

Parallel Lines

- Parallel lines have the same slope.
- Parallel lines never intersect.
- Symbol for parallel \rightarrow //
- Horizontal lines are parallel to each other.
- Vertical lines are parallel to each other.

Perpendicular Lines

- Perpendicular lines have opposite reciprocal slopes.
- Perpendicular lines intersect at right angles.
- Symbol for perpendicular \rightarrow \perp
- Horizontal and vertical lines are always perpendicular to each other.

Decide whether the following lines are parallel, perpendicular, or neither.

1. Line p contains points (-3, -1) & (-5, -2)
Line b contains points (-4, -1) & (12, -9)

Line p: $m = \frac{-2 - (-1)}{-5 - (-3)} = \frac{-1}{-2} = \frac{1}{2}$

Line b: $m = \frac{-9 - (-1)}{12 - (-4)} = \frac{-8}{16} = -\frac{1}{2}$ $m_{\text{line p}} = \frac{1}{2}$

$m_{\text{line b}} = -\frac{1}{2}$

Line J \rightarrow $3x + y = 11 \quad y = -3x + 11 \quad m = -3$
Line S \rightarrow $2x - 6y = -18 \quad -6y = -2x - 18 \quad \frac{-6y}{-6} = \frac{-2x - 18}{-6}$
 $y = \frac{1}{3}x + 3$

$m_{\text{line j}} = -3$

$m_{\text{line s}} = \frac{1}{3}$

Circle: **PARALLEL** **PERPENDICULAR** **NEITHER**

Circle: **PARALLEL** **PERPENDICULAR** **NEITHER**

Find the slope of a line parallel and perpendicular to the given line.

3. $y = 6$ horizontal line

$m_{\parallel} = 0$

$m_{\perp} = \text{undefined}$

4. $3y = \frac{2x}{3} - \frac{24}{3}$

$y = \frac{2}{3}x - 8$

$m_{\parallel} = \frac{2}{3}$

$m_{\perp} = -\frac{3}{2}$

Write the slope-intercept equation for a line **PARALLEL** to the given line and contains the given point.

5. $y = 3x - 4 \quad m = 3$
Contains the point (-3, 8)

$8 = 3(-3) + b$

$8 = -9 + b$
 $+9 \quad +9$

$17 = b$

$y = 3x + 17$

6. $y = -\frac{1}{2}x + 8 \quad m = -\frac{1}{2}$
Contains the point (4, -6)

$-6 = -\frac{1}{2}(4) + b$

$-6 = -2 + b$
 $+2 \quad +2$

$-4 = b$

$y = -\frac{1}{2}x - 4$

Write the slope-intercept equation for a line **PERPENDICULAR** to the given line and contains the point.

7. $y = -\frac{1}{5}x + 6 \quad m = -\frac{1}{5} \quad \perp m = 5$
Contains the point (4, 8)

$8 = 5(4) + b$

$8 = 20 + b$
 $-20 \quad -20$

$-12 = b$

$y = 5x - 12$

8. $y = 2x - 5 \quad m = 2 \quad \perp m = -\frac{1}{2}$
Contains the point (-8, 2)

$2 = -\frac{1}{2}(-8) + b$

$2 = 4 + b$
 $-4 \quad -4$

$-2 = b$

$y = -\frac{1}{2}x - 2$