

Are these lines parallel?

$$y = 2x - 6$$

$$y = 2x + \frac{4}{5}$$

Are these parallel?

$$y = 3x + 4$$

$$-3x + \frac{1}{2}y = 12$$

Given an equation of a line. Write the equation of a new line parallel to the first line.

Example: Write the equation of a line that contains (2, -6) and is parallel to $y = 3x + 9$?

The question asks you to write a new equation that has (2,-6).

1) Take the slope from the first equation. It becomes the slope of the new equation. $m = 3$. That's all you need from the first equation. Ignore it for everything else.

$$m = 3$$

2) Write the new equation in point slope form by using the slope from Step 1 and the given point:

$$y - -6 = 3(x - 2)$$

$y + 6 = 3(x - 2)$ Stop here for point slope form. Point slope does not distribute the 3. You only distribute if they ask for slope intercept form.

Convert to slope intercept form:

$$y + 6 = 3(x - 2)$$

$$y + 6 = 3x - 6$$

Distributive property

$$y + 6 - 6 = 3x - 6 - 6$$

$$y = 3x - 12$$

*Get y by itself:
 $y = mx + b$*

Write the equation of a new line that contains $(4, -5)$ and is parallel to $y = \frac{1}{2}x + 8$.

Ⓐ Write in point slope form
Ⓑ Convert it to slope intercept form.

Given: $m = \frac{1}{2}x$

$(4, -5)$
 x, y

$$y + 5 = \frac{1}{2}(x - 4)$$

$$y + 5 = \frac{1}{2}(x - 4)$$

$$y = \frac{1}{2}x - 7$$

$$Y = \frac{1}{2}X - 7$$

convert to
standard form
 $Ax + By = C$

$$2y = x - 14$$

$$-x + 2y = 14$$

$$-1(-x + 2y = 14)$$

$$|x - 2y = -14|$$

*Ax has to be
positive

Write the equation of a new line that contains $(3, -2)$ and is parallel to $y = 2x - 4$

- Ⓐ Convert to point slope form.
- Ⓑ Convert it to slope intercept form.

New line

5.6 - PERPENDICULAR LINES:

Two lines are perpendicular if their slopes are **NEGATIVE RECIPROCAL**S.

Negative reciprocal – Flip the value of the given slope and reverse the sign.
If you multiply the two slopes it = -1.

Slope = 2. The negative reciprocal is -1/2

2

$$\frac{4}{1} \quad -\frac{1}{4}$$

m = 3 The negative reciprocal is -4/3

4

3

Are these lines perpendicular

@ $y = 4x - 1$ $m = 4$

$y = -\frac{1}{4}x + 3$ $m = -\frac{1}{4}$

Perpendicular

Write the negative reciprocal to find the slope of the line perpendicular to the given line

$$y = 3x - 2 \quad m = 3$$

Perpendicular: Flip 3 and change the sign = $\left(-\frac{1}{3}\right)$

Example: Write the equation of a line that contains (4, 2) and is perpendicular to :

$$m = -\frac{1}{3} \quad Y = -\frac{1}{3}X + 2$$

perpendicular = $\frac{3}{1}$

1) Write the negative reciprocal for the slope from the first equation. It becomes the slope of the new equation.

$$(4, 2) \quad m = \frac{3}{1}$$

That's all you need from the first equation. Ignore everything else.

2) Write the new equation by using the slope from Step 1 and the given point:

$y - 2 = 3(x - 4)$ Stop here for point slope form. Point slope does not distribute the 3. You only distribute if they ask for slope intercept form.

Convert it to slope intercept form:

Write the equation of a new line that contains $(4, -5)$ and is perpendicular to $y = \frac{1}{2}x + 8$.

ⓐ Write in point slope form

ⓑ Convert it to slope intercept form.

Old] ~~$y = \frac{1}{2}x + 8$~~ ~~$m = \frac{1}{2}$~~

New $(4, -5)$

perpendicular

$y + 5 = -\frac{2}{1}(x - 4)$ point slope form

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

$y = -2x + 3$