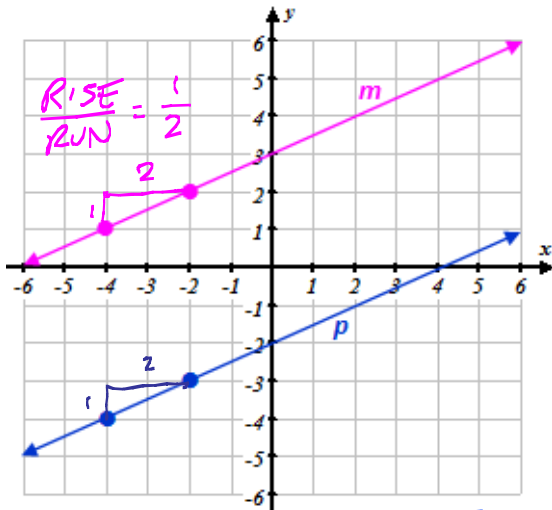


1. Describe each pair of lines and determine their slopes.

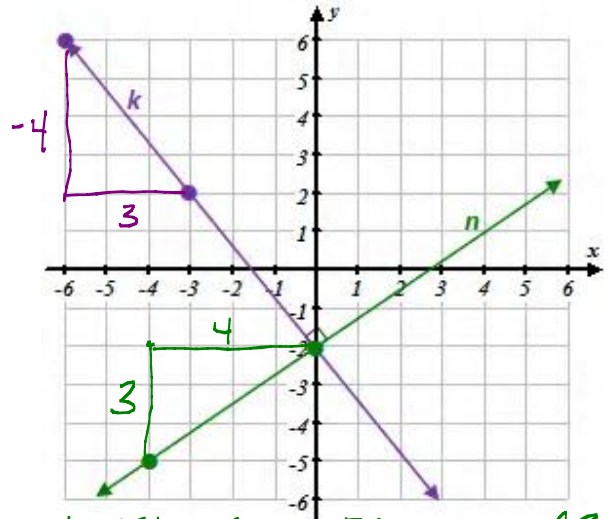


LINES ARE PARALLEL

$m \parallel p$

SLOPE (M) = $\frac{1}{2}$ SLOPE (P) = $\frac{1}{2}$

PARALLEL LINES HAVE THE SAME SLOPE



LINES ARE PERPENDICULAR

$k \perp n$

SLOPE (K) = $-\frac{4}{3}$ SLOPE (N) = $\frac{3}{4}$

PERPENDICULAR LINES HAVE SLOPES THAT ARE NEGATIVE RECIPROCALS OF EACH OTHER.

2. Describe each pair of lines as **Parallel**, **Perpendicular**, **Same**, or **None of These**.

a. $y = 2x + 3$ $M = \frac{2}{1}$
 $y = -\frac{1}{2}x - 1$ $M = -\frac{1}{2}$

b. $y = 3x - 2$ $M = 3$
 $y = 3x + 1$ $M = 3$

c. $y = \frac{2}{3}x + 6$ $M = \frac{2}{3}$
 $y = -\frac{2}{3}x - 3$ $M = -\frac{2}{3}$

Circle One of the Choices
Parallel **Perpendicular**
Same **None of These**

Circle One of the Choices
Parallel **Perpendicular**
Same **None of These**

Circle One of the Choices
Parallel **Perpendicular**
Same **None of These**

d. $2x - 6y = 4$
 $-3x + 9y = -6$

$$\begin{array}{r} 2x - 6y = 4 \\ -2x = -4 \\ \hline -6y = -2x + 4 \\ = + \\ = + \\ \hline -6y = -2x + 4 \\ = + \\ \hline y = \frac{1}{3}x - \frac{2}{3} \\ M = \frac{1}{3} \end{array}$$

$$\begin{array}{r} -3x + 9y = -6 \\ +3x = +6 \\ \hline 9y = 3x - 6 \\ = - \\ = - \\ \hline 9y = 3x - 6 \\ = - \\ \hline y = \frac{1}{3}x - \frac{2}{3} \\ M = \frac{1}{3} \end{array}$$

Circle One of the Choices
Parallel **Perpendicular**
Same **None of These**

e. $-3x = 3y + 6$
 $4x + 4y = 2$

$$\begin{array}{r} -3x = 3y + 6 \\ -6 = -6 \\ \hline -3x - 6 = 3y \\ = \\ = \\ \hline -3x - 6 = 3y \\ = \\ \hline -x - 2 = y \\ M = -1 \end{array}$$

$$\begin{array}{r} 4x + 4y = 2 \\ -4x = -4x \\ \hline 4y = -4x + 2 \\ = + \\ = + \\ \hline 4y = -4x + 2 \\ = + \\ \hline y = -x + \frac{1}{2} \\ M = -1 \end{array}$$

Circle One of the Choices
Parallel **Perpendicular**
Same **None of These**

f. $-6y = -3x + 6$
 $4x + 2y = -6$

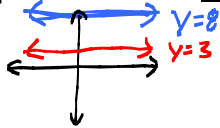
$$\begin{array}{r} -6y = -3x + 6 \\ -6 = -6 \\ \hline -6y = -3x + 6 \\ = + \\ = + \\ \hline -6y = -3x + 6 \\ = + \\ \hline y = \frac{1}{2}x - 1 \\ M = \frac{1}{2} \end{array}$$

$$\begin{array}{r} 4x + 2y = -6 \\ -4x = -4x \\ \hline 2y = -4x - 6 \\ = - \\ = - \\ \hline 2y = -4x - 6 \\ = - \\ \hline y = -2x - 3 \\ M = -\frac{2}{1} \end{array}$$

Circle One of the Choices
Parallel **Perpendicular**
Same **None of These**

3. Describe each pair of lines as **Parallel**, **Perpendicular**, **Same**, or **None of These**.

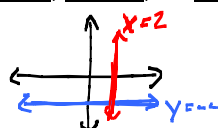
a. $y = 3$
 $y = 8$



Circle One of the Choices

Parallel Perpendicular
Same None of These

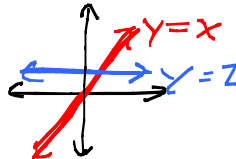
b. $x = 2$
 $y = -4$



Circle One of the Choices

Parallel **Perpendicular**
Same None of These

c. $y = x$
 $y = 2$



Circle One of the Choices

Parallel Perpendicular
Same **None of These**

4. Find the equation of a line in slope intercept form given the following conditions:

- a. Find the equation of a line that is **parallel** to $y = \frac{3}{2}x + 1$ and passes through the point $(-2, 1)$.

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

$$y = mx + b$$

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

TEMPORARILY PLUG IN $(-2, 1)$

$$(1) = \frac{3}{2}(-2) + b$$

$$1 = -3 + b$$

$$\begin{array}{r} +3 \\ 1 = -3 + b \\ \hline 4 = b \end{array}$$

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

- b. Find the equation of a line that is **parallel** to $x = 2y - 4$ and passes through the point $(4, 2)$.

$\begin{array}{r} +4 \\ x+4 = 2y \\ \hline \end{array}$ $\begin{array}{r} +4 \\ x+4 = 2y \\ \hline \end{array}$

$$\frac{x+4}{2} = \frac{2y}{2}$$

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

$\uparrow$
 $m = \frac{1}{2}$
 $\parallel m = \frac{1}{2}$

$$y = mx + b$$

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

TEMPORARILY PLUG IN $(4, 2)$

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

$$2 = 2 + b$$

$$\begin{array}{r} -2 \\ 2 = 2 + b \\ \hline 0 = b \end{array}$$

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

- c. Find the equation of a line that is **perpendicular** to $y = \frac{1}{3}x - 2$ & passes through the point $(3, 2)$.

$m = \frac{1}{3}$
 $\perp m = -\frac{3}{1}$

$$y = mx + b$$

$$y = -3x + b$$

TEMPORARILY PLUG IN $(3, 2)$

$$(2) = -3(3) + b$$

$$2 = -9 + b$$

$$\begin{array}{r} +9 \\ 2 = -9 + b \\ \hline 11 = b \end{array}$$

$$y = -3x + 11$$

- d. Find the equation of a line that has a y-intercept of 2 and it is **perpendicular** to a line that passes through the points $(2, 5)$ and $(-1, 4)$.

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

$$m = \frac{4 - 5}{-1 - 2} = \frac{-1}{-3} = \frac{1}{3}$$

$\perp m = -\frac{3}{1}$

$$y = mx + b$$

$$y = -3x + 2$$

- e. Find the equation of a line that is **parallel** to the line m graphed & passes through the point $(3, 1)$.

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

$$y = mx + b$$

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

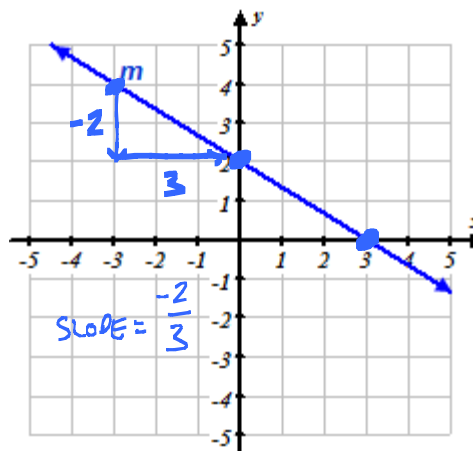
TEMPORARILY PLUG IN $(3, 1)$

$$(1) = -\frac{2}{3}(3) + b$$

$$1 = -2 + b$$

$$\begin{array}{r} +2 \\ 1 = -2 + b \\ \hline 3 = b \end{array}$$

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



- f. Find the equation of a line that is **perpendicular** to the line m graphed & passes through the point $(6, 2)$.

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

$$y = mx + b$$

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

TEMPORARILY PLUG IN $(6, 2)$

$$(2) = \frac{3}{2}(6) + b$$

$$2 = 9 + b$$

$$\begin{array}{r} -9 \\ 2 = 9 + b \\ \hline -7 = b \end{array}$$

$$y = \frac{3}{2}x - 7$$

5. Given **line r** passes through **(2, -3)** and **(2, 8)**. Another line, **line t** passes through the points **(6, 1)** and **(9, 1)**. Can the lines be described as Parallel, Perpendicular, Same, or None of These?

$$\text{line r: } M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - (-3)}{2 - 2} = \frac{11}{0} \quad \text{UNDEFINED}$$

↑
VERTICAL

$$\text{line t } M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 1}{9 - 6} = \frac{0}{3} = 0$$

← HORIZONTAL

LINES ARE PERPENDICULAR

6. Given **line s** passes through **(-1, 5)** and **(2, 6)**. Another line, **line q** passes through the points **(3, 1)** and **(9, 3)**. Can the lines be described as Parallel, Perpendicular, Same, or None of These?

$$\text{line s: } M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 5}{2 - (-1)} = \frac{1}{3}$$

$$\text{line q: } M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 1}{9 - 3} = \frac{2}{6} = \frac{1}{3}$$

←
SAME
SLOPE

LINES ARE PARALLEL

7. Given line **p** passes through **(2, 4)** and **(5, 6)**. Another line **q** is perpendicular to line **p** and passes through the point **(3, 1)**. Find another lattice point that also lies on line **q**. (Consider a lattice point to be a point that has integer coordinates).

$$\text{line p: } M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 4}{5 - 2} = \frac{2}{3}$$

$$\text{line q: } -\frac{3}{2}$$

$$-\frac{3}{2} = \frac{1 - y_1}{3 - x_1}$$

$$\begin{array}{r} -3 = 1 - y_1 \\ -4 = -y_1 \\ \hline -4 = -y_1 \\ -1 = -1 \\ \hline 4 = y_1 \end{array}$$

$$\begin{array}{r} 2 = 3 - x_1 \\ -3 = -3 \\ \hline \end{array}$$

$$\begin{array}{r} -1 = -x_1 \\ -1 = -1 \\ \hline 1 = x_1 \end{array}$$

(1, 4)