

Pre-Test Seperate sheet of paper.

Parallel and
Perpendicular Lines

Write an equation for a line with the slope of $1/2$.

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

What would the slope of a line parallel to $y - 1/4x = 10$ be?

Learned in Lesson

Write an equation for a line that would be perpendicular to a line with equation $y = 2x + 1$.

Learned in Lesson

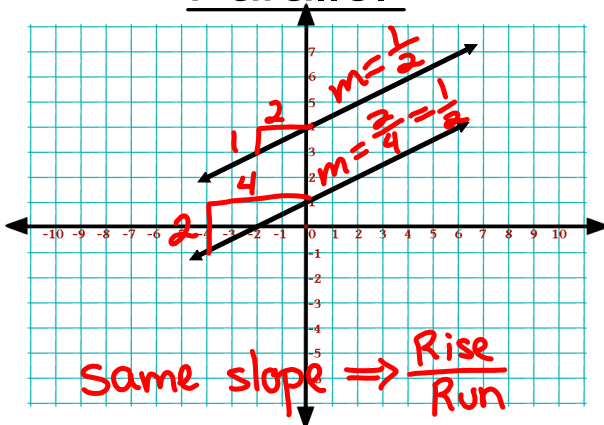
Goals For today:

GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

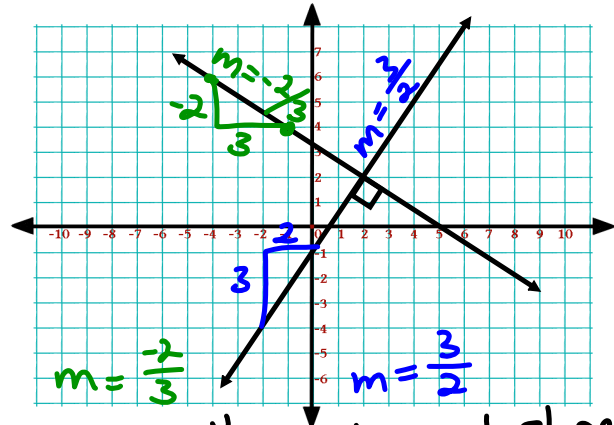
← Important piece

Determining Parallel and Perpendicular Parallel and Perpendicular Lines

Parallel



Perpendicular



Remember:
slope = $\frac{\text{Rise}}{\text{Run}}$

Identify slope of the following lines and give two new equations
One parallel and one perpendicular.

1. $y = 3x + 5$

original
 $m = 3$

parallel
 $m = 3$
 $y = 3x$

perp.
 $m = -\frac{1}{3}$
 $y = -\frac{1}{3}x$

2. $y = \frac{1}{4}(x + 8)$

original
 $y = \frac{1}{4}x + 2$
 $m = \frac{1}{4}$

parallel
 $m = \frac{1}{4}$
 $y = \frac{1}{4}x$

perp.
 $m = -4$
 $y = 4x$

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

original
 $y + 2 = 6x - 12$
 $y = 6x - 14$
 $m = 6$

parallel
 $m = 6$
 $y = 6x$

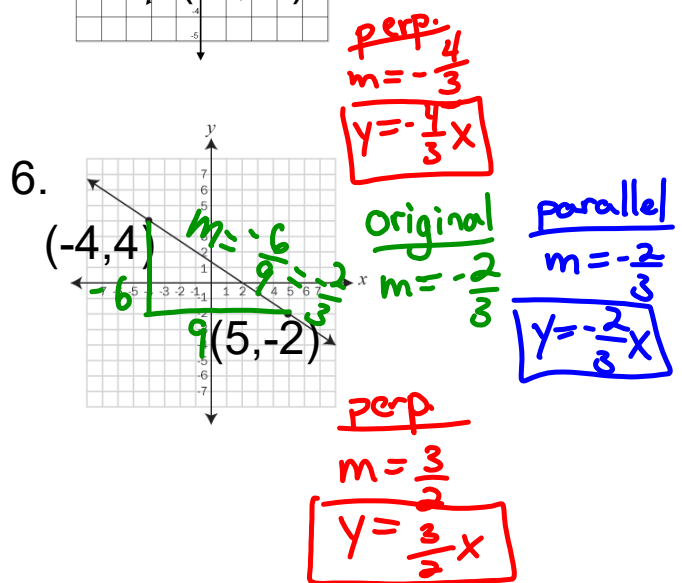
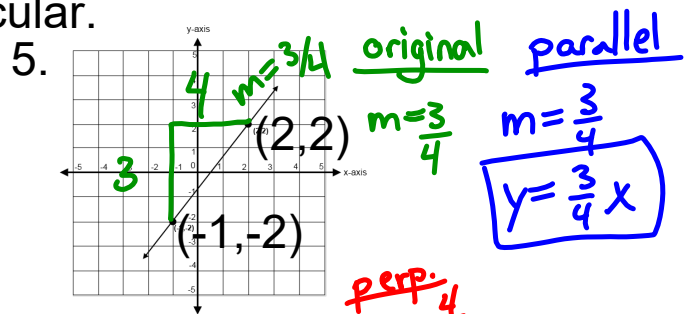
perp.
 $m = -\frac{1}{6}$
 $y = -\frac{1}{6}x$

4. $3y = 9x + 15$

original
 $y = 3x + 5$
 $m = 3$

parallel
 $m = 3$
 $y = 3x$

perp.
 $m = -\frac{1}{3}$
 $y = -\frac{1}{3}x$



NEW Problem type. Parallel and Perpendicular Lines

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

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

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

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

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

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

* Use point-slope formula to write equation

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

Ex. Write the equation of a line that goes through (2,4) and is parallel to $y = \frac{1}{4}x + 11$

original

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

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

parallel

$$m = \frac{1}{4} \quad (x_1, y_1) = (2, 4)$$

* Use point slope

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

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

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

Parallel and Perpendicular Lines

Can you do it on your own?

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

Original

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

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

parallel

$$m = \frac{2}{3} \quad (x_1, y_1) = (6, 5)$$

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

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

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

Review Pre-test

What would the slope of a line ^{Same} parallel to $y - \frac{1}{4}x = 10$ be?

original
 $y - \frac{1}{4}x = 10$

$y = \frac{1}{4}x + 10 \Rightarrow m = \frac{1}{4}$

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

Write an equation for a line that would be perpendicular ^{opp. rec.} to a line with equation $y = 2x + 1$.

original
 $y = 2x + 1$
 $m = 2$

perp.
 $m = -\frac{1}{2}$
 $y = -\frac{1}{2}x$