) if three points on the preimage are collinear, then their images are collinear; and
(4) a segment and its image have the same measure. For these reasons, we say that isometries preserve angle measure, betweenness, collinearity, and distance (length).

● Two figures are **congruent** if and only if they are related by an isometry. Because of the four preservation properties mentioned in the preceding paragraph, congruent figures have the same size and shape.

● When two lines intersect, four angles are formed. Pairs of these angles are either **linear pairs** or **vertical angles**. The angles in linear pairs are supplementary. Vertical angles have the same measure.

● When two lines are cut by a **transversal**, eight angles are formed. If the two lines are parallel, then any two of the eight angles formed either have the same measure or are supplementary.

● Specifically, if the two lines are parallel, then:
(1) pairs of corresponding angles have the same measure;
(2) pairs of alternate interior angles have the same measure;
(3) pairs of alternate exterior angles have the same measure;
(4) two same-side interior angles are supplementary; and
(5) two same-side exterior angles are supplementary.

Vocabulary

14-1
slide, translation
preimage
translation image
congruent figures

14-2
perpendicular
midpoint
bisector
perpendicular bisector
reflection image of *A* over *m*
reflecting line,
    line of reflection

14-3
transformation
rotation
center of rotation
magnitude
rotation image

14-4
congruence transformation
isometry

14-5
opposite rays
straight angle
linear pair
vertical angles

14-6
transversal
exterior angles
interior angles
exterior angles on the same
    side of the transversal,
    same-side exterior angles
interior angles on the same
    side of the transversal,
    same-side interior angles
alternate exterior angles
alternate interior angles
corresponding angles
∥, is parallel to

◗ In the coordinate plane, a **size change** centered at the origin can be achieved by multiplying coordinates of points by a given scale factor.

◗ Size changes, congruence transformations, and combinations of these are **similarity transformations**. Two figures are **similar** if and only if they are related by a similarity transformation. Similarity transformations multiply distances (lengths) by a constant amount. Because distance is multiplied by a constant amount but other properties are preserved, similar figures have the same shape but not necessarily the same size.

◗ The sum of the measures of the three angles of any triangle is 180º.

◗ If two angles in one triangle have the same measures as two angles in another triangle, then the two triangles are similar.

Theorems and Properties

Vertical Angles Theorem (14-5)
Triangle-Sum Property (14-7)
Exterior Angle Theorem for Triangles (14-7)
AA Similarity Theorem (14-9)

Vocabulary

14-7
revolution
interior angles of a polygon
exterior angles of a polygon

14-8
concurrent
point of concurrency
size change
dilation
center

14-9
similar
similarity transformation