pg 46-47 #4-9, 11-14

4. not congruent

5. congruent

6. $\angle A$ and $\angle J$, $\angle B$ and $\angle K$,
$\angle C$ and $\angle L$, $\angle D$ and $\angle M$;
Side AB and Side JK,
Side BC and Side KL,
Side CD and Side LM,
Side DA and Side MJ

7. $\angle P$ and $\angle W$, $\angle Q$ and $\angle V$,
$\angle R$ and $\angle Z$, $\angle S$ and $\angle Y$,
$\angle T$ and $\angle X$;
Side PQ and Side WV,
Side QR and Side VZ,
Side RS and Side ZY,
Side ST and Side YX,
Side TP and Side XW

8. congruent; Corresponding side lengths and corresponding angles are congruent.

9. not congruent; Corresponding side lengths are not congruent.

11. The corresponding angles are not congruent, so the two figures are not congruent.

12. a. 32 ft   **b.** $\angle M$

    c. 20 ft   **d.** 96 ft

13. See *Taking Math Deeper.*

14. yes; The dimensions of congruent figures are equal, so the areas of the figures are equal.

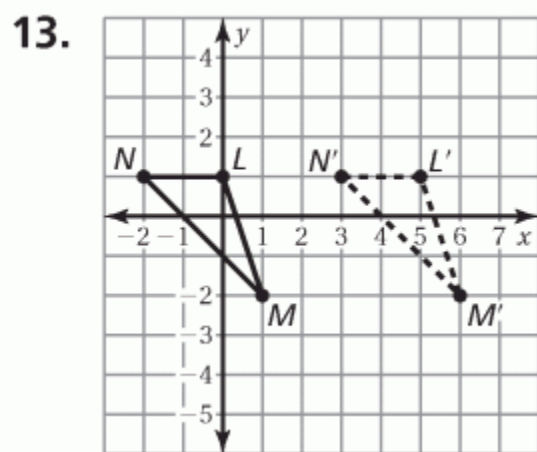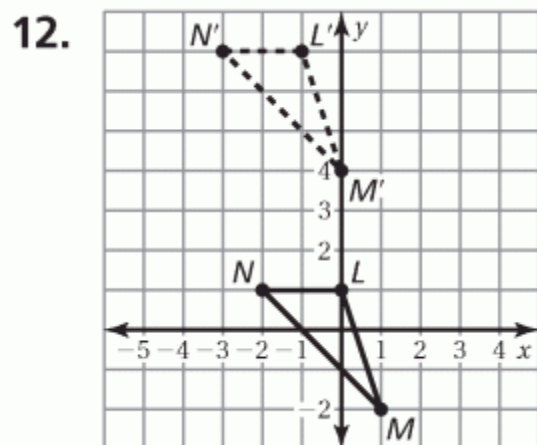# pg 52-53 #4-16, 17-21,23
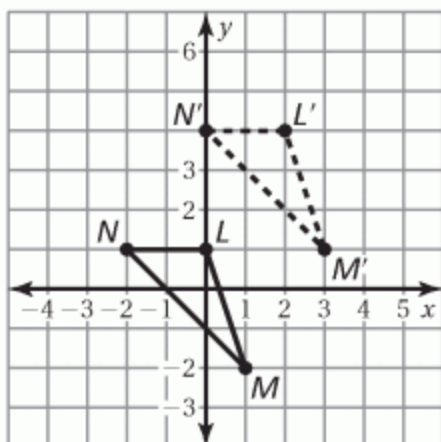
4. yes

5. no

6. no

7. yes
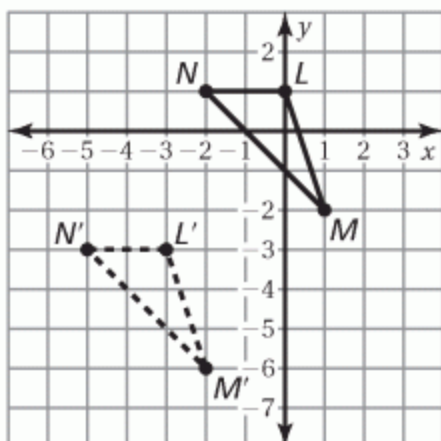
8. yes

9. no

10. $J'(3, 0), K'(3, -2), L'(0, -2)$

11. $A'(-3, 0), B'(0, -1),$
    $C'(1, -4), D'(-3, -5)$

12.

13.

14.

15.

16. Yes, because the figure slides.

17. 2 units left and 2 units up

18. 5 units right and 9 units up

19. 6 units right and 3 units down

20. 5 units left and 2 units down

21. **a.** 5 units right and 1 unit up

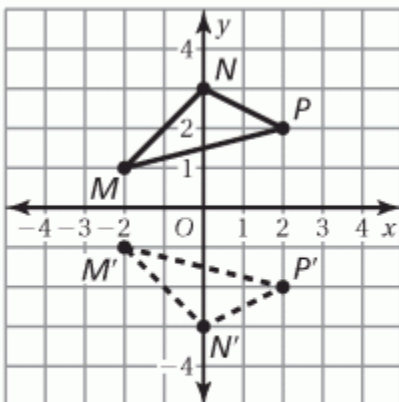   **b.** no; It would hit the island.

    c. 4 units up and 4 units right

23. See *Taking Math Deeper*.
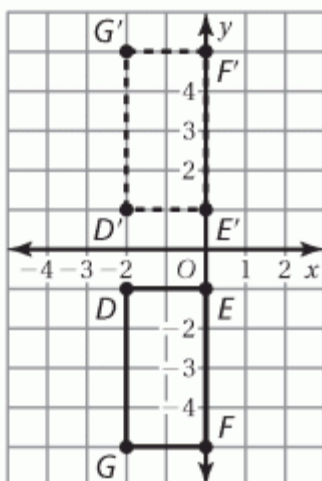
pg 58-59 #1-8, 9-17 odd, 18 20, 22, 24

1. The third one because it is not a reflection.

2. A figure is a reflection of another figure if one is the mirror image of the other.

3. Quadrant IV

4. no

5. yes

6. yes
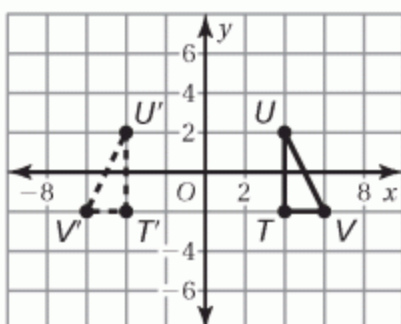
7. no

8. yes

9. no

11.

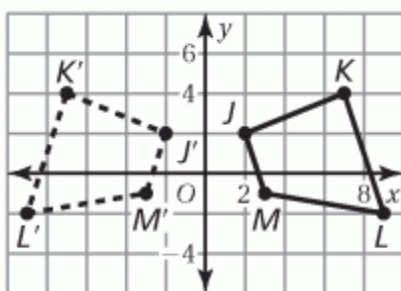

$M'(-2, -1)$, $N'(0, -3)$, $P'(2, -2)$

13.

$D'(-2, 1), E'(0, 1), F'(0, 5), G'(-2, 5)$

15.

$T'(-4, -2), U'(-4, 2), V'(-6, -2)$

17.

$J'(-2, 2), K'(-7, 4), L'(-9, -2), M'(-3, -1)$

18. B, C, D, E, H, I, K, O, X

22. x-axis

24. $W'(-4, 5), X'(-4, 2), Y'(0, 2), Z'(2, 5)$

pg 65-67 #7-12, 13, 16, 19, 22-26

7. reflection

8. rotation

9. translation

10. no

11. yes; 90° counterclockwise

12. yes; 180° clockwise or counterclockwise

13. $A'(2, 2), B'(1, 4), C'(3, 4),$ $D'(4, 2)$

16. $P'(-1, -2), Q'(-3, -2), R'(-2, 1),$ $S'(0, 1)$

19. It only needs to rotate 120° to produce an identical image.

22. $R''(2, 1), S''(-1, 7), T''(2, 7)$

23. $J''(4, 4), K''(3, 4), L''(1, 1),$ $M''(4, 1)$

24. *Sample answer:* Rotate 90° counterclockwise about the origin and then translate 5 units left; Rotate 90° clockwise about the origin and then translate 1 unit right and 5 units up.

25. *Sample answer:* Rotate 180° about the origin and then rotate 90° clockwise about vertex $(-1, 0)$; Rotate 90° counterclockwise about the origin and then translate 1 unit left and 1 unit down.

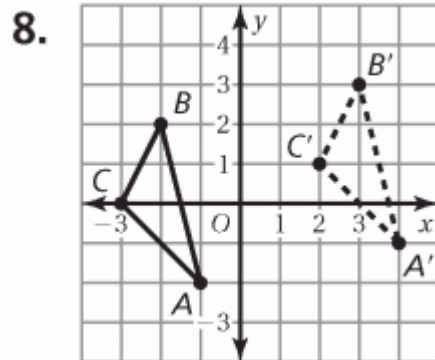**26. a.** $A'(6, 2)$, $B'(3, 2)$, $C'(1, 4)$, $D'(6, 4)$

 b. Reflect the trapezoid in the x-axis and then in the y-axis, or reflect the trapezoid in the y-axis and then in the x-axis.

pg 91-93 #2-8 even, 9-17 odd

2. 20 ft

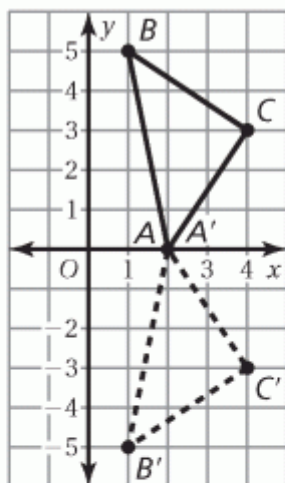**4.** $\angle R$ and $\angle W$, $\angle Q$ and $\angle X$,
$\angle T$ and $\angle Y$, $\angle S$ and $\angle Z$;
Side RQ and Side WX, Side QT and
Side XY, Side TS and Side YZ, Side SR
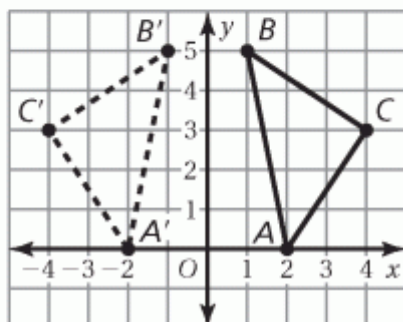and Side WZ

6. yes

8.

9. no

11. a.

b.

13. $E'(2, -1), F'(2, -3),$
$G'(-2, -3), H'(-2, -1)$

15. yes; 180° counterclockwise
or clockwise

17. $A'(-2, -4), B'(-2, -2),$
$C'(-4, -3)$

pg 74-75 #4, 5, 7-11 odd, 12-18 even
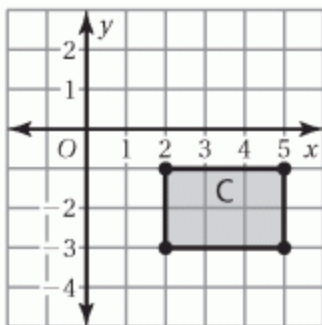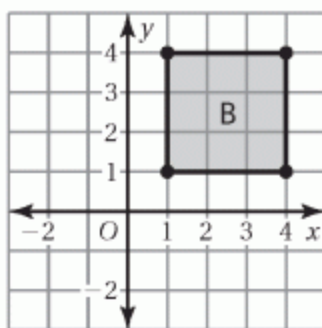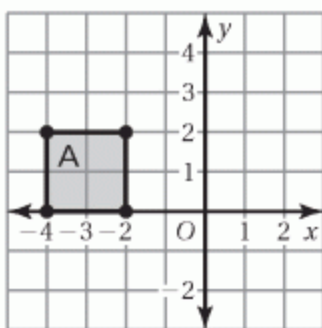
4. similar; Corresponding angles are congruent.

Because $\dfrac{4}{6} = \dfrac{6}{9} = \dfrac{8}{12}$,

the corresponding side lengths are proportional.

5. not similar; Corresponding side lengths are not proportional.

7.

A and B; Corresponding side lengths are proportional and corresponding angles are congruent.

9. $6\dfrac{2}{3}$

11. 14

12. no

14. a. sometimes; They are similar only when corresponding side lengths are proportional and corresponding angles are congruent.

b. always; All angles are congruent and all sides are proportional.

c. sometimes; Corresponding angles are always congruent, but corresponding side lengths are not always proportional.

d. never; They do not have the same shape.

16. a. yes   **b.** no

18. yes; A scale drawing is a proportional drawing of an object, so corresponding angles are congruent and corresponding side lengths are proportional.

pg 80-81 #4, 8-11, 14-15, 18-19

4. $\dfrac{11}{6}$; $\dfrac{121}{36}$

8. The perimeter doubles.

9. The area is 9 times larger.

10. 8.4

11. 25.6

14. *ABCD*: $P = 14$, $A = 12$; *WXYZ*: $P = 28$, $A = 48$; yes; Corresponding side lengths are proportional and corresponding angles are congruent.

15. 108 yd

18. **a.** $\dfrac{1}{4}$; $\dfrac{1}{4}$; $\dfrac{1}{16}$

   b. The ratio of the circumferences is equal to the ratio of the radii. The ratio of the square of the radii is equal to the ratio of the areas. These are the same proportions that are used for similar figures.

19. 15 m

pg 87-89 #5, 7-14, 19, 22

5.
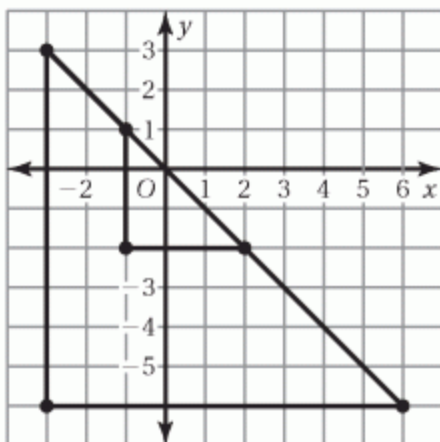
The triangles are similar.

7. yes

8. yes

9. no

10. yes

11. yes

12. no

13.
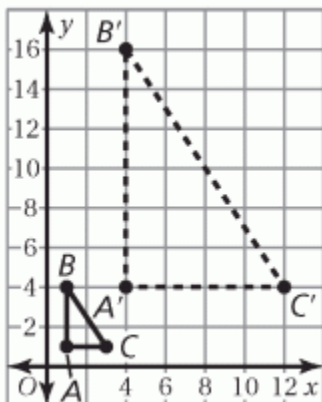
14.
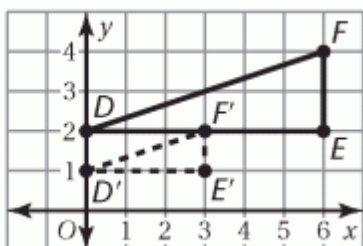
19. Each coordinate was multiplied by 2 instead of divided by 2. The coordinates should be $A'(1, 2.5)$, $B'(1, 0)$, and $C'(2, 0)$.

22. enlargement; $\dfrac{3}{2}$

25. $J''(3, -3)$, $K''(12, -9)$, $L''(3, -15)$

27. *Sample answer:* Rotate 90° counterclockwise about the origin and then dilate with respect to the origin using a scale factor of 2

36. $(2x + 3, 2y - 1)$ is a dilation using a scale factor of 2 followed by a translation 3 units right and 1 unit down. $(2(x + 3), 2(y + 1))$ is a translation 3 units right and 1 unit down followed by a dilation using a scale factor of 2.

pg 91-95 #2, 4-6, 8-10, 13-15, 17, 19, 21, 23, 25-26, 29

2. 20 ft

4. $\angle R$ and $\angle W$, $\angle Q$ and $\angle X$, $\angle T$ and $\angle Y$, $\angle S$ and $\angle Z$; Side RQ and Side WX, Side QT and Side XY, Side TS and Side YZ, Side SR and Side WZ

5. no

6. yes

8.
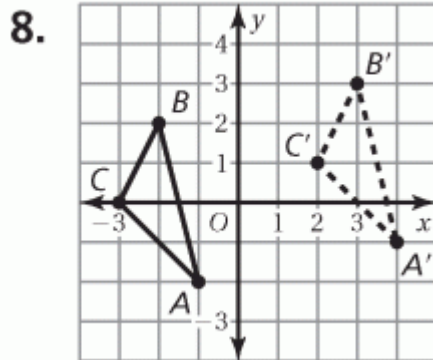
9. no

10. yes

13. $E'(2, -1)$, $F'(2, -3)$, $G'(-2, -3)$, $H'(-2, -1)$

14. no

15. yes; 180° counterclockwise or clockwise

17. $A'(-2, -4)$, $B'(-2, -2)$, $C'(-4, -3)$

19. yes; The lengths of corresponding sides are proportional and corresponding angles are congruent.

21. 9 cm

23. $\dfrac{7}{4}$; $\dfrac{49}{16}$

25. no

26. yes

29. $Q''(-4, 2)$, $R''(14, 2)$, $S''(14, -7)$, $T''(-4, -7)$

pp. 506-507 #5-13, 15-16, 21-24, 30

5. *Sample answer:* adjacent: $\angle FGH$ and $\angle HGJ$, $\angle FGK$ and $\angle KGJ$; vertical: $\angle FGH$ and $\angle JGK$, $\angle FGK$ and $\angle JGH$

6. *Sample answer:* adjacent: $\angle SML$ and $\angle LMN$, $\angle SMR$ and $\angle RMQ$; vertical: $\angle NMP$ and $\angle SMR$, $\angle LMN$ and $\angle RMQ$

7. $\angle ACB$ and $\angle BCD$ are adjacent angles, not vertical angles.

8. adjacent; 55

9. vertical; 128

10. adjacent; 63

11. vertical; 25

12. adjacent; 15

13. adjacent; 20

15.

16.
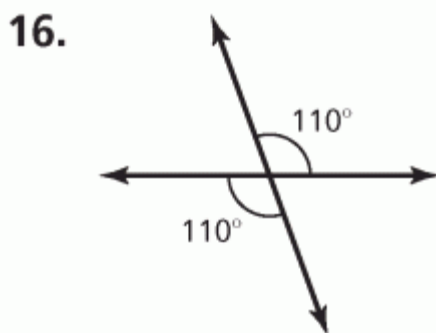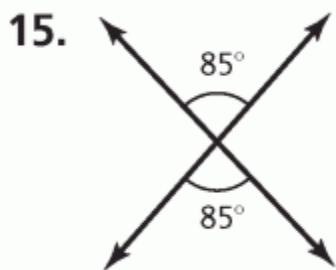
21. never

22. always

23. sometimes

24. always

30. B

pp. 512-513 #6-8, 12-14, 16, 24, 26, 28-30

6. neither

7. complementary

8. complementary

12. complementary; 15

13. complementary; 55

14. supplementary; 31

16. 53

24. yes; *Sample answer:* $\angle LMQ$ is a straight angle. By removing $\angle NMP$, the remaining two angles ($\angle LMN$ and $\angle PMQ$) have a sum of 90°.

26. See *Taking Math Deeper.*

28. $x = -15$

29. $n = -\dfrac{5}{12}$

30. $y = -9.3$

pg 107-109 #3-7, 10, 12, 14, 18-23, 25-26

3. *m* and *n*

4. *t*

5. 8

6. $\angle 5$, $\angle 7$, $\angle 1$, and $\angle 3$ are congruent. $\angle 8$, $\angle 6$, $\angle 4$, and $\angle 2$ are congruent.

7. $\angle 1 = 107°$, $\angle 2 = 73°$

10. The two lines are not parallel, so $\angle 5 \neq \angle 6$.

12. *Sample answer:* Railroad tracks are parallel, and the out of bounds lines on a football field are parallel.

14. You only need one angle because half of the angles are congruent to that angle and you can find the other angles using relationships.

18. 56°; *Sample answer:* $\angle 1$ and $\angle 8$ are corresponding angles and $\angle 8$ and $\angle 4$ are supplementary.

19. 132°; *Sample answer:* $\angle 2$ and $\angle 4$ are alternate interior angles and $\angle 4$ and $\angle 3$ are supplementary.

20. 55°; *Sample answer:* $\angle 4$ and $\angle 2$ are alternate interior angles.

21. 120°; *Sample answer:* $\angle 6$ and $\angle 8$ are alternate exterior angles.

22. 129.5°; *Sample answer:* $\angle 7$ and $\angle 5$ are alternate exterior angles and $\angle 5$ and $\angle 6$ are supplementary.

23. 61.3°; *Sample answer:* $\angle 3$ and $\angle 1$ are alternate interior angles and $\angle 1$ and $\angle 2$ are supplementary.

25. They are all right angles because perpendicular lines form 90° angles.

26. *Sample answer:* 1) $\angle 1$ and $\angle 7$ are congruent because they are alternate exterior angles. 2) $\angle 1$ and $\angle 5$ are corresponding angles and $\angle 5$ and $\angle 7$ are vertical angles. So, $\angle 1$ and $\angle 7$ are congruent.

pg 114-115 #4, 7-9, 12-16, 19-21

4. 30°, 60°, 90°

7. 25°, 45°, 110°

8. 44°, 48°, 88°

9. 48°, 59°, 73°

12. 128°

13. 140°

14. 108°

15. The measure of the exterior angle is equal to the sum of the measures of the two nonadjacent interior angles. The sum of all three angles is not 180°;

$(2x - 12) = x + 30$

$x = 42$

The exterior angle is
$(2(42) - 12)° = 72°.$

16. See *Taking Math Deeper.*

19. sometimes; The sum of the angle measures must equal 180°.

20. always; Because the sum of the interior angle measures must equal 180° and one of the interior angles is 90°, the other two interior angles must sum to 90°.

21. never; If a triangle had more than one vertex with an acute exterior angle, then it would have to have more than one obtuse interior angle which is impossible.

5. $1260°$

6. $900°$

7. $360°$

8. $1080°$

10. The right side of the formula is $(n - 2) \cdot 180°$, not $n \cdot 180°$.
$S = (n - 2) \cdot 180°$
$\quad = (13 - 2) \cdot 180°$
$\quad = 11 \cdot 180°$
$\quad = 1980°$

11. no; The interior angle measures given add up to $535°$, but the sum of the interior angle measures of a pentagon is $540°$.

13. $90°, 135°, 135°, 135°, 135°, 90°$

16. $60°$

19. The sum of the interior angle measures should have been divided by the number of angles, 20. $3240° \div 20 = 162°$; The measure of each interior angle is $162°$.

21. 24 sides

24. $54°, 74°, 78°, 55°, 99°$

25. $60°$; The sum of the interior angle measures of a hexagon is $720°$. Because it is regular, each angle has the same measure. So, each interior angle is $720° \div 6 = 120°$ and each exterior angle is $60°$.

28. $125°, 125°, 55°, 55°$

pg 130-131 #6-7, 10-14

6. yes; The triangles have two pairs of congruent angles.

7. no; The triangles do not have two pairs of congruent angles.

10. the leftmost and rightmost; They both are right triangles with 45° angles.

11. yes; The triangles have two pairs of congruent angles.

12. no; The triangles do not have two pairs of congruent angles.

13. See *Taking Math Deeper*.

14. no; Each side increases by 50%, so each side is multiplied by a factor of $\frac{3}{2}$. The area is $\frac{3}{2}\left(\frac{3}{2}\right) = \frac{9}{4}$ or 225% of the original area, which is a 125% increase.

pg 17 #1-7 odd; pg 32 #1, 5, 6; pg 69 #1;
pg 91-93 #7, 12, 16