

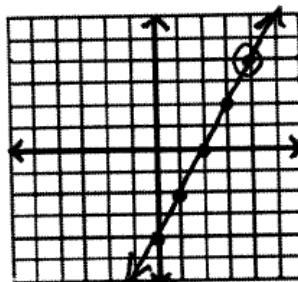
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$$y - y_1 = m(x - x_1)$$

1. $m = 2$; and $(4, 4)$

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

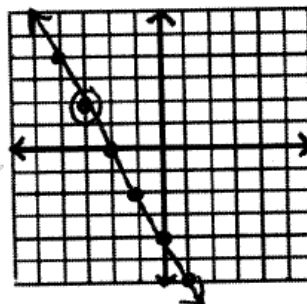
$$\begin{array}{r} y - 4 \quad + \quad 2x - 8 \\ \hline y = 2x - 4 \end{array}$$



5. $m = -2$; and $(-3, 2)$

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

$$\begin{array}{r} y - 2 \quad + \quad -2x - 6 \\ \hline y = -2x - 4 \end{array}$$

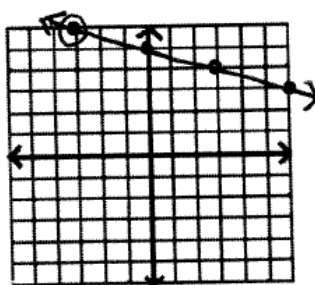


7. $m = -\frac{1}{3}$; and $(-3, 6)$

$$y - 6 = -\frac{1}{3}(x - -3)$$

$$y - 6 = -\frac{1}{3}(x + 3)$$

$$\begin{array}{r} y - 6 = -\frac{1}{3}x - 1 \\ \hline y = -\frac{1}{3}x + 5 \end{array}$$



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Example 2: Using Two Points to Write an Equation (finding the slope first)

Write an equation in point-slope form that passes through the points (6, -4) and (-3, 5). Then change the equation to slope-intercept form ($y=mx+b$).

Step 1: Find the slope using the formula.

Step 2: Choose **ONE** point to be (x_1, y_1) .

Step 3: Substitute.

Step 4: Solve for y.

$$m = -1 \quad (6, -4)$$

$$y - -4 = -1(x - 6)$$

$$y + 4 = -1x + 6$$

$$y = -1x + 2$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-4)}{-3 - 6} = \frac{9}{-9} = -1$$

$$m = -1 \quad (-3, 5)$$

$$y - 5 = -1(x + 3)$$

$$y - 5 = -1x - 3$$

$$y = -1x + 2$$

✓ Understanding Check:

1. Find the slope-intercept form of a linear equation that passes through the points: $(-1, 5)$ and $(1, 9)$

$$x_1 \quad y_1 \quad x_2 \quad y_2$$

$$m = \frac{9-5}{1-(-1)} = \frac{4}{2} = 2$$

$$y - 5 = 2(x + 1)$$

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

$$y = 2x + 7$$

3. Find the slope-intercept form of a linear equation that passes through the points $(4, -1)$ and $(-4, -3)$

$$x_1 \quad y_1 \quad x_2 \quad y_2$$

$$m = \frac{-3 - (-1)}{-4 - 4} = \frac{-2}{-8} = \frac{1}{4}$$

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

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

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

2. Find the slope-intercept form of a linear equation that passes through the points $(1, 1)$ and $(2, -2)$

4. Find the slope-intercept form of a linear equation that passes through the points $(-3, 3)$ and $(1, -5)$

✓ Understanding Check:

2. Find the slope-intercept form of a linear equation that passes through the points $(1, 1)$ and $(2, -2)$

$$m = \frac{-2-1}{2-1} = \frac{-3}{1} = -3 \quad \left| \begin{array}{l} m = -3 \\ (1, 1) \end{array} \right|$$

$$\begin{array}{r} y-1 = -3(x-1) \\ y-1 = -3x+3 \\ \hline y = -3x+4 \end{array}$$

4. Find the slope-intercept form of a linear equation that passes through the points $(-3, 3)$ and $(1, -5)$

$$m = \frac{-5-3}{1-3} = \frac{-8}{-2} = 4$$

$$\begin{aligned} y-3 &= -2(x-3) \\ y-3 &= -2(x+3) \\ y-3 &= -2x-6 \\ \quad \quad \quad \quad \quad \quad \rightarrow +3 \\ \hline y &= -2x-3 \end{aligned}$$

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Example 3: Writing an Equation Using a Table or Word Description

If a table models a linear equation, you can use two points from the table to make an equation for the table.

1.

x	y
-4	9
2	-3
5	-9
9	-17

Step 1: Choose 2 points.Step 2: Find the slope.Step 3: Use point-slope formula with ONE point.Step 4: Solve for y.

$$(2, -3), (5, -9)$$

$$m = \frac{-9 - (-3)}{5 - 2} = \frac{-6}{3} = -2$$

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

$$y + 3 = -2x + 4$$

$$y = -2x + 1$$

2. John noticed that when he ordered pizza on Monday, he got a 3-topping pizza for \$10.00. On Wednesday, he got a 1-topping pizza for \$8.00. If the price of the pizza follows a linear model, find the equation that best describes the relationship between the price of the pizza (p) and the number of toppings (t).

$$\begin{array}{cc} \begin{array}{c} t \\ (3, 10) \\ x_1 \quad y_1 \end{array} & \begin{array}{c} p \\ (1, 8) \\ x_2 \quad y_2 \end{array} \end{array}$$

$$m = \frac{8 - 10}{1 - 3} = \frac{-2}{-2} = 1$$

$$y - 10 = 1(x - 3)$$

$$y - 10 = x - 3$$

$$y = x + 7$$

$$p = t + 7$$

✓ Understanding Check:

Find the equation of the line for each table of values.

a.

x	y
-1	-5
3	7
-2	-8
2	4

b.

x	y
-2	4
4	1
8	-1
2	2

**Summary of Linear Equations****Slope-Intercept Form**

$$y = mx + b$$

m is the slope and b is
y – intercept.

$$y = 3x + 5$$

Standard Form

$$Ax + By = C$$

A and B are not
both 0.

$$2x + 3y = 6$$

Point-Slope Form

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

(x_1, y_1) lies on the
graph of the equation,
and m is the slope.

$$y - 4 = 7(x - 3)$$

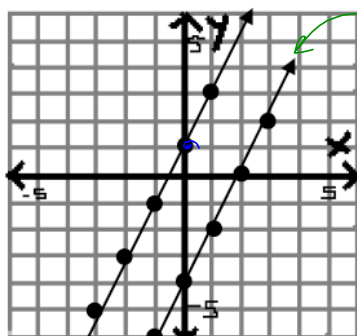
Homework

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5-5 Parallel and Perpendicular Lines

In the graph below, the lines are parallel. Write the equation of each line and compare their slopes.



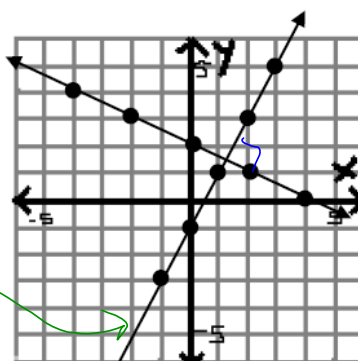
$b = 1$
 $m = 2$

$$y = 2x + 1$$

$$y = 2x - 4$$

$b = -4$
 $m = 2$

Intersect @ 90°
In the graph below, the lines are perpendicular. Write the equation of each line and compare their slopes.



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

$$y = 2x - 1$$

$b = -1$
 $m = 2$

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



Slopes of Parallel Lines:

slopes are equal.

Slopes of Perpendicular Lines:

slopes are opposite reciprocals of each other