

1. How can you determine if lines are parallel?

Perpendicular?

↳ Same slope

↳ Opposite reciprocal slopes

2. Given the equation,  $y=2x-6$ ,  <sup>$m=2$</sup>  decide if the following equations are parallel, perpendicular, the same, or neither.

Get each in the form of  $y=mx+b$

a)  $2y-4x=12$

$$\begin{aligned} &+4x \quad +4x \\ 2y &= 4x+12 \\ y &= 2x+6 \\ m &= 2 \quad \text{same slope} \\ & \quad \text{parallel} \end{aligned}$$

b)  $2y=-(x-9)$

$$\begin{aligned} 2y &= -x+9 \\ \frac{2y}{2} &= \frac{-x+9}{2} \\ y &= -\frac{1}{2}x+4.5 \\ m &= -\frac{1}{2} \quad \text{opp. rec. slope} \\ & \quad \text{perpendicular} \end{aligned}$$

c)  $4y=2x+8$

$$\begin{aligned} \frac{4y}{4} &= \frac{2x+8}{4} \\ y &= \frac{1}{2}x+2 \\ m &= \frac{1}{2} \\ & \quad \text{reciprocal slope} \\ & \quad \text{neither.} \end{aligned}$$

## Answers

## In Class Activity

<b>Parallel</b> This pocket should contain the following cards-	<b>Perpendicular</b> This pocket should contain the following cards-	<b>Same Line</b> This pocket should contain the following cards-	<b>Neither</b> This pocket should contain the following cards-
1, 8, 11, 13, 18, 19, 20 21, 25, 33, 38, 40	4, 10, 12, 14, 15 24, 23, 26, 29, 30	6, 9 22	2, 3, 5, 7, 16, 17 27, 28, 32, 31, 35, 34, 36, 39

NEW Problem type.

Ex. Write an equation that is perpendicular to  $\frac{5}{6}x+2-y=0$ , that passes through point (5, -1).

Original Slope

$$\frac{5}{6}x+2-y=0$$

$$\frac{5}{6}x+2=y$$

$$m = \frac{5}{6}$$

New line

$$m = -\frac{6}{5} \quad \text{point } (x_1, y_1) = (5, -1)$$

Use point slope formula

$$y-y_1 = m(x-x_1)$$

$$y-(-1) = -\frac{6}{5}(x-5)$$

$$y+1 = -\frac{6}{5}x+6$$

$$\boxed{y = -\frac{6}{5}x+5}$$

This line is perp. to the original and goes through (5, -1)

Ex. Write the equation of a line that goes through (2,4) and is parallel to  $4y - 44 = x$

Original slope

$$4y - 44 = x$$

$$\begin{array}{r} +44 \\ +44 \end{array}$$

$$\frac{4y}{4} = \frac{x+44}{4}$$

$$y = \frac{1}{4}x + 11$$

$$m = \frac{1}{4}$$

New line  $(x_1, y_1)$

$$m = \frac{1}{4} \text{ point } (2, 4)$$

$$y - y_1 = m(x - x_1)$$

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

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

$$\begin{array}{r} +4 \\ +4 \end{array}$$

$y = \frac{1}{4}x + 3.5$

This line is parallel to the original line and goes through (2,4)

You try!

Parallel and Perpendicular Lines

Write an equation that is parallel to  $y = \frac{2}{3}x - 8$ , that passes through point (6, 5).

Original line

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

$$m = \frac{2}{3}$$

New line  $(x_1, y_1)$

$$m = \frac{2}{3} \text{ point } (6, 5)$$

$$y - y_1 = m(x - x_1)$$

$$y - 5 = \frac{2}{3}(x - 6)$$

$$y - 5 = \frac{2}{3}x - 4$$

$$\begin{array}{r} +5 \\ +5 \end{array}$$

$y = \frac{2}{3}x + 1$

This line is parallel to the original and goes through (6,5)

Practice problems

3, 5, 9, and 11

Parallel

3)  $x + y = 2$ , through point (2,1)

Perpendicular

5)  $y = 2x + 1$ , through point (4,6)

Refer to practice sheet answer key

9) Write an equation for a line parallel to a line with the points. (-14, -16), (2, -20)

11. Write the equation for a line parallel to line  $y - 4x = 7$  that goes through point (2,1)

## Sticky note check

Find the equation of a line that is <sup>opp. rec. slope</sup> perpendicular to  $\frac{1}{2}x + y = 14$  and passes through  $(4,5)$ .

Original line

$$\frac{1}{2}x + y = 14$$
$$-\frac{1}{2}x \quad -\frac{1}{2}x$$
$$y = -\frac{1}{2}x + 14$$
$$m = -\frac{1}{2}$$

New Line  $(x_1, y_1)$

$$m = 2 \quad \text{point } (4,5)$$

$$y - y_1 = m(x - x_1)$$

$$y - 5 = 2(x - 4)$$

$$y - 5 = 2x - 8$$
$$+5 \quad +5$$

$$y = 2x - 3$$

This line is perpendicular to the original line and goes through  $(4,5)$

## Sticky note check

Find the equation of a line that is <sup>Same Slope</sup> parallel to  $2x + 3y - 6 = 0$  and passes through  $(6,4)$

Original slope

$$2x + 3y - 6 = 0$$
$$-3y \quad -3y$$
$$\frac{2x - 6}{-3} = \frac{-3y}{-3}$$
$$-\frac{2}{3} + 2 = y$$
$$m = -\frac{2}{3}$$

New line  $(x_1, y_1)$

$$m = -\frac{2}{3} \quad \text{point } (6,4)$$

$$y - y_1 = m(x - x_1)$$

$$y - 4 = -\frac{2}{3}(x - 6)$$

$$y - 4 = -\frac{2}{3}x + 4$$
$$+4 \quad +4$$

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

This line is parallel to the original and passes through  $(6,4)$

