**AChor/MFM2P** **Name: _____**
**Date: _____**

## Worksheet 4-6: Finding Equation of a Line

We can find the equation of any line **by finding the slope and *y*-intercept**. Then the equation of the line can be written in slope-intercept form, $y = mx + b$.

**Part 1: Determine Linear Equations when Slope and *y*-Intercept are given.**
**How: Substitute *m* and *b* into the form** $y = mx + b$

(a) $m = -5$, $b = \frac{1}{2}$

(b) $m = -1$, $b = 0$

(c) $m = \frac{1}{2}$, $b = -5$

(d) $m = -0.77$, $b = 0.9$

**Part 2: Determine Linear Equations when Slope and One Point are given.**
**How: Substitute slope and (*x*, *y*) of the given point into** $y = mx + b$ **to find *b*.**

(a) Find the equation of the line that passes through (–1, 6) with slope 5.
$x =$ $y =$ $m =$ $b =$

(b) Find the equation of the line that passes through (3, –3) with slope –2.
$x =$ $y =$ $m =$ $b =$

(c) Find the equation of the line with slope 4 and *x*-intercept 2.
$x =$ $y =$ $m =$ $b =$

**Part 3: Determine Linear Equations when Two Points are given.**
**Steps:**

1. **Find the slope using $m = \frac{y_2 - y_1}{x_2 - x_1}$ or identify the slope if it is given.**
2. **Find the *y*-intercept, $b$, by substituting the (*x*, *y*) of one given point and the slope into $y = mx + b$ and solve for $b$.**
3. **Write the equation using the values for $m$ from step 1 and $b$ from step 2.**

(a) Find the equation of the line that passes through the points (1, –2) and (4, 7).
$x =$ $y =$ $m =$ $b =$

*Step 1: Slope* *Step 2: y-Intercept*

*Step 3: Equation*

(b) Find the equation of the line that passes through the points (–6, –2) and (4, 3).
$x =$ $y =$ $m =$ $b =$

*Step 1: Slope* *Step 2: y-Intercept*

*Step 3: Equation*

**Part 4: Determine Linear Equations when One Point and One Intercept are given.**

1. **State the (*x*, *y*) of the given intercept. [Hint: *x*-intercept at (*a*, 0) and *y*-intercept at (0, *b*)]**
2. **Find the slope using $m = \frac{y_2 - y_1}{x_2 - x_1}$ or identify the slope if it is given.**
3. **Find the *y*-intercept, $b$, by substituting the (*x*, *y*) of one given point and the slope into $y = mx + b$ and solve for $b$.**
4. **Write the equation using the values for $m$ from step 1 and $b$ from step 2.**

(a) Find the equation of the line that passes through (2, 1) with *y*-intercept –3.

*x* = *y* = *m* = *b* =

*Step 1: Slope* *Step 2: y-Intercept*

*Step 3: Equation*

(b) Find the equation of the line that passes through (2, –1) with *x*-intercept 4.

*x* = *y* = *m* = *b* =

*Step 1: Slope* *Step 2: y-Intercept*

*Step 3: Equation*

(c) Find the equation of the line with *y*-intercept 3, and *x*-intercept –2.

*x* = *y* = *m* = *b* =

*Step 1: Slope* *Step 2: y-Intercept*

*Step 3: Equation*

**Part 5: Determine Linear Equations when Slope of <u>Another</u> Line is given.**

- Parallel lines have the **same slope.**
- Equations for vertical lines: $x = a$ whereas equations for horizontal lines: $y = b$.

(a) Find the equation of the line that is parallel to $y = -2x + 3$ and passes through (–2, –1).

*x* = *y* = *m* = *b* =

*Step 1: Slope* *Step 2: y-Intercept*

*Step 3: Equation*

(b) Find the equation of the line that is parallel to $y = 5x - 3$ and passes through (–3, 4).

$x =$ $y =$ $m =$ $b =$

*Step 1: Slope* *Step 2: y-Intercept*

*Step 3: Equation*

(c) Find the equation of the line that is parallel to $x = 3$ and passes through (–4, 3).

(d) Find the equation of the line that is parallel to $y = 2$ and passes through (2, 5).

(e) Find the equation of the line that is parallel to $y = 4$ and passes through (1, 3).

(f) Find the equation of the line that is parallel to $x = -1$ and passes through (–2, –3).

**Part 6: Determine Linear Equations When Equations of Other Lines are Given.**

1. **Identify the slope and y-intercept from the given equations.**
2. **Use given relationship to determine the required linear equations.**

(a) Write the equation of a line than is steeper than $y = 2x$.

(b) Write the equation of a line that is less steep than $y = -x$.

(c) Write the equation of a line that is steeper than $y = -4.5x + 2.5$.

(d) Write the equation of a line that is less steep than $y = 5000 + 8.5x$.

(e) Write the equation of a line that is steeper than $y = -8 + 3x$

**Answers:**

**1.** (a) $y = -5x + \frac{1}{2}$, (b) $y = -x$, (c) $y = \frac{1}{2}x - 5$, (d) $y = -0.77x + 0.9$;

**2.** (a) $y = 5x + 11$, (b) $y = -2x + 3$, (c) $y = 4x - 8$;

**3.** (a) $y = 3x - 5$, (b) $y = \frac{1}{2}x + 1$;

**4.** (a) $y = 2x - 3$, (b) $y = \frac{1}{2}x - 2$, (c) $y = \frac{3}{2}x + 3$;

**5.** (a) $y = -2x - 5$, (b) $y = 5x + 19$; (c) $x = -4$, (d) $y = 5$, (e) $y = 3$, (f) $x = -2$;

**6.** (a) $m > |2|$, (b) $m < |1|$, (c) $m > |4.5|$, (d) $m < |8.5|$, (e) $m > 3$