Warm up

Write an equation given the following info:

1. $m = \frac{2}{3}$ (-9, -1)

2. (-2, -1) (-2, 3)

3. (-2, 6) (2, 8)

4. m = 0 (3, 4)

PARALLEL LINES

- **Graphs:** Lines Never Intersect and are in the same plane (coplanar)

- **Equations:**

  Same Slopes

  Different y-intercepts

PERPENDICULAR LINES

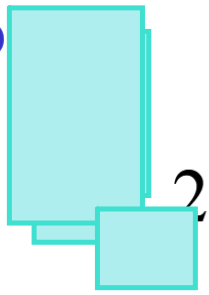
- **Graphs: Lines Intersect at right angles (90° angles)**

- **Equations:** * Important

  Opposite (negative) Reciprocal Slopes

  With the same or different y-int

Find the Opposite (negative) Reciprocal Slop



Change Sign flip fraction

1. $-\frac{2}{3}$ $\frac{3}{2}$

2. $\frac{11}{12}$ $-\frac{12}{11}$

Change sign flip fraction

3. $\frac{7}{1}$ $-\frac{1}{7}$ $= \frac{-1}{7}$

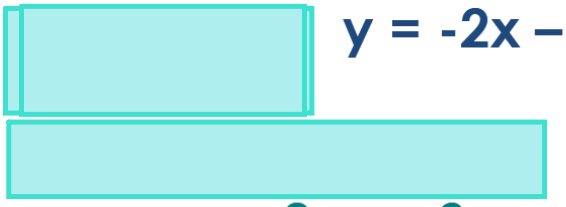
4. $-\frac{1}{9}$ 9

Are these lines parallel, perpendicular, or neither?

1. $y = -2x + 1$

   $y = -2x - 4$

   parallel



2. $y = 3x - 4$

   $y = -3x + 1$

   neither

3. $y = 1/5\ x + 2$

   $y = -5x + 6$

   perpendicular

Are these lines parallel, perpendicular, or neither?

4. $y = -2x + 1$

$y = -1/2x - 4$

neither

5. $y = 3x - 4$

$y = 1 + 3x$

$y = 3x + 1$

parallel

6. $y = 5/6\ x + 2$

$y = -6/5\ x + 6$

perpendicular

How to Write an Equation of a Line PARALLEL to another and given a point

1. Given equation should be solved for y ($y = mx + b$)
2. Write down the slope of that line
3. Substitute m and (x, y) in $y = mx + b$.
4. Solve for b.
5. Write the equation using m and b.

same slope

Write a line parallel to the line 2x + y = 3 and passes through the point (-2, 5).

x y

Original

$2x + y = 3$

$-2x \quad -2x$

$y = -2x + 3$

$m = -2$

same

$m = -2$

$y = mx + b$

$5 = -2(-2) + b$

$5 = 4 + b$

$-4 \quad -4$

$1 = b$

new

$y = mx + b$

$y = -2x + 1$

$y = -2x + 1$

Write a line parallel to the line y = 3x – 5 and passes through the point (-5, -2).

$y = mx + b$

Original
$y = 3x - 5$
$m = 3$

same
$m = 3$

$y = mx + b$
$-2 = 3(-5) + b$
$-2 = -15 + b$
$+15 \quad +15$
$13 = b$

$y = 3x + 13$

$y = 3x + 13$

Write a line parallel to the line $y = -4x + 1$ and passes through the point (2, -1).

Write a line parallel to the line $y = -x - 7$ and passes through the point (-4, -4).

How to Write an Equation of a Line PERPENDICULAR to another and given a point

1. Given equation should be solved for y ($y = mx + b$)
2. Write down the OPPOSITE RECIPROCAL slope of that line
3. Substitute m and (x, y) in $y = mx + b$.
4. Solve for b.
5. Write the equation using m and b.

change sign
flip fraction

Write a line perpendicular to the line y = ½ x – 2 and passes through the point (1, 0).

x y

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

$m = \frac{-2}{1} = -2$

$y = mx + b$
$0 = -2(1) + b$
$0 = -2 + b$
$+2 \quad +2$
$2 = b$

$y = mx + b$
$-2 \quad 2$

$y = -2x + 2$

$y = -2x + 2$

Write a line perpendicular to the line y = -3x + 2 and passes through the point (6, 5). Leave the equation in standard form.

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

Write a line perpendicular to the line 2x + 3y = 9 and passes through the point (6, -1).

$2x + 3y = 9$

$-2x \quad -2x$

$\frac{3y}{3} = \frac{-2}{3}x + \frac{9}{3}$

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

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

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

Write a line perpendicular to the line y = 2x – 1 and passes through the point (2, 4).

Write a line perpendicular to the line $y = -\frac{1}{3}x + 2$ and passes through the point (5, 1).