

3 Chapter Review

3.1 Pairs of Lines and Angles (pp. 125–130)

Think of each segment in the figure as part of a line.

a. Which line(s) appear perpendicular to \overleftrightarrow{AB} ?

▶ \overleftrightarrow{BD} , \overleftrightarrow{AC} , \overleftrightarrow{BH} , and \overleftrightarrow{AG} appear perpendicular to \overleftrightarrow{AB} .

b. Which line(s) appear parallel to \overleftrightarrow{AB} ?

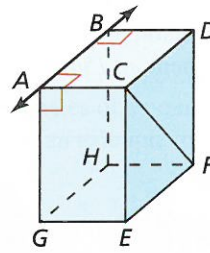
▶ \overleftrightarrow{CD} , \overleftrightarrow{GH} , and \overleftrightarrow{EF} appear parallel to \overleftrightarrow{AB} .

c. Which line(s) appear skew to \overleftrightarrow{AB} ?

▶ \overleftrightarrow{CF} , \overleftrightarrow{CE} , \overleftrightarrow{DF} , \overleftrightarrow{FH} , and \overleftrightarrow{EG} appear skew to \overleftrightarrow{AB} .

d. Which plane(s) appear parallel to plane ABC ?

▶ Plane EFG appears parallel to plane ABC .



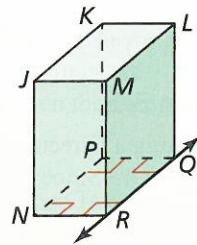
Think of each segment in the figure as part of a line. Which line(s) or plane(s) appear to fit the description?

1. line(s) perpendicular to \overleftrightarrow{QR}

2. line(s) parallel to \overleftrightarrow{QR}

3. line(s) skew to \overleftrightarrow{QR}

4. plane(s) parallel to plane LMQ



3.2 Parallel Lines and Transversals (pp. 131–136)

Find the value of x .

By the Vertical Angles Congruence Theorem (Theorem 2.6), $m\angle 6 = 50^\circ$.

$$(x - 5)^\circ + m\angle 6 = 180^\circ$$

$$(x - 5)^\circ + 50^\circ = 180^\circ$$

$$x + 45 = 180$$

$$x = 135$$

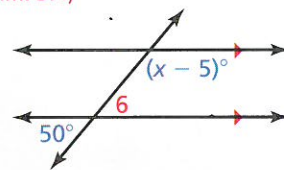
▶ So, the value of x is 135.

Consecutive Interior Angles Theorem (Thm. 3.4)

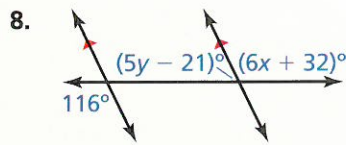
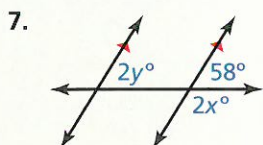
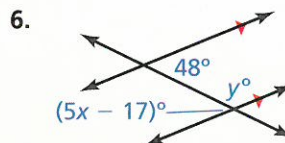
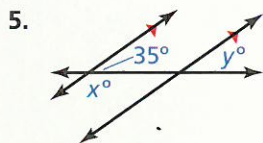
Substitute 50° for $m\angle 6$.

Combine like terms.

Subtract 45 from each side.



Find the values of x and y .

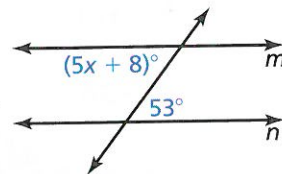


3.3 Proofs with Parallel Lines (pp. 137–144)

Find the value of x that makes $m \parallel n$.

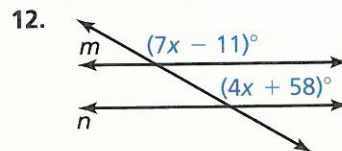
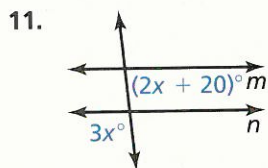
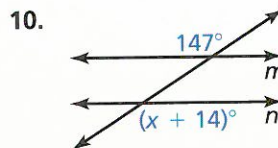
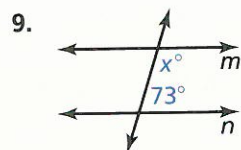
By the Alternate Interior Angles Converse (Theorem 3.6), $m \parallel n$ when the marked angles are congruent.

$$\begin{aligned}(5x + 8)^\circ &= 53^\circ \\ 5x &= 45 \\ x &= 9\end{aligned}$$



► The lines m and n are parallel when $x = 9$.

Find the value of x that makes $m \parallel n$.

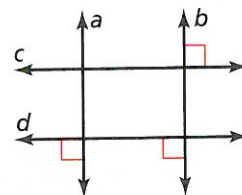


3.4 Proofs with Perpendicular Lines (pp. 147–154)

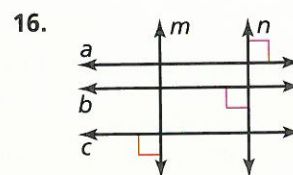
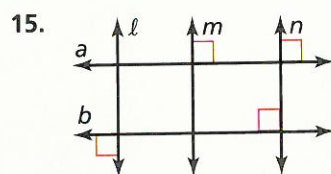
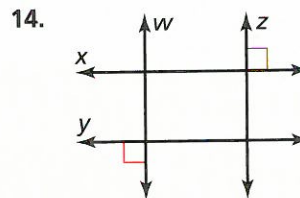
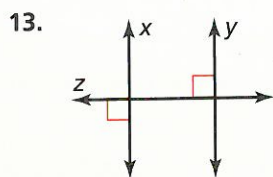
Determine which lines, if any, must be parallel. Explain your reasoning.

Lines a and b are both perpendicular to d , so by the Lines Perpendicular to a Transversal Theorem (Theorem 3.12), $a \parallel b$.

Also, lines c and d are both perpendicular to b , so by the Lines Perpendicular to a Transversal Theorem (Theorem 3.12), $c \parallel d$.



Determine which lines, if any, must be parallel. Explain your reasoning.



3.5 Equations of Parallel and Perpendicular Lines (pp. 155–162)

- a. Write an equation of the line passing through the point $(-2, 4)$ that is parallel to the line $y = 5x - 7$.

Step 1 Find the slope m of the parallel line. The line $y = 5x - 7$ has a slope of 5. By the Slopes of Parallel Lines Theorem (Theorem 3.13), a line parallel to this line also has a slope of 5. So, $m = 5$.

Step 2 Find the y -intercept b by using $m = 5$ and $(x, y) = (-2, 4)$.

$$y = mx + b \quad \text{Use slope-intercept form.}$$

$$4 = 5(-2) + b \quad \text{Substitute for } m, x, \text{ and } y.$$

$$14 = b \quad \text{Solve for } b.$$

► Because $m = 5$ and $b = 14$, an equation of the line is $y = 5x + 14$.

- b. Write an equation of the line passing through the point $(6, 1)$ that is perpendicular to the line $3x + y = 9$.

Step 1 Find the slope m of the perpendicular line. The line $3x + y = 9$, or $y = -3x + 9$, has a slope of -3 . Use the Slopes of Perpendicular Lines Theorem (Theorem 3.14).

$$-3 \cdot m = -1 \quad \text{The product of the slopes of } \perp \text{ lines is } -1.$$

$$m = \frac{1}{3} \quad \text{Divide each side by } -3.$$

Step 2 Find the y -intercept b by using $m = \frac{1}{3}$ and $(x, y) = (6, 1)$.

$$y = mx + b \quad \text{Use slope-intercept form.}$$

$$1 = \frac{1}{3}(6) + b \quad \text{Substitute for } m, x, \text{ and } y.$$

$$-1 = b \quad \text{Solve for } b.$$

► Because $m = \frac{1}{3}$ and $b = -1$, an equation of the line is $y = \frac{1}{3}x - 1$.

Write an equation of the line passing through the given point that is parallel to the given line.

17. $A(3, -4), y = -x + 8$

18. $A(-6, 5), y = \frac{1}{2}x - 7$

19. $A(2, 0), y = 3x - 5$

20. $A(3, -1), y = \frac{1}{3}x + 10$

Write an equation of the line passing through the given point that is perpendicular to the given line.

21. $A(6, -1), y = -2x + 8$

22. $A(0, 3), y = -\frac{1}{2}x - 6$

23. $A(8, 2), y = 4x - 7$

24. $A(-1, 5), y = \frac{1}{7}x + 4$

Find the distance from point A to the given line.

25. $A(2, -1), y = -x + 4$

26. $A(-2, 3), y = \frac{1}{2}x + 1$