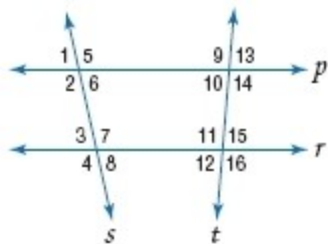**Mid-Chapter Quiz: Lessons 3-1 through 3-3**

Identify the transversal connecting each pair of angles. Then classify the relationship between each pair of angles as *alternate interior, alternate exterior, corresponding,* or *consecutive interior* angles.

1. ∠6 and ∠3

   SOLUTION:

   Angle 1 and angle 3 is a pair of angles connected by the transversal line *s*. Angle 1 and angle 3 are nonadjacent interior angles that lie on opposite sides of the transversal *s*. They are alternate interior angles.

   ANSWER:

   line *s*; alternate interior

2. ∠1 and ∠14

   SOLUTION:

   Angle 1 and angle 14 is a pair of angles connected by the transversal line *p*. Angle 1 and angle 14 are nonadjacent exterior angles that lie on opposite sides of transversal *p*. They are alternate exterior angles.

   ANSWER:

   line *p*; alternate exterior

3. ∠10 and ∠11

   SOLUTION:

   Angle 10 and angle 11 is a pair of angles connected by the transversal line *t*. Angle 10 and angle 11 are interior angles that lie on the same side of transversal *t*. They are consecutive interior angles.

   ANSWER:

   line *t*; consecutive interior
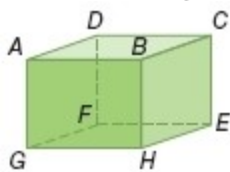
4. ∠5 and ∠7

   SOLUTION:

   Angle 5 and angle 7 is a pair of angles connected by the transversal line *s*. Angle 5 and angle 7 lie on the same side of transversal *s* and on the same side of lines *p* and *r*. They are corresponding angles.

   ANSWER:

   line *s*; corresponding

Mid-Chapter Quiz: Lessons 3-1 through 3-3

Refer to the figure to identify each of the following.

5. a plane parallel to plane *ABCD*

SOLUTION:

The plane *FGHE* is parallel to the plane *ABCD*.

ANSWER:

FGHE

6. a segment skew to $\overline{GH}$ that contains point *D*

SOLUTION:

The segments $\overline{AD}$ and $\overline{DF}$ through *D* are neither parallel to $\overline{GH}$, nor do they intersect $\overline{GH}$. So, they are skew to $\overline{GH}$.

ANSWER:

$\overline{AD}, \overline{DF}$

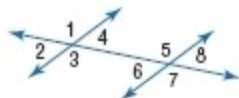7. all segments parallel to $\overline{HE}$

SOLUTION:

The segments $\overline{GF}, \overline{AD},$ and $\overline{BC}$ are parallel to $\overline{HE}$.

ANSWER:

$\overline{GF}, \overline{AD}, \overline{BC}$

8. **MULTIPLE CHOICE** Which term best describes ∠4 and ∠8?

A corresponding
B alternate exterior
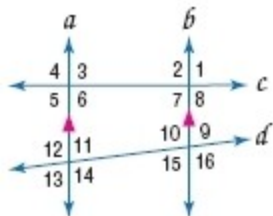**C** alternate interior
D consecutive interior

SOLUTION:

The angles 4 and 8 lie on the same side of the transversal and on the same side of the other two lines. They are corresponding angles. Therefore, the correct choice is A.

ANSWER:

A

In the figure, $m \angle 4 = 104$, $m \angle 14 = 118$. Find the measure of each angle. Tell which postulate(s) or theorem(s) you used.

9. $\angle 2$

SOLUTION:

By the Corresponding Angles Theorem,
$\angle 2 \cong \angle 4$. So, $m \angle 2 = 104$.

ANSWER:

104; $\angle 2 \cong \angle 4$ by Corr. $\angle$ s Thm.

10. $\angle 9$

SOLUTION:

By the Consecutive Interior Angles Theorem, $\angle 14$ and $\angle 15$ are supplementary. So, $m \angle 15 = 180 - 118 = 62$.
By the Vertical Angles Theorem, $\angle 15 \cong \angle 9$.
Therefore, $m \angle 9 = 62$.

ANSWER:

62; $\angle 14$ is supplementary to $\angle 15$ by Cons. Int $\angle$ s Thm. and $\angle 15 \cong \angle 9$ by Vert. $\angle$ s Thm.

11. $\angle 10$

SOLUTION:

By the Alternate Interior Angles Theorem, $\angle 14 \cong \angle 10$. So, $m \angle 10 = 118$.

ANSWER:

118; $\angle 14 \cong \angle 10$ by Alt. Int. $\angle$ s Thm.
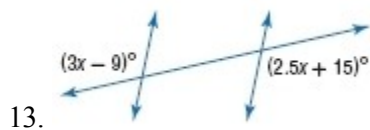
12. $\angle 7$

SOLUTION:

By the Vertical Angles Theorem, $\angle 4 \cong \angle 6$. By the Consecutive Interior Angles Theorem, $\angle 6$ and $\angle 7$ are supplementary. So, $m \angle 7 = 180 - 104 = 76$.

ANSWER:

76; $\angle 4 \cong \angle 6$ by Vert. $\angle$ s Thm. and $\angle 7$ is supplementary to $\angle 6$ by Cons. Int. $\angle$ s Thm.

Find x.

13.

SOLUTION:

In the figure, the given angles are alternate exterior angles.
Alternate Exterior Angles Theorem:
If two parallel lines are cut by a transversal, then each pair of alternate exterior angles is congruent. So,
$$3x - 9 = 2.5x + 15.$$
$$0.5x = 24$$
$$x = 48$$

ANSWER:

48

14. **MODEL TRAINS** Amy is setting up two parallel train tracks so that a third track runs diagonally across the first two. To properly place a switch, she needs the angle between the diagonal and the top right portion of the second track to be twice as large as the angle between the diagonal and bottom right portion of the first track. What is the measure of the angle between the diagonal and the top right portion of the second track?

SOLUTION:

Let x be the angle between the diagonal and bottom of the first track. Then the angle between the diagonal and the top of the second track will be $2x$. By the Consecutive Interior Angles Theorem, $x + 2x = 180$.
$x = 60$. The measure of the angle between the diagonal and the top right portion of the second track is $2x$ or $2(60)$ or 120.

ANSWER:

120

Mid-Chapter Quiz: Lessons 3-1 through 3-3

Determine whether $\overrightarrow{AB}$ and $\overrightarrow{XY}$ are *parallel*, *perpendicular*, or *neither*. Graph each line to verify your answer.

15. $A(2, 0), B(4, -5), X(-3, 3), Y(-5, 8)$

SOLUTION:
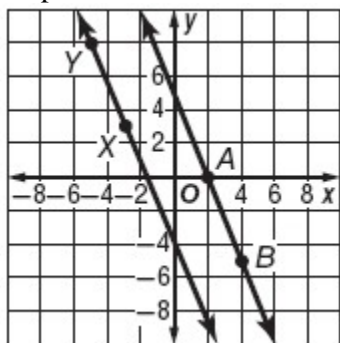
Substitute the coordinates of the points into the slope formula to find the slopes of the lines.

$$m_1 = \frac{y_2 - y_1}{x_2 - x_1} \quad m_2 = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-5 - 0}{4 - 2} \qquad = \frac{8 - 3}{-5 - (-3)}$$

$$= \frac{-5}{2} \qquad = \frac{5}{-2}$$
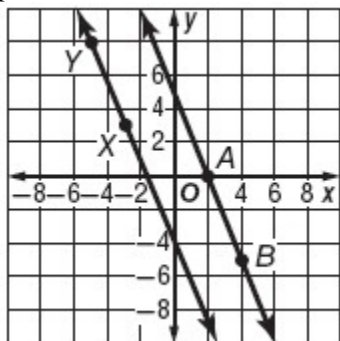
$$= -\frac{5}{2} \qquad = -\frac{5}{2}$$

The two lines have equal slopes, $-\frac{5}{2}$. Therefore, the lines are parallel.

Graph the lines on a coordinate plane to verify the answer.

ANSWER:

parallel

16. $A(1, 1)$, $B(6, -9)$, $X(4, -10)$, $Y(7, -4)$

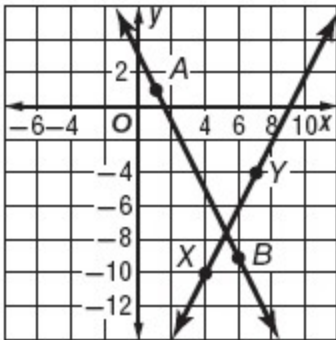   *SOLUTION:*

    Substitute the coordinates of the points in slope formula to find the slopes of the lines.

$$m_1 = \frac{y_2 - y_1}{x_2 - x_1} \quad m_2 = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-9 - 1}{6 - 1} \qquad = \frac{-4 - (-10)}{7 - 4}$$

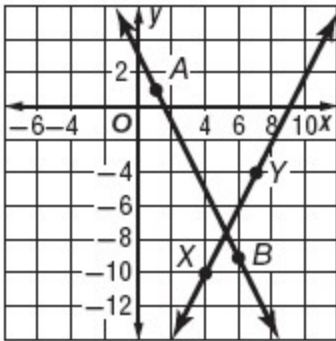$$= \frac{-10}{5} \qquad = \frac{6}{3}$$

$$= -2 \qquad = 2$$

    The two lines do not have equal slopes nor is their product -1. Therefore, the lines are neither parallel nor perpendicular.

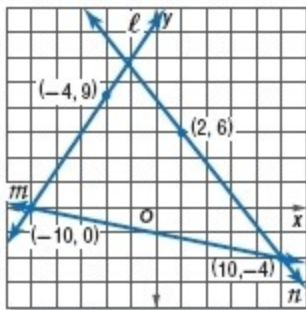   Graph the lines on a coordinate plane to verify the answer.

    ANSWER:

    neither

Find the slope of each line.

17. line ℓ

SOLUTION:

The coordinates of two points on the line ℓ are $(-4, 9)$ and $(-10, 0)$. Substitute the values in the slope formula.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{0 - 9}{-10 - (-4)}$$
$$= \frac{-9}{-6}$$
$$= \frac{3}{2}$$

Therefore, the slope of the line is $\frac{3}{2}$.

ANSWER:

$\frac{3}{2}$

18. a line parallel to *m*

    SOLUTION:
    The slope of a line parallel to *m* is same as that of *m*. The coordinates of two points on the line *m* are (−10, 0) and (10, −4). Substitute the values in the slope formula.

    $$m = \frac{y_2 - y_1}{x_2 - x_1}$$
    $$= \frac{-4 - 0}{10 - (-10)}$$
    $$= \frac{-4}{20}$$
    $$= -\frac{1}{5}$$

    Therefore, the slope of a line parallel to *m* is $-\frac{1}{5}$.

    ANSWER:

    $-\frac{1}{5}$

19. a line perpendicular to *n*

    SOLUTION:
    The product of slopes of the line *n* and a line perpendicular to *n* is −1. The coordinates of two points on the line *n* are (2, 6) and (10, −4). Substitute the values in the slope formula.

    $$m = \frac{y_2 - y_1}{x_2 - x_1}$$
    $$= \frac{-4 - 6}{10 - 2}$$
    $$= \frac{-10}{8}$$
    $$= -\frac{5}{4}$$

    Therefore, the slope of a line perpendicular to *n* is $\frac{4}{5}$.

    ANSWER:

    $\frac{4}{5}$

20. **SALES** The 2008 and 2011 sales figures for Vaughn Electronics are in the table below.

Year	Approximate Sales ($)
2008	240,000
2011	330,000

a. What is the rate of change in approximate sales from 2008 to 2011?

b. If this rate of change continues, predict the approximate sales for the year 2015.

SOLUTION:

a. Use the points (2008, 240000) and (2011, 330000) to find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{330000 - 240000}{2011 - 2008}$$

$$= \frac{90000}{3}$$

$$= 30000$$

The rate of change is approximately $30,000 per year.

b. Substitute $m = 30000$, $x_1 = 2003$, $y_1 = 240000$, and $x_2 = 2010$ in the slope formula.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$30,000 = \frac{y_2 - 240,000}{2015 - 2008}$$

$$(30,000)7 = y_2 - 240,000$$

$$210,000 + 240,000 = y_2$$

$$450,000 = y_2$$

Therefore the approximate sales for the year 2010 will be for $450,000.

ANSWER:

a. $30,000 per year

b. $450,000