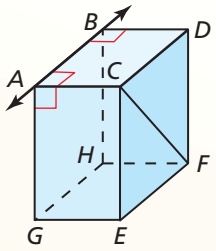
3 Chapter Review

Dynamic Solutions available at *BigIdeasMath.com*

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 $\overleftrightarrow{AB}$.

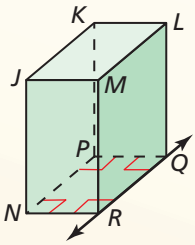
c. Which line(s) appear skew to $\overleftrightarrow{AB}$?

▶ $\overleftrightarrow{CF}$, $\overleftrightarrow{CE}$, $\overleftrightarrow{DF}$, $\overleftrightarrow{FH}$, 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.

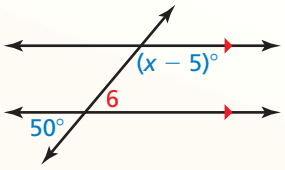
By the Vertical Angles Congruence Theorem (Theorem 2.6), $m\angle 6 = 50°$.

$(x - 5)° + m\angle 6 = 180°$ Consecutive Interior Angles Theorem (Thm. 3.4)

$(x - 5)° + 50° = 180°$ Substitute 50° for $m\angle 6$.

$x + 45 = 180$ Combine like terms.

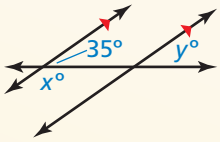
$x = 135$ Subtract 45 from each side.



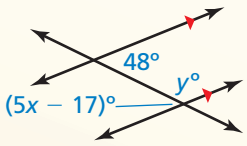
▶ So, the value of x is 135.

Find the values of x and y.

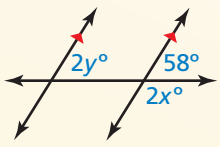
5.



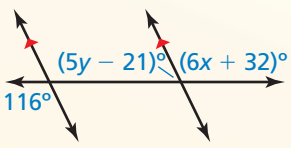
6.



7.

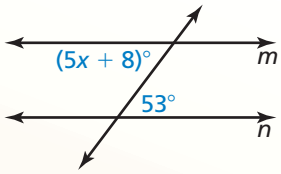


8.



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

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



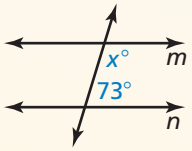
By the Alternate Interior Angles Converse (Theorem 3.6), $m \parallel n$ when the marked angles are congruent.

$$(5x + 8)° = 53°$$
$$5x = 45$$
$$x = 9$$

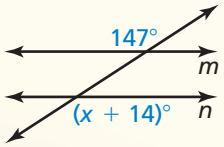
▶ The lines m and n are parallel when $x = 9$.

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

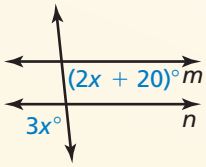
9.



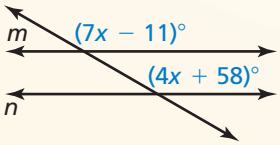
10.



11.

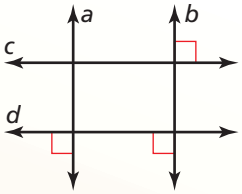


12.



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

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

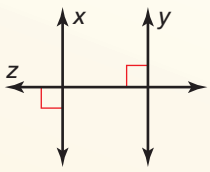


Lines a and b are both perpendicular to d, so by the Lines Perpendicular to a Transversal Theorem (Theorem 3.12), $a \parallel b$.

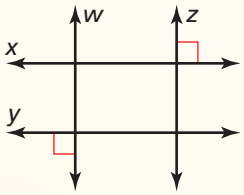
Also, lines c and d are both perpendicular to b, so by the Lines Perpendicular to a Transversal Theorem (Theorem 3.12), $c \parallel d$.

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

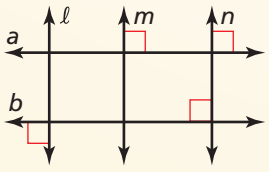
13.



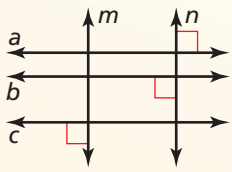
14.



15.



16.



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 $(x, y) = (-2, 4)$.

$y = mx + b$ Use slope-intercept form.

$4 = 5(-2) + b$ Substitute for m, x, and y.

$14 = b$ 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).

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

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

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

$y = mx + b$ Use slope-intercept form.

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

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