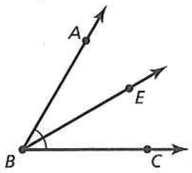
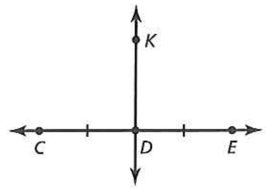
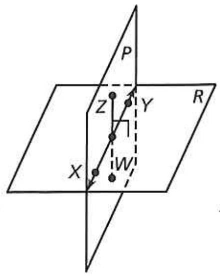
13. *Sample answer:*



14. *Sample answer:*



15. *Sample answer:*



16.

Equation	Explanation and Reason
$-9x - 21 = -20x - 87$	Write the equation; Given
$11x - 21 = -87$	Add $20x$ to each side; Addition Property of Equality
$11x = -66$	Add 21 to each side; Addition Property of Equality
$x = -6$	Divide each side by 11; Division Property of Equality

17.

Equation	Explanation and Reason
$15x + 22 = 7x + 62$	Write the equation; Given
$8x + 22 = 62$	Subtract $7x$ from each side; Subtraction Property of Equality
$8x = 40$	Subtract 22 from each side; Subtraction Property of Equality
$x = 5$	Divide each side by 8; Division Property of Equality

18.

Equation	Explanation and Reason
$3(2x + 9) = 30$	Write the equation; Given
$6x + 27 = 30$	Multiply; Distributive Property
$6x = 3$	Subtract 27 from each side; Subtraction Property of Equality
$x = \frac{1}{2}$	Divide each side by 6; Division Property of Equality

19.

Equation	Explanation and Reason
$5x + 2(2x - 23) = -154$	Write the equation; Given
$5x + 4x - 46 = -154$	Multiply; Distributive Property
$9x - 46 = -154$	Combine like terms; Simplify.
$9x = -108$	Add 46 to each side; Addition Property of Equality
$x = -12$	Divide each side by 9; Division Property of Equality

20. Transitive Property of Equality

21. Reflexive Property of Equality

22. Symmetric Property of Angle Congruence (Thm. 2.2)

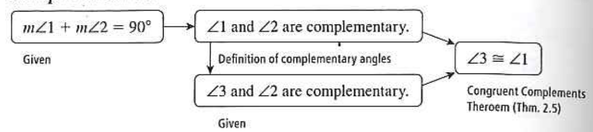
23. Reflexive Property of Angle Congruence (Thm. 2.2)

24. Transitive Property of Equality

25.

STATEMENTS	REASONS
1. An angle with vertex A exists.	**1.** Given
2. $m\angle A$ equals the measure of the angle with vertex A.	**2.** Protractor Postulate (Post. 1.3)
3. $m\angle A = m\angle A$	**3.** Reflexive Property of Equality
4. $\angle A \cong \angle A$	**4.** Definition of congruent angles

26. *Sample answer:*



Chapter 3

Chapter 3 Maintaining Mathematical Proficiency *(p. 123)*

1. $m = -\frac{3}{4}$ **2.** $m = 3$ **3.** $m = 0$

4. $y = -3x + 19$ **5.** $y = -2x + 2$ **6.** $y = 4x + 9$

7. $y = \frac{1}{2}x - 5$ **8.** $y = -\frac{1}{4}x - 7$ **9.** $y = \frac{2}{3}x + 9$

10. When calculating the slope of a horizontal line, the vertical change is zero. This is the numerator of the fraction, and zero divided by any number is zero. When calculating the slope of a vertical line, the horizontal change is zero. This is the denominator of the fraction, and any number divided by zero is undefined.

3.1 Vocabulary and Core Concept Check *(p. 129)*

1. skew

3.1 Monitoring Progress and Modeling with Mathematics *(pp. 129–130)*

3. $\overleftrightarrow{AB}$ **5.** $\overleftrightarrow{BF}$ **7.** $\overleftrightarrow{MK}$ and $\overleftrightarrow{LS}$

9. no; They are intersecting lines.

11. $\angle 1$ and $\angle 5$; $\angle 2$ and $\angle 6$; $\angle 3$ and $\angle 7$; $\angle 4$ and $\angle 8$

13. $\angle 1$ and $\angle 8$; $\angle 2$ and $\angle 7$ **15.** corresponding

17. consecutive interior

19. Lines that do not intersect could also be skew; If two coplanar lines do not intersect, then they are parallel.

21. **a.** true; The floor is level with the horizontal just like the ground.

b. false; The lines intersect the plane of the ground, so they intersect certain lines of that plane.

c. true; The balusters appear to be vertical, and the floor of the tree house is horizontal. So, they are perpendicular.

23. yes; If the original two lines are parallel, and the transversal is perpendicular to both lines, then all eight angles are right angles.

25. $\angle HJG$, $\angle CFJ$ **27.** $\angle CFD$, $\angle HJC$

29. no; They can both be in a plane that is slanted with respect to the horizontal.

3.1 Maintaining Mathematical Proficiency *(p. 130)*

31. $m\angle 1 = 21°$, $m\angle 3 = 21°$, $m\angle 4 = 159°$

3.2 Vocabulary and Core Concept Check (p. 135)

1. Both theorems refer to two pairs of congruent angles that are formed when two parallel lines are cut by a transversal, and the angles that are congruent are on opposite sides of the transversal. However with the Alternate Interior Angles Theorem (Thm. 3.2), the congruent angles lie between the parallel lines, and with the Alternate Exterior Angles Theorem (Thm. 3.3), the congruent angles lie outside the parallel lines.

3.2 Monitoring Progress and Modeling with Mathematics (pp. 135–136)

3. $m\angle 1 = 117°$ by Vertical Angles Congruence Theorem (Thm. 2.6); $m\angle 2 = 117°$ by Alternate Exterior Angles Theorem (Thm. 3.3)

5. $m\angle 1 = 122°$ by Alternate Interior Angles Theorem (Thm. 3.2); $m\angle 2 = 58°$ by Consecutive Interior Angles Theorem (Thm. 3.4)

7. 64; $2x° = 128$

$x = 64$

9. 12; $m\angle 5 = 65°$

$65° + (11x - 17)° = 180°$

$11x + 48 = 180$

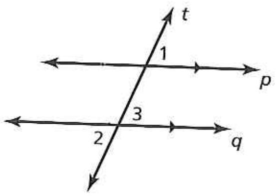
$11x = 132$

$x = 12$

11. $m\angle 1 = 100°, m\angle 2 = 80°, m\angle 3 = 100°$; Because the 80° angle is a consecutive interior angle with both $\angle 1$ and $\angle 3$, they are supplementary by the Consecutive Interior Angles Theorem (Thm. 3.4). Because $\angle 1$ and $\angle 2$ are consecutive interior angles, they are supplementary by the Consecutive Interior Angles Theorem (Thm. 3.4).

13. In order to use the Corresponding Angles Theorem (Thm. 3.1), the angles need to be formed by two parallel lines cut by a transversal, but none of the lines in this diagram appear to be parallel; $\angle 9$ and $\angle 10$ are corresponding angles.

15.



STATEMENTS	REASONS
1. $p \parallel q$	1. Given
2. $\angle 1 \cong \angle 3$	2. Corresponding Angles Theorem (Thm. 3.1)
3. $\angle 3 \cong \angle 2$	3. Vertical Angles Congruence Theorem (Thm. 2.6)
4. $\angle 1 \cong \angle 2$	4. Transitive Property of Congruence

17. $m\angle 2 = 104°$; Because the trees form parallel lines, and the rope is a transversal, the 76° angle and $\angle 2$ are consecutive interior angles. So, they are supplementary by the Consecutive Interior Angles Theorem (Thm. 3.4).

19. yes; If two parallel lines are cut by a perpendicular transversal, then the consecutive interior angles will both be right angles.

21. $19x - 10 = 180$

$14x + 2y - 10 = 180;\quad x = 10, y = 25$

23. no; In order to make the shot, you must hit the cue ball so that $m\angle 1 = 65°$. The angle that is complementary to $\angle 1$ must have a measure of 25° because this angle is alternate interior angles with the angle formed by the path of the cue ball and the vertical line drawn.

3.2 Maintaining Mathematical Proficiency (p. 136)

25. If two angles are congruent, then they are vertical angles; false

27. If two angles are supplementary, then they form a linear pair; false

3.3 Vocabulary and Core Concept Check (p. 142)

1. corresponding, alternate interior, alternate exterior

3.3 Monitoring Progress and Modeling with Mathematics (pp. 142–144)

3. $x = 40$; Lines m and n are parallel when the marked corresponding angles are congruent.

$3x° = 120°$

$x = 40$

5. $x = 15$; Lines m and n are parallel when the marked consecutive interior angles are supplementary.

$(3x - 15)° + 150° = 180°$

$3x + 135 = 180$

$3x = 45$

$x = 15$

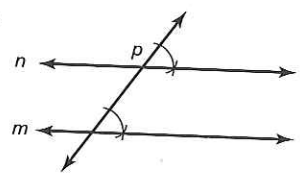
7. $x = 60$; Lines m and n are parallel when the marked consecutive interior angles are supplementary.

$2x° + x° = 180°$

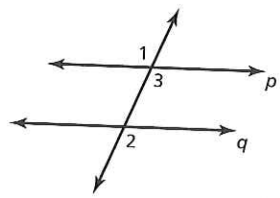
$3x = 180$

$x = 60$

9.



11.



It is given that $\angle 1 \cong \angle 2$. By the Vertical Angles Congruence Theorem (Thm. 2.6), $\angle 1 \cong \angle 3$. Then by the Transitive Property of Congruence, $\angle 2 \cong \angle 3$. So, by the Corresponding Angles Theorem (Thm. 3.1), $p \parallel q$.

13. yes; Alternate Interior Angles Converse (Thm. 3.6)

15. no **17.** no

19. This diagram shows that vertical angles are always congruent. Lines a and b are not parallel unless $x = y$, and we cannot assume that they are equal.

21. yes; $m\angle DEB = 180° - 123° = 57°$ by the Linear Pair Postulate (Post. 2.8). So, by definition, a pair of corresponding angles are congruent, which means that $\overleftrightarrow{AC} \parallel \overleftrightarrow{DF}$ by the Corresponding Angles Converse (Thm. 3.5).

23. no; The marked angles are vertical angles. We do not know anything about the angles formed by the intersection of $\overleftrightarrow{DF}$ and $\overleftrightarrow{BE}$.

25. yes; E. 20th Ave. is parallel to E. 19th Ave. by the Corresponding Angles Converse (Thm. 3.5). E. 19th Ave. is parallel to E. 18th Ave. by the Alternate Exterior Angles Converse (Thm. 3.7). E. 18th Ave. is parallel to E. 17th Ave. by the Alternate Interior Angles Converse (Thm. 3.6). So, they are all parallel to each other by the Transitive Property of Parallel Lines (Thm. 3.9).

27. The two angles marked as 108° are corresponding angles. Because they have the same measure, they are congruent to each other. So, $m \parallel n$ by the Corresponding Angles Converse (Thm. 3.5).

29. A, B, C, D; The Corresponding Angles Converse (Thm. 3.5) can be used because the angle marked at the intersection of line m and the transversal is vertical angles with, and therefore congruent to, an angle that is corresponding with the other marked angle. The Alternate Interior Angles Converse (Thm. 3.6) can be used because the angles that are marked as congruent are alternate interior angles. The Alternate Exterior Angles Converse (Thm. 3.7) can be used because the angles that are vertical with, and therefore congruent to, the marked angles are alternate exterior angles. The Consecutive Interior Angles Converse (Thm. 3.8) can be used because each of the marked angles forms a linear pair with, and is therefore supplementary to, an angle that is a consecutive interior angles with the other marked angle.

31. two; *Sample answer:* $\angle 1 \cong \angle 5$, $\angle 2 \cong \angle 7$, $\angle 3 \cong \angle 6$, $\angle 4$ and $\angle 7$ are supplementary.

33.

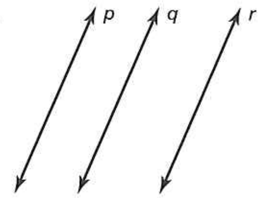
STATEMENTS	REASONS
1. $m\angle 1 = 115°$, $m\angle 2 = 65°$	**1.** Given
2. $m\angle 1 + m\angle 2 = m\angle 1 + m\angle 2$	**2.** Reflexive Property of Equality
3. $m\angle 1 + m\angle 2 = 115° + 65°$	**3.** Substitution Property of Equality
4. $m\angle 1 + m\angle 2 = 180°$	**4.** Simplify.
5. $\angle 1$ and $\angle 2$ are supplementary.	**5.** Definition of supplementary angles
6. $m \parallel n$	**6.** Consecutive Interior Angles Converse (Thm 3.8)

35.

STATEMENTS	REASONS
1. $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$	**1.** Given
2. $\angle 2 \cong \angle 3$	**2.** Vertical Angles Congruence Theorem (Thm. 2.6)
3. $\angle 1 \cong \angle 3$	**3.** Transitive Property of Congruence
4. $\angle 1 \cong \angle 4$	**4.** Transitive Property of Congruence
5. $\overline{AB} \parallel \overline{CD}$	**5.** Alternate Interior Angles Converse (Thm. 3.6)

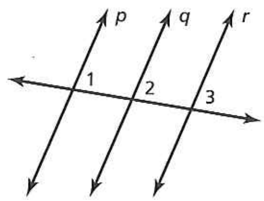
37. no; Based on the diagram $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ by the Alternate Interior Angles Converse (Thm. 3.6), but you cannot be sure that $\overleftrightarrow{AD} \parallel \overleftrightarrow{BC}$.

39. a.



b. Given: $p \parallel q$, $q \parallel r$
Prove: $p \parallel r$

c.



STATEMENTS	REASONS
1. $p \parallel q$, $q \parallel r$	**1.** Given
2. $\angle 1 \cong \angle 2$, $\angle 2 \cong \angle 3$	**2.** Corresponding Angles Theorem (Thm. 3.1)
3. $\angle 1 \cong \angle 3$	**3.** Transitive Property of Congruence
4. $p \parallel r$	**4.** Corresponding Angles Converse (Thm. 3.5)

3.3 Maintaining Mathematical Proficiency *(p. 144)*

41. about 6.71 **43.** 13

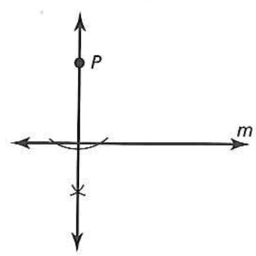
3.4 Vocabulary and Core Concept Check *(p. 152)*

1. midpoint, right

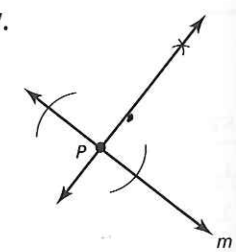
3.4 Monitoring Progress and Modeling with Mathematics *(pp. 152–154)*

3. about 3.2 units

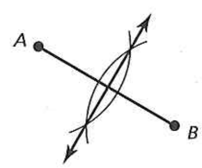
5.



7.

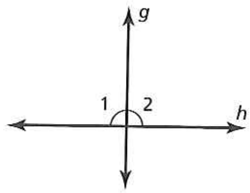


9.



11. In order to claim parallel lines by the Lines Perpendicular to a Transversal Theorem (Thm. 3.12), *both* lines must be marked as perpendicular to the transversal; Lines x and z are perpendicular.

13.



Because $\angle 1 \cong \angle 2$ by definition, $m\angle 1 = m\angle 2$. Also, by the Linear Pair Postulate (Post. 2.8), $m\angle 1 + m\angle 2 = 180°$. Then, by the Substitution Property of Equality, $m\angle 1 + m\angle 1 = 180°$, and $2(m\angle 1) = 180°$ by the Distributive Property. So, by the Division Property of Equality, $m\angle 1 = 90°$. Finally, $g \perp h$ by the definition of perpendicular lines.

15.

STATEMENTS	REASONS
1. $a \perp b$	1. Given
2. $\angle 1$ is a right angle.	2. Definition of perpendicular lines
3. $\angle 1 \cong \angle 4$	3. Vertical Angles Congruence Theorem (Thm. 2.6)
4. $m\angle 1 = 90°$	4. Definition of right angle
5. $m\angle 4 = 90°$	5. Transitive Property of Equality
6. $\angle 1$ and $\angle 2$ are a linear pair.	6. Definition of linear pair
7. $\angle 1$ and $\angle 2$ are supplementary.	7. Linear Pair Postulate (Post. 2.8)
8. $m\angle 1 + m\angle 2 = 180°$	8. Definition of supplementary angles
9. $90° + m\angle 2 = 180°$	9. Transitive Property of Equality
10. $m\angle 2 = 90°$	10. Subtraction Property of Equality
11. $\angle 2 \cong \angle 3$	11. Vertical Angles Congruence Theorem (Thm. 2.6)
12. $m\angle 3 = 90°$	12. Transitive Property of Equality
13. $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$ are right angles.	13. Definition of right angle

17. none; The only thing that can be concluded in this diagram is that $v \perp y$. In order to say that lines are parallel, you need to know something about both of the intersections between the transversal and the two lines.

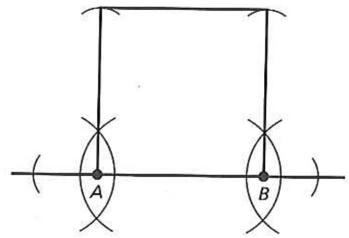
19. $m \parallel n$, Because $m \perp q$ and $n \perp q$, lines m and n are parallel by the Lines Perpendicular to a Transversal Theorem (Thm. 3.12). The other lines may or may not be parallel.

21. $n \parallel p$; Because $k \perp n$ and $k \perp p$, lines n and p are parallel by the Lines Perpendicular to a Transversal Theorem (Thm. 3.12).

23. $m\angle 1 = 90°$, $m\angle 2 = 60°$, $m\angle 3 = 30°$, $m\angle 4 = 20°$, $m\angle 5 = 90°$;
$m\angle 1 = 90°$, because it is marked as a right angle.
$m\angle 2 = 90° - 30° = 60°$, because it is complementary to the 30° angle.
$m\angle 3 = 30°$, because it is vertical angles with, and therefore congruent to, the 30° angle.
$m\angle 4 = 90° - (30° + 40°) = 20°$, because it forms a right angle together with $\angle 3$ and the 40° angle.
$m\angle 5 = 90°$, because it is vertical angles with, and therefore congruent to, $\angle 1$.

25. $x = 8$ **27.** A, C, D, E

29.



31. rectangle

33. Find the length of the segment that is perpendicular to the plane and that has one endpoint on the given point and one endpoint on the plane; You can find the distance from a line to a plane only if the line is parallel to the plane. Then you can pick any point on the line and find the distance from that point to the plane. If a line is not parallel to a plane, then the distance from the line to the plane is not defined because it would be different for each point on the line.

3.4 Maintaining Mathematical Proficiency *(p. 154)*

35. $-\frac{2}{3}$ **37.** 3 **39.** $m = -\frac{1}{2}$; $b = 7$

41. $m = -8$; $b = 6$

3.5 Vocabulary and Core Concept Check *(p. 160)*

1. directed

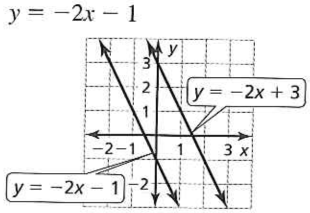
3.5 Monitoring Progress and Modeling with Mathematics *(pp. 160–162)*

3. $P(7, -0.4)$ **5.** $P(-1.5, -1.5)$ **7.** $a \parallel c$, $b \perp d$

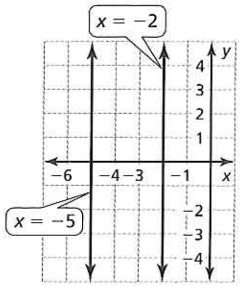
9. perpendicular; Because $m_1 \cdot m_2 = \left(\frac{2}{3}\right)\left(-\frac{3}{2}\right) = -1$, lines 1 and 2 are perpendicular by the Slopes of Perpendicular Lines Theorem (Thm. 3.14).

11. perpendicular; Because $m_1 \cdot m_2 = 1(-1) = -1$, lines 1 and 2 are perpendicular by the Slopes of Perpendicular Lines Theorem (Thm. 3.14).

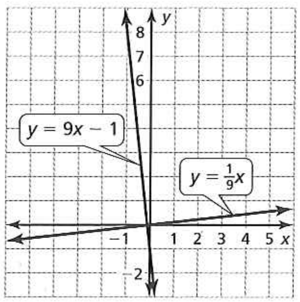
13. $y = -2x - 1$



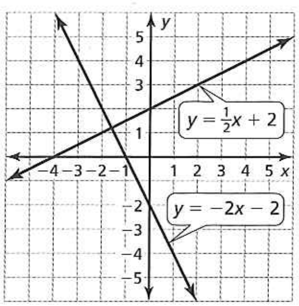
15. $x = -2$



17. $y = \frac{1}{9}x$



19. $y = \frac{1}{2}x + 2$



21. about 3.2 units **23.** about 5.4 units

25. Because the slopes are opposites but not reciprocals, their product does not equal -1. Lines 1 and 2 are neither parallel nor perpendicular.

27. $(0, 1)$; $y = 2x + 1$ **29.** $(3, 0)$; $y = \frac{3}{2}x - \frac{9}{2}$

31. $\left(-\frac{11}{5}, -\frac{6}{5}\right)$

33. no; $m_{\overline{LM}} = \frac{2}{5}$, $m_{\overline{LN}} = -\frac{7}{4}$, and $m_{\overline{MN}} = 9$. None of these can pair up to make a product of -1, so none of the segments are perpendicular.

35. $y = \frac{3}{2}x - 1$

37. $m < -1$; The slope of a line perpendicular to ℓ must be the opposite reciprocal of the slope of line ℓ. So, it must be negative, and have an absolute value greater than 1.

39. It will be the same point.

41. **a.** no solution; The lines do not intersect, so they are parallel.

b. $(7, -4)$; The lines intersect in one point.

c. infinitely many solutions; The lines are the same line.

43. $k = 4$

45. Using points $A(3, 2)$ and $B(6, 8)$ find the coordinates of point P that lies beyond point B along $\overrightarrow{AB}$ so that the ratio of AB to BP is 3 to 2. In order to keep the ratio, $\frac{AB}{BP} = \frac{3}{2}$, solve this ratio for BP to get $BP = \frac{2}{3}AB$. Next, find the rise and run from point A to point B. Leave the slope in terms of rise and run and do not simplify. $m_{\overline{AB}} = \frac{8-2}{6-3} = \frac{6}{3} = \frac{\text{rise}}{\text{run}}$. Add $\frac{2}{3}$ of the *run* to the x-coordinate of B, which is $\frac{2}{3} \cdot 3 + 6 = 8$. Add $\frac{2}{3}$ of the *rise* to the y-coordinate of B, which is $\frac{2}{3} \cdot 6 + 8 = 12$. So, the coordinates of P are $(8, 12)$.

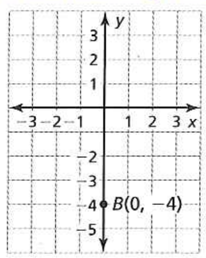
47. If lines x and y are perpendicular to line z, then by the Slopes of Perpendicular Lines Theorem (Thm. 3.14), $m_x \cdot m_z = -1$ and $m_y \cdot m_z = -1$. By the Transitive Property of Equality, $m_x \cdot m_z = m_y \cdot m_z$, and by the Division Property of Equality $m_x = m_y$. Therefore, by the Slopes of Parallel Lines Theorem (Thm. 3.13), $x \parallel y$.

49. If lines x and y are vertical lines and they are cut by any horizontal transversal, z, then $x \perp z$ and $y \perp z$ by Theorem 3.14. Therefore, $x \parallel y$ by the Lines Perpendicular to a Transversal Theorem (Thm. 3.12).

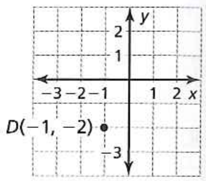
51. By definition, the x-axis is perpendicular to the y-axis. Let m be a horizontal line, and let n be a vertical line. Because any two horizontal lines are parallel, m is parallel to the x-axis. Because any two vertical lines are parallel, n is parallel to the y-axis. By the Perpendicular Transversal Theorem, (Thm. 3.11), n is perpendicular to the x-axis. Then, by the Perpendicular Transversal Theorem (Thm. 3.11), n is perpendicular to m.

3.5 Maintaining Mathematical Proficiency *(p. 162)*

53.



55.



57.

x	-2	-1	0	1	2
$y = x - \frac{3}{4}$	$-\frac{11}{4}$	$-\frac{7}{4}$	$-\frac{3}{4}$	$\frac{1}{4}$	$\frac{5}{4}$

Chapter 3 Review *(pp. 164–166)*

1. $\overleftrightarrow{NR}, \overleftrightarrow{MR}, \overleftrightarrow{LQ}, \overleftrightarrow{PQ}$ **2.** $\overleftrightarrow{LM}, \overleftrightarrow{JK}, \overleftrightarrow{NP}$

3. $\overleftrightarrow{JM}, \overleftrightarrow{KL}, \overleftrightarrow{KP}, \overleftrightarrow{JN}$ **4.** plane JKP **5.** $x = 145$, $y = 35$

6. $x = 13$, $y = 132$ **7.** $x = 61$, $y = 29$

8. $x = 14$, $y = 17$ **9.** $x = 107$ **10.** $x = 133$

11. $x = 32$ **12.** $x = 23$

13. $x \parallel y$; Because $x \perp z$ and $y \perp z$, lines x and y are parallel by the Lines Perpendicular to a Transversal Theorem (Thm. 3.12).

14. none; The only thing that can be concluded in this diagram is that $x \perp z$ and $w \perp y$. In order to say that lines are parallel, you need to know something about *both* of the intersections between the two lines and a transversal.

15. $\ell \parallel m \parallel n$, $a \parallel b$; Because $a \perp n$ and $b \perp n$, lines a and b are parallel by the Lines Perpendicular to a Transversal Theorem (Thm. 3.12). Because $m \perp a$ and $n \perp a$, lines m and n are parallel by the Lines Perpendicular to a Transversal Theorem (Thm. 3.12). Because $\ell \perp b$ and $n \perp b$, lines ℓ and n are parallel by the Lines Perpendicular to a Transversal Theorem (Thm. 3.12). Because $\ell \parallel n$ and $m \parallel n$, lines ℓ and m are parallel by the Transitive Property of Parallel Lines (Thm. 3.9).

16. $a \parallel b$; Because $a \perp n$ and $b \perp n$, lines a and b are parallel by the Lines Perpendicular to a Transversal Theorem (Thm. 3.12).

17. $y = -x - 1$ 18. $y = \frac{1}{2}x + 8$ 19. $y = 3x - 6$

20. $y = \frac{1}{3}x - 2$ 21. $y = \frac{1}{2}x - 4$ 22. $y = 2x + 3$

23. $y = -\frac{1}{4}x + 4$ 24. $y = -7x - 2$

25. about 2.1 units 26. about 2.7 units

Chapter 4

Chapter 4 Maintaining Mathematical Proficiency *(p. 171)*

1. reflection 2. rotation 3. dilation

4. translation

5. no; $\frac{12}{14} = \frac{6}{7} \neq \frac{5}{7}$, The sides are not proportional.

6. yes; The corresponding angles are congruent and the corresponding side lengths are proportional.

7. yes; The corresponding angles are congruent and the corresponding side lengths are proportional.

8. no; Squares have four right angles, so the corresponding angles are always congruent. Because all four sides are congruent, the corresponding sides will always be proportional.

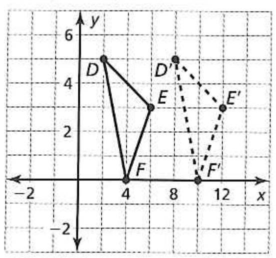
4.1 Vocabulary and Core Concept Check *(p. 178)*

1. $\triangle ABC$ is the preimage, and $\triangle A'B'C'$ is the image.

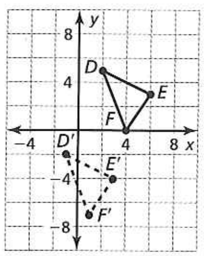
4.1 Monitoring Progress and Modeling with Mathematics *(pp. 178–180)*

3. $\overrightarrow{CD}$, $\langle 7, -3 \rangle$

5.



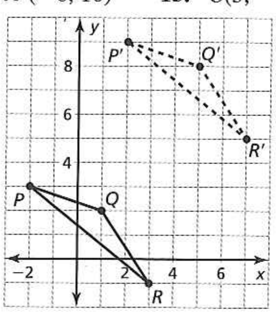
7.



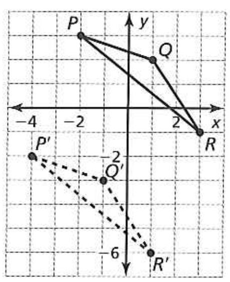
9. $\langle 3, -5 \rangle$ 11. $(x, y) \rightarrow (x - 5, y + 2)$

13. $A'(-6, 10)$ 15. $C(5, -14)$

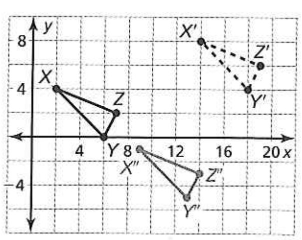
17.



19.

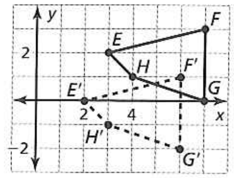


21.



23. translation: $(x, y) \rightarrow (x + 5, y + 1)$, translation: $(x, y) \rightarrow (x - 5, y - 5)$

25. The quadrilateral should have been translated left and down;



27. a. The amoeba moves right 5 and down 4.
b. about 12.8 mm c. about 0.52 mm/sec

29. $r = 100$, $s = 8$, $t = 5$, $w = 54$

31. $E'(-3, -4)$, $F'(-2, -5)$, $G'(0, -1)$

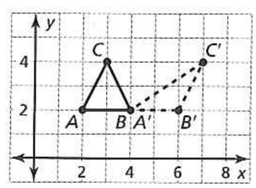
33. $(x, y) \rightarrow (x - m, y - n)$; You must go back the same number of units in the opposite direction.

35. If a rigid motion is used to transform figure A to figure A', then by definition of rigid motion, every part of figure A is congruent to its corresponding part of figure A'. If another rigid motion is used to transform figure A' to figure A'', then by definition of rigid motion, every part of figure A' is congruent to its corresponding part of figure A''. So, by the Transitive Property of Congruence, every part of figure A is congruent to its corresponding part of figure A''. So by definition of rigid motion, the composition of two (or more) rigid motions is a rigid motion.

37. Draw a rectangle. Then draw a translation of the rectangle. Next, connect each vertex of the preimage with the corresponding vertex in the image. Finally, make the hidden lines dashed.

39. yes; According to the definition of translation, the segments connecting corresponding vertices will be congruent and parallel. Also, because a translation is a rigid motion, $\overline{GH} \cong \overline{G'H'}$. So, the resulting figure is a parallelogram.

41. no; Because the value of y changes, you are not adding the same amount to each x-value.



4.1 Maintaining Mathematical Proficiency *(p. 180)*

43. yes 45. no 47. x 49. $6x - 12$

4.2 Vocabulary and Core Concept Check *(p. 186)*

1. translation and reflection

4.2 Monitoring Progress and Modeling with Mathematics *(pp. 186–188)*

3. y-axis 5. neither