Chapter 14

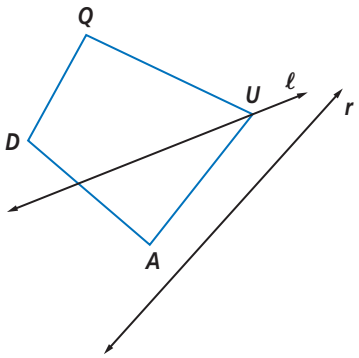
Chapter Review

SKILLS
PROPERTIES
USES
REPRESENTATIONS

SKILLS Procedures used to get answers

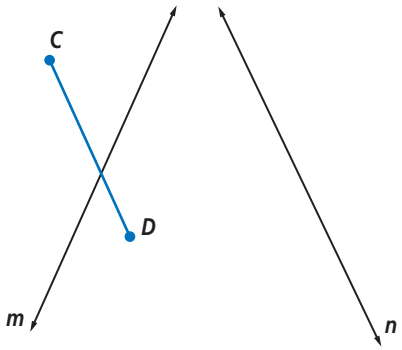
OBJECTIVE A **Reflect figures over a line. (Lesson 14-2)**

In 1 and 2, use the figure below.



1. Trace $QUAD$ and reflect it over line r.
2. Trace $QUAD$ and reflect it over line ℓ.

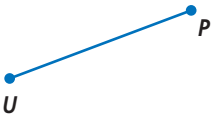
In 3 and 4, trace the figure shown below.



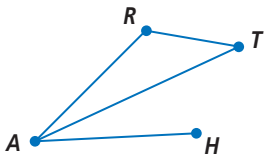
3. Reflect $\overline{CD}$ over m.
4. Reflect $\overline{CD}$ over n.
5. If $\triangle KIP$ is reflected over $\overline{KI}$, what is the image of K?
6. Reflect square $HARD$ over $\overleftrightarrow{HD}$. If the image is $H'A'R'D'$, H is the midpoint of what segment?

OBJECTIVE B **Draw the rotation image of a point or figure. (Lesson 14-3)**

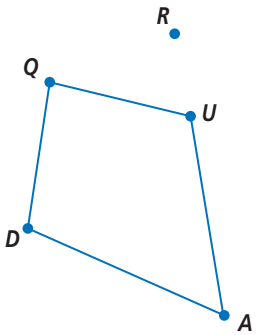
7. Rotate point U -150° about P.



In 8 and 9, use the figure below.



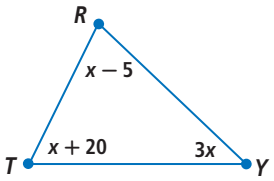
8. Rotate $\overline{HA}$ 60° about T.
9. Rotate $\triangle ART$ 210° about H.
10. Trace the figure below and rotate $QUAD$ -73° about R.



OBJECTIVE C **Use the Triangle-Sum Property to find measures of angles. (Lesson 14-7)**

11. In $\triangle ZAP$, $m\angle P = 82^\circ$ and $m\angle A = \frac{1}{2}(m\angle P)$. Find $m\angle Z$.

12. In the figure below, find m∠*T*, m∠*R*, and m∠*Y*.



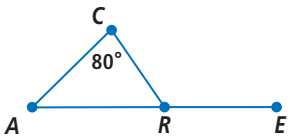
13. In △*AIM*, m∠*A* = 70°, and m∠*I* is 60° more than m∠*M*. Find m∠*I* and m∠*M*.

14. If the measures of the angles of a triangle are in the ratio 2:3:5, what are the measures of the angles?

15. △*RIT* is a right triangle with right angle at *I*. If m∠*R* = m∠*T* + 28°, find m∠*R*, m∠*I*, and m∠*T*.

OBJECTIVE D Use the Exterior Angle Theorem to answer questions about angles in triangles. (Lesson 14-7)

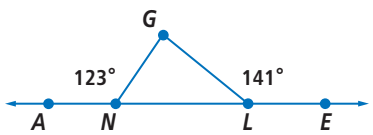
In 16 and 17, use the figure below.



16. If m∠*CRE* = 125°, find m∠*CAR*.

17. If m∠*CAR* = 35°, find m∠*CRE*.

18. Given the diagram below, find m∠*G*.

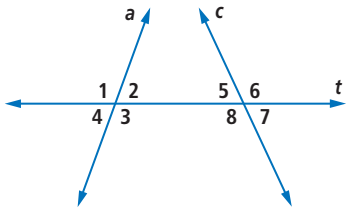


19. If the exterior angles at two vertices of a triangle are 112° and 103°, what is the measure of the exterior angle at the third vertex?

PROPERTIES The principles behind the mathematics

OBJECTIVE E Use properties of lines and angles to determine angle measures. (Lessons 14-5, 14-6)

In 20–23, use the diagram below.



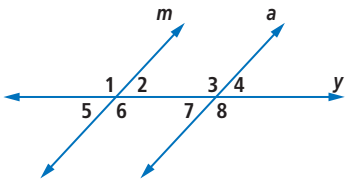
20. List all pairs of angles whose measures add to 180°.

21. **Fill in the Blank** ∠1 and ∠6 are called _____?_____ angles.

22. If m∠7 = 82° and m∠1 = 111°, find m∠4 + m∠5.

23. If m∠5 = 74° and m∠1 = 122°, find the sum of the measures of each pair of alternate interior angles.

In 24–27, use the figure below where *m* || *a*.



24. Which angles have the same measure as ∠1?

25. Which angles are supplementary to ∠2?

26. If m∠8 = 58°, find the measures of all the other angles.

27. If ∠5 is a right angle, how many of the other seven angles in the diagram are right angles?

28. Two lines are cut by a transversal. If the same-side interior angles are supplementary, then the lines are parallel. Give three other if-then statements for demonstrating the lines are parallel.

OBJECTIVE F Explain the consequences of the Triangle-Sum Property. (Lesson 14-7)

29. Why is it impossible for a triangle to have two right angles?

30. Can a triangle have three acute angles? Explain why or why not.

31. Can a triangle have two obtuse angles? Explain why or why not.

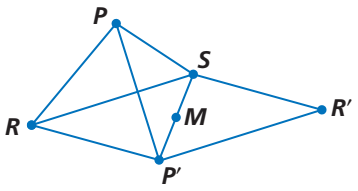
32. In an equilateral triangle, all three angles have the same measure. What is that measure? Explain your answer.

OBJECTIVE G Recognize and apply properties of congruence transformations and congruent figures. (Lessons 14-1, 14-2, 14-3, 14-4)

33. A figure was rotated by 137°, then by x° about the same center, returning the figure to its original position.
    a. Give a possible positive value of x.
    b. Give a possible negative value of x.

34. The points A, B, and C are on a line with B between A and C. A student draws A', B', and C', the images of A, B, and C under a congruence transformation.
    a. If A', B', and C' are not collinear, is the student's result correct? Explain.
    b. If A', B', and C' are collinear, with C' between A' and B', is the student's result correct? Explain.

In 35 and 36, use the figure below. $\triangle P'RS$ is the reflection image of $\triangle PRS$ over $\overline{RS}$. $\triangle SR'P'$ is a rotation image of $\triangle P'RS$ about point M.



35. **Fill in the Blanks** Line segment ___?___ is a perpendicular bisector of line segment ___?___ .

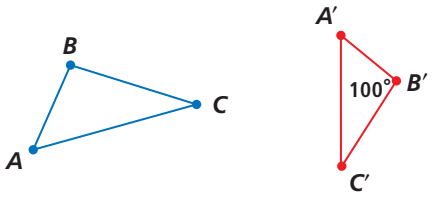
36. Consider the rotation that takes $\triangle P'RS$ to $\triangle SR'P'$.
    a. What is the center of the rotation?
    b. What is the magnitude of the rotation?
    c. Explain how you got your answers to Parts a and b.

OBJECTIVE H Recognize and apply properties of size-change transformations and similar figures. (Lessons 14-8, 14-9)

37. Suppose $\overline{AB} \perp \overline{BC}$. Explain why the images of $\overline{AB}$ and $\overline{BC}$ under a size change are perpendicular.

38. Suppose that D', E', and F' are the size-change images of the points D, E, and F and $\triangle DEF$ and $\triangle D'E'F'$ have the same perimeter.
    a. What is the magnitude of the size change?
    b. **True or False** $\triangle DEF$ and $\triangle D'E'F'$ are congruent.

In 39 and 40, use the diagram below. The red figure is the image of the blue figure under a size change followed by a rotation.



39. Measure to determine the magnitude of the size change.

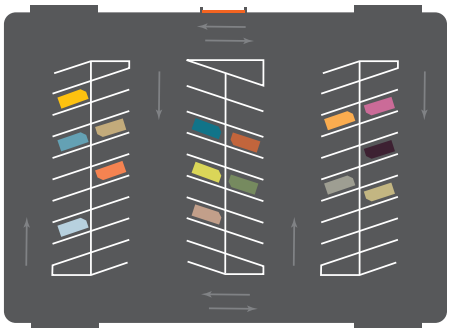
40. Determine the measure of $\angle ABC$.

41. **True or False** A figure and its reflection image are similar.

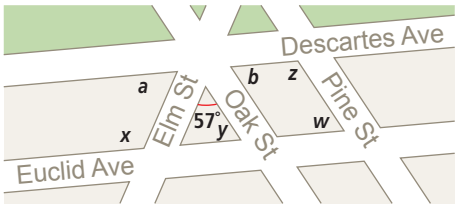
USES Applications of mathematics in real-world situations

OBJECTIVE I **Use angle properties in everyday situations. (Lessons 14-5, 14-6, 14-7)**

42. In the parking lot diagram below, three sets of parallel segments are cut by transversals. If one of the smaller angles at an intersection point measures 82°, what are the measures of all the angles for each parking space?



In 43–46, use the map below. Descartes Avenue and Euclid Avenue are parallel. Oak Street and Pine Street are parallel.



43. What is true of $a + b$?

44. Suppose $x = 109°$. Find y.

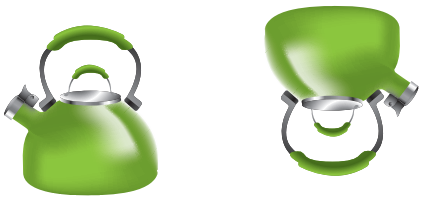
45. Suppose $x = 121°$. What is a?

46. If $z = 135°$, find a, b, x, and y.

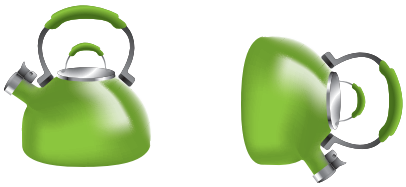
OBJECTIVE J **Identify the congruence transformation that maps one congruent figure onto another; identify the similarity transformation that maps one similar figure onto another. (Lessons 14-4, 14-9)**

In 47–50, describe a congruence transformation that maps one figure onto the other.

47.



48.



49.

50.

In 51–54, describe a similarity transformation that maps one figure onto the other.

51.

52.

53.

54.

REPRESENTATIONS Pictures, graphs, or objects that illustrate concepts

OBJECTIVE K Transform figures on a coordinate graph. (Lessons 14-1, 14-3, 14-8)

In 55–60, use the quadrilateral with vertices $T = (-2, 6)$, $H = (3, 8)$, $E = (8, 5)$, $N = (0, 2)$.

55. Draw the image of *THEN* under the translation in which $(x, y) \rightarrow (x + 3, y - 6)$. Give the coordinates of T', H', E', and N'.

56. The image of *THEN* under a transformation is $T^* = (6, -2)$, $H^* = (11, 0)$, $E^* = (16, -3)$, and $N^* = (8, -6)$. Is $T^*H^*E^*N^*$ a slide image of *THEN*? If so, describe the slide. If not, why not?

57. Find the image of *THEN* reflected over the y-axis.

58. Find the image of *THEN* reflected over the x-axis.

59. Rotate *THEN* 90° about the origin. Call the image $T''H''E''N''$ and give the coordinates of its vertices.

60. Graph the image of *THEN* under the size change $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$.

61. $\triangle RED$ has $R = (1, 2)$, $E = (-4, -1)$, $D = (3, -1)$. $\triangle HAT$ has $H = (2, 6)$, $A = (-8, -3)$, $T = (6, -3)$. Is $\triangle HAT$ a size-change image of $\triangle RED$? Why or why not?

In 62–65, a rule for finding the image of a point under a single transformation is given. Identify and describe the type of transformation in words.

62. $(x, y) \rightarrow (-x, y)$

63. $(x, y) \rightarrow (y, -x)$

64. $(x, y) \rightarrow (3x, 3y)$

65. $(x, y) \rightarrow (x + 2, y - 3)$