READY TO GO ON? PAGE 59

1. $P = 2\ell + 2w$ $\qquad\qquad$ $A = \ell w$
$= 2(20) + 2(8)$ $\qquad\qquad$ $= (20)(8) = 160 \text{ in}^2$
$= 40 + 16 = 56 \text{ in.}$

2. $P = a + b + c$
$= 13 + 2x + 20 + 3x - 11$
$= 5x + 22$
$A = \frac{1}{2}bh$
$= \frac{1}{2}(2x + 20)(13)$
$= \frac{1}{2}(26x + 260)$
$= 13x + 130$

3. $P = 2\ell + 2w$ $\qquad\qquad$ $A = \ell w$
$= 2(6x) + 2(3x + 2)$ $\qquad$ $= (6x)(3x + 2)$
$= 12x + 6x + 4$ $\qquad\qquad$ $= 18x^2 + 12x$
$= 18x + 4$

4. $P = a + b + c$
$= 10 + 5x + 14 + 14x - 2$
$= 19x + 22$
$A = \frac{1}{2}bh$
$= \frac{1}{2}(5x + 14)(10)$
$= \frac{1}{2}(50x + 140)$
$= 25x + 70$

5. $C = 2\pi r$ $\qquad\qquad$ $A = \pi r^2$
$= 2\pi(6) \approx 37.7 \text{ m}$ $\qquad$ $= \pi(6)^2 = 113.1 \text{ m}^2$

6. $\left(\dfrac{-4 + 3}{2}, \dfrac{6 + 8}{2}\right) = \left(\dfrac{-1}{2}, \dfrac{14}{2}\right) = (-0.5, 7)$

7. Step 1 Let coords. of K equal (x, y).
Step 2 Use Mdpt. Formula.
$(9, 3) = \left(\dfrac{6 + x}{2}, \dfrac{-2 + y}{2}\right)$
Step 3 Find x-coord. $\qquad$ Find y-coord.
$9 = \dfrac{6 + x}{2}$ $\qquad\qquad$ $3 = \dfrac{-2 + y}{2}$
$18 = 6 + x$ $\qquad\qquad$ $6 = -2 + y$
$12 = x$ $\qquad\qquad\qquad$ $8 = y$
The coordinates of K are $(12, 8)$.

8. Step 1 Find coords. of each point.
$Q(4, 3)$, $R(-3, 1)$, $S(-2, -4)$, and $T(5, -2)$.
Step 2 Use Dist. Formula.
$QR = \sqrt{(-3 - 4)^2 + (1 - 3)^2}$
$= \sqrt{(-7)^2 + (-2)^2}$
$= \sqrt{49 + 4} = \sqrt{53} \approx 7.3$
$ST = \sqrt{(5 - (-2))^2 + (-2 - (-4))^2}$
$= \sqrt{7^2 + 2^2}$
$= \sqrt{49 + 4} = \sqrt{53} \approx 7.3$
Since $QR = ST$, $\overline{QR} \cong \overline{ST}$.

9. Method 1 Dist. Formula.
$FG = \sqrt{(-3 - 4)^2 + (-2 - 3)^2}$
$= \sqrt{(-7)^2 + (-5)^2}$
$= \sqrt{49 + 25} = \sqrt{74} \approx 8.6$
Method 2 Pyth. Thm. Count the units for the legs of the rt. $\triangle$ formed by F and G.
$a = 7$ and $b = 5$
$c^2 = a^2 + b^2$
$= 7^2 + 5^2$
$= 74$
$c = \sqrt{74} \approx 8.6$

10. reflection; $\triangle ABC \rightarrow \triangle A'B'C'$
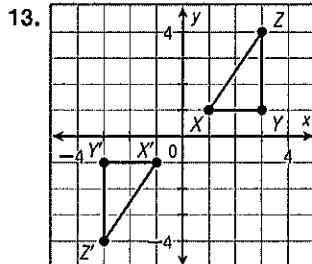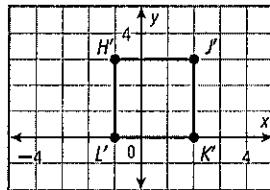
11. translation; $PQRS \rightarrow P'Q'R'S'$

12. Vertices of figure are $H(2, 1)$, $J(5, 1)$, $K(5, -2)$, and $L(2, -2)$. Vertices of image are:
$H'(2 - 3, 1 + 2) = H'(-1, 3)$
$J'(5 - 3, 1 + 2) = J'(2, 3)$
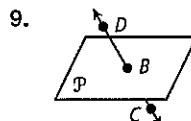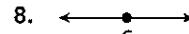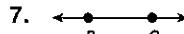$K'(5 - 3, -2 + 2) = K'(2, 0)$
$L'(2 - 3, -2 + 2) = L'(-1, 0)$

13.

From graph, transformation is a rotation of 180° about the origin.

STUDY GUIDE: REVIEW, PAGES 60–63

1. angle bisector $\qquad\qquad$ **2.** complementary angles

3. hypotenuse

LESSON 1-1

4. A, F, E, G or C, G, D, B

5. Possible answer: $\overleftrightarrow{GC}$

6. Possible answer: plane AEG

7.

8.

9.

LESSON 1-2

10. $JL = |2 - (-1.5)|$
$\quad = |3.5| = 3.5$

11. $HK = |1 - (-4)|$
$\quad = |5| = 5$

12. Use Seg. Add. Post.
$XY + YZ = XZ$
$13.8 + YZ = 21.4$
$\quad\quad YZ = 21.4 - 13.8 = 7.6$

13. Step 1 Find x.
Use Seg. Add. Post.
$PQ + QR = PR$
$3x + 6x + 4 = 14x - 6$
$\quad\quad\quad 10 = 5x$
$\quad\quad\quad\;\; x = 2$
Step 2 Find PR.
$PR = 14x - 6$
$\quad = 14(2) - 6 = 22$

14. Step 1 Find x.
$TU = UV$
$3x + 4 = 5x - 2$
$\quad\;\; 6 = 2x$
$\quad\;\; x = 3$
Step 2 Find TU, UV, and TV.
$TU = 3x + 4$
$\quad = 3(3) + 4 = 13$
$UV = TU = 13$
$TV = TU + UV$
$\quad = 13 + 13 = 26$

15. Step 1 Find x.
$DE = EF$
$9x = 4x + 10$
$5x = 10$
$\;\; x = 2$
Step 2 Find DE, EF, and DF.
$DE = 9x$
$\quad = 9(2) = 18$
$EF = DE = 18$
$DF = DE + EF$
$\quad = 18 + 18 = 36$

LESSON 1-3

16. $\angle VYX$ rt.; $\angle XYZ$ acute; $\angle ZYW$ acute; $\angle VYZ$ obtuse; $\angle XYW$ rt; $\angle VYW$ straight.

17. Step 1 Find x.
Use $\angle$ Add. Post.
$m\angle HJK + m\angle KJL = m\angle HJL$
$13x + 20 + 10x + 27 = 116$
$\quad\quad\quad\quad\quad\quad 23x = 69$
$\quad\quad\quad\quad\quad\quad\;\; x = 3$
Step 2 Find $m\angle HJK$.
$m\angle HJK = 13x + 20$
$\quad\quad\quad = 13(3) + 20 = 59°$

18. Step 1 Find x.
$m\angle MNP = m\angle PNQ$
$6x - 12 = 4x + 8$
$\quad 2x = 20$
$\quad\;\; x = 10$
Step 2 Find $m\angle MNQ$.
$m\angle MNQ = 6x - 12 + 4x + 8$
$\quad\quad\quad = 10x - 4$
$\quad\quad\quad = 10(10) - 4 = 96°$

LESSON 1-4

19. only adj.

20. adj. and a lin. pair

21. not adj.

22. $90 - m\angle = 90 - 74.6 = 15.4°$
$180 - m\angle = 180 - 74.6 = 105.4°$

23. $90 - m\angle = 90 - (2x - 4)$
$\quad\quad\quad\quad = (94 - 2x)°$
$180 - m\angle = 180 - (2x - 4)$
$\quad\quad\quad\quad = (184 - 2x)°$

24. $m\angle = 4(90 - m\angle) + 5$
$m\angle = 365 - 4m\angle$
$5m\angle = 365$
$\;\; m\angle = 73°$

LESSON 1-5

25. $P = 2\ell + 2w$
$\quad = 2(4x - 1) + 2(3x)$
$\quad = 14x - 2$

$A = \ell w$
$\quad = (4x - 1)(3x)$
$\quad = 12x^2 - 3x$

26. $P = 4s$
$\quad = 4(x + 4)$
$\quad = 4x + 16$

$A = s^2$
$\quad = (x + 4)^2$
$\quad = x^2 + 8x + 16$

27. $P = a + b + c$
$\quad = 8 + x - 5 + 12$
$\quad = x + 15$

$A = \frac{1}{2}bh$
$\quad = \frac{1}{2}(x - 5)(8)$
$\quad = 4x - 20$

28. $P = 2\ell + 2w$
$\quad = 2(5x + 7) + 2(20)$
$\quad = 10x + 54$

$A = \ell w$
$\quad = (5x + 7)(20)$
$\quad = 100x + 140$

29. $C = 2\pi r$
$\quad = 2\pi(21)$
$\quad = 42\pi \approx 131.9$ m

$A = \pi r^2$
$\quad = \pi(21)^2$
$\quad = 441\pi$
$\quad \approx 1385.4$ m^2

30. $r = \frac{14}{2} = 7$ ft
$C = 2\pi r$
$\quad = 2\pi(7)$
$\quad = 14\pi \approx 44.0$ ft

$A = \pi r^2$
$\quad = \pi(7)^2$
$\quad = 49\pi \approx 153.9$ ft^2

31. $A = \frac{1}{2}bh$
$102 = \frac{1}{2}(17)h$
$\quad h = \frac{2}{17}(102) = 12$ m

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LESSON 1-6

32. $Y\left(\dfrac{3+(-1)}{2}, \dfrac{2+4}{2}\right) = \left(\dfrac{2}{2}, \dfrac{6}{2}\right) = (1, 3)$

33. Step 1 Let coords. of B equal (x, y).
Step 2 Use Mdpt. Formula.
$(-2, 3) = \left(\dfrac{5+x}{2}, \dfrac{0+y}{2}\right)$

Step 3 Find x-coord.   Find y-coord.
$-2 = \dfrac{5+x}{2}$ $3 = \dfrac{0+y}{2}$
$-4 = 5 + x$ $6 = 0 + y$
$-9 = x$ $6 = y$
The coordinates of B are $(-9, 6)$.

34. Step 1 Let coords. of A equal (x, y).
Step 2 Use Mdpt. Formula.
$(-2, 3) = \left(\dfrac{x+(-4)}{2}, \dfrac{y+4}{2}\right)$

Step 3 Find x-coord.   Find y-coord.
$-2 = \dfrac{x+(-4)}{2}$ $3 = \dfrac{y+4}{2}$
$-4 = x - 4$ $6 = y + 4$
$0 = x$ $2 = y$
The coordinates of A are $(0, 2)$.

35. Method 1 Use Dist. Formula. Subst. values for coords. of X and Y into Dist. Formula.
$$XY = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(6 - (-2))^2 + (1 - 4)^2}$$
$$= \sqrt{8^2 + (-3)^2}$$
$$= \sqrt{64 + 9} = \sqrt{73} \approx 8.5$$
Method 2 Use Pyth. Thm. Count the units for the legs of the rt. $\triangle$ formed by X and Y.
$a = 8$ and $b = 3$
$c^2 = a^2 + b^2$
$= 8^2 + 3^2$
$= 64 + 9$
$= 73$
$c = \sqrt{73} \approx 8.5$

36. Method 1 Use Dist. Formula. Subst. values for coords. of H and K into Dist. Formula.
$$HK = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(-2 - 0)^2 + (-4 - 3)^2}$$
$$= \sqrt{(-2)^2 + (-7)^2}$$
$$= \sqrt{4 + 49} = \sqrt{53} \approx 7.3$$
Method 2 Use Pyth. Thm. Count the units for the legs of the rt. $\triangle$ formed by H and K.
$a = 2$ and $b = 7$
$c^2 = a^2 + b^2$
$= 2^2 + 7^2$
$= 4 + 49$
$= 53$
$c = \sqrt{53} \approx 7.3$

37. Method 1 Use Dist. Formula. Subst. values for coords. of L and M into Dist. Formula.
$$LM = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(3 - (-4))^2 + (-2 - 2)^2}$$
$$= \sqrt{7^2 + (-4)^2}$$
$$= \sqrt{49 + 16} = \sqrt{65} \approx 8.1$$
Method 2 Use Pyth. Thm. Count the units for the legs of the rt. $\triangle$ formed by L and M.
$a = 7$ and $b = 4$
$c^2 = a^2 + b^2$
$= 7^2 + 4^2$
$= 49 + 16$
$= 65$
$c = \sqrt{65} \approx 8.1$

LESSON 1-7

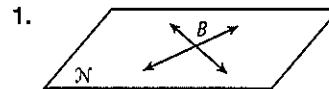**38.** 90° rotation; $DEFG \rightarrow D'E'F'G'$

39. translation; $PQRS \rightarrow P'Q'R'S'$

40. $X'(-5 + 4, -4 + 5) = X'(-1, 1)$
$Y'(-3 + 4, -1 + 5) = Y'(1, 4)$
$Z'(-2 + 4, -2 + 5) = Z'(2, 3)$

CHAPTER TEST, PAGE 64

1.

2. Possible answer: D, E, C, A

3. Possible answer: $\overleftrightarrow{BE}$ **4.** $AB = |0.5 - (-3)|$
$= |3.5| = 3.5$

5. Step 1 Find x.
Use Seg. Add. Post.
$EF + FG = EG$
$6x - 4 + 3x = 5x + 8$
$4x = 12$
$x = 3$
Step 2 Find EF.
$EF = 6x - 4$
$= 6(3) - 4 = 14$

6. Step 1 Find x.
$HJ = JK$
$3x + 5 = 9x - 3$
$8 = 6x$
$x = \dfrac{4}{3}$
Step 2 Find HJ, JK, and HK.
$HJ = 3x + 5$
$= 3\left(\dfrac{4}{3}\right) + 5 = 9$
$JK = HJ = 9$
$HK = HJ + JK$
$= 9 + 9 = 18$

7. acute   **8.** rt.

9. obtuse

10. Step 1 Find x.

$m\angle RTV = m\angle VTS$

$16x - 6 = 13x + 9$

$\quad\quad 3x = 15$

$\quad\quad\ x = 5$

Step 2 Find $m\angle RTV$.

$m\angle RTV = 16x - 6$

$\quad\quad\quad = 16(5) - 6 = 74°$

11. $m\angle = 3(180 - m\angle) - 5$

$\quad m\angle = 540 - 3m\angle - 5$

$\quad 4m\angle = 535$

$\quad m\angle = 133.75°$

$\quad m(\text{supp. of } \angle) = 180 - m\angle$

$\quad\quad\quad\quad\quad\quad = 180 - 133.75 = 46.25°$

12. only adj.   **13.** adj. and a lin. pair

14. not adj.

15. $P = 2b + 2h$ $A = bh$

$\quad = 2(8) + 2(4)$ $= (8)(4) = 32\ \text{ft}^2$

$\quad = 16 + 8 = 24\ \text{ft}$

16. $C = 2\pi r$ $A = \pi r^2$

$\quad = 2\pi(15)$ $= \pi(15)^2$

$\quad = 30\pi \approx 94.2\ \text{m}$ $= 225\pi \approx 706.9\ \text{m}^2$

17. $r = \dfrac{d}{2} = 12.5\ \text{ft}$

$\quad C = 2\pi r$ $A = \pi r^2$

$\quad = 2\pi(12.5)$ $= \pi(12.5)^2$

$\quad = 25\pi \approx 78.5\ \text{ft}$ $= 156.25\pi \approx 490.9\ \text{ft}^2$

18. $r = \dfrac{d}{2} = 1.4\ \text{cm}$

$\quad C = 2\pi r$ $A = \pi r^2$

$\quad = 2\pi(1.4)$ $= \pi(1.4)^2$

$\quad = 2.8\pi \approx 8.8\ \text{cm}$ $= 1.96\pi \approx 6.2\ \text{cm}^2$

19. $\left(\dfrac{-4 + 3}{2}, \dfrac{6 + 2}{2}\right) = \left(\dfrac{-1}{2}, \dfrac{8}{2}\right) = (-0.5,\ 4)$

20. Step 1 Let coords. of N equal (x, y).

Step 2 Use Mdpt. Formula.

$(-5, 1) = \left(\dfrac{2 + x}{2}, \dfrac{4 + y}{2}\right)$

Step 3 Find x-coord.   Find y-coord.

$-5 = \dfrac{2 + x}{2}$ $1 = \dfrac{4 + y}{2}$

$-10 = 2 + x$ $2 = 4 + y$

$-12 = x$ $-2 = y$

The coordinates of N are $(-12, -2)$.

21. Use Dist. Formula.

$AB = \sqrt{(-1 - (-5))^2 + (3 - 1)^2}$

$\quad = \sqrt{4^2 + 2^2}$

$\quad = \sqrt{16 + 4} = \sqrt{20}$

$CD = \sqrt{(4 - 1)^2 + (1 - 4)^2}$

$\quad = \sqrt{3^2 + (-3)^2}$

$\quad = \sqrt{9 + 9} = \sqrt{18}$

Since $AB \neq CD$, $\overline{AB} \not\cong \overline{CD}$

22. 180° rotation; $QRS \to Q'R'S'$

23. reflection; $WXYZ \to W'X'Y'Z'$

24. Step 1 Find the coordinates of $\triangle ABC$.

Vertices of $\triangle ABC$ are $A(-5, 1)$, $B(-2, 4)$, and $C(-1, 1)$.

Step 2 Use $(x, y) \to (x + 3, y - 3)$ to find vertices of image.

$A'(-5 + 3, 1 - 3) = A'(-2, -2)$

$B'(-2 + 3, 4 - 3) = B'(1, 1)$

$C'(-1 + 3, 1 - 3) = C'(2, -2)$

Step 3

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