

Math 10 C
Chapter 7 – Linear Equations

Name: _____

1. Find the equation of the line as described by the following.

Slope y-intercept

a) (8, 6) and (-3, 2)

$x_1 \ y_1 \quad x_2 \ y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 6}{-3 - 8} = \frac{-4}{-11}$$

$$m = \frac{4}{11}$$

$$y = mx + b \quad y = \frac{4}{11}x + b$$

Use point (-3, 2).

$$2 = \frac{4}{11}(-3) + b$$

$$2 = \frac{-12}{11} + b$$

$$\frac{22}{11} = \frac{-12}{11} + b$$

$$\frac{34}{11} = b$$

$$y = \frac{4}{11}x + \frac{34}{11}$$

General Form

b) (1, 6) and $m = \frac{-3}{5}$

Slope-Point.

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

$$(y - 6) = \frac{-3}{5}(x - 1)$$

$$y - 6 = \frac{-3}{5}x + \frac{3}{5}$$

$$+\frac{3}{5}x \quad +\frac{3}{5}x$$

$$\frac{3}{5}x + y - 6 = \frac{3}{5}$$

$$-\frac{3}{5} \quad -\frac{3}{5}$$

$$\frac{3}{5}x + y - \frac{23}{5} = 0$$

$$\cdot 5 \quad \cdot 5 \quad \cdot 5 \quad \cdot 5$$

$$3x + 5y - 23 = 0$$

Slope-point form

c) (5, 3) and (3, 7)

$x_1 \ y_1 \quad x_2 \ y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 3}{3 - 5} = \frac{4}{-2} = -2$$

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

$$(y - 3) = -2(x - 5)$$

OPTION #1 $(y - 3) = -2(x - 5)$

OPTION #2 $(y - 7) = -2(x - 3)$

2. Write the equation of the line that passes through the points (7, -3) and (2, 6) in both general and y-intercept form ($y = mx + b$, $Ax + By + C = 0$). Graph the line on the graph provided. (4 marks)

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{-9}{5}$$

$$y = mx + b \quad \text{using } m = \frac{-9}{5} \text{ and } (2, 6)$$

$$6 = \frac{-9}{5}(2) + b$$

$$\frac{30}{5} = \frac{-18}{5} + b$$

$$\frac{48}{5} = b$$

$$y = \frac{-9}{5}x + \frac{48}{5}$$

$$+\frac{9}{5}x \quad +\frac{9}{5}x$$

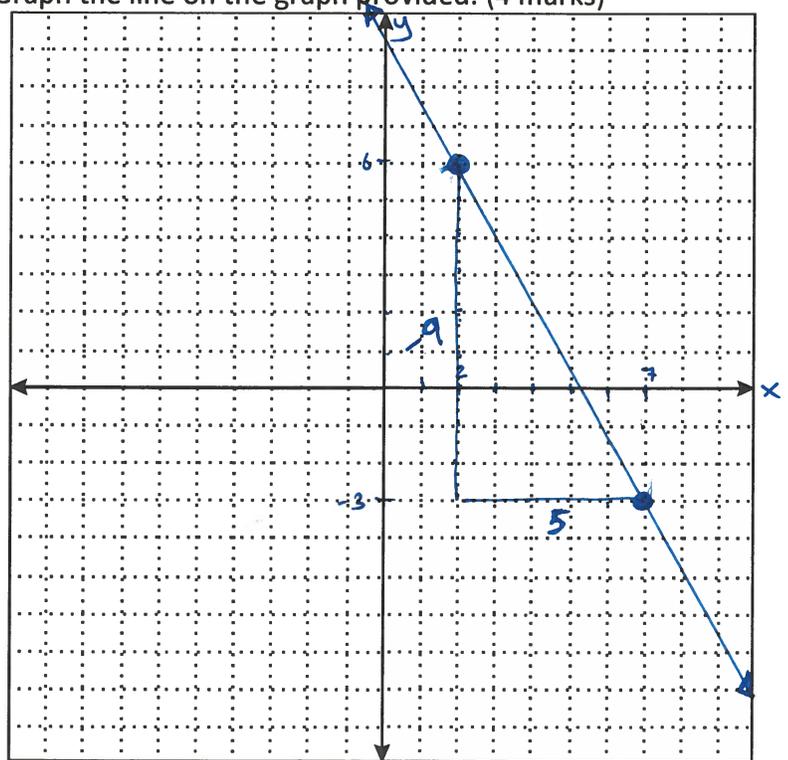
$$\frac{9}{5}x + y = \frac{48}{5}$$

$$-\frac{48}{5} \quad -\frac{48}{5}$$

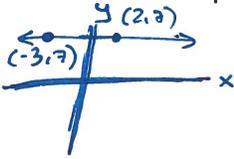
$$\frac{9}{5}x + y - \frac{48}{5} = 0$$

$$\cdot 5 \quad \cdot 5 \quad \cdot 5 \quad \cdot 5$$

$$9x + 5y - 48 = 0$$

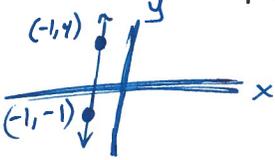


3. Determine the equation in general form, of the line through (2, 7) and parallel to the x-axis.



$$y = 7$$

4. Determine the equation in general form, of the line through (-1, 4) and parallel to the y-axis.



$$x = -1$$

5. Find the equation of a line in slope-point form that passes through (-3, 3) and is perpendicular to the line $9x - 3y + 6 = 0$.

What is this slope?

$$9x + 6 = 3y$$

$$\div 3 \quad \div 3 \quad \div 3$$

$$3x + 2 = y$$

$$y = 3x + 2$$

Slope is $3/1$

Perpendicular line has slope $-\frac{1}{3}$ (negative reciprocal)

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

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

6. Find the equation of a line in slope y-intercept form that passes through (4, -2) and is parallel to the line $15x + 5y - 10 = 0$.

What is this slope?

$$5y = -15x + 10$$

$$\div 5 \quad \div 5 \quad \div 5$$

$$y = -3x + 2$$

Slope is $-3/1$

Parallel has same slope of $-3/1$

$$y = -3x + b \quad \text{Plug in } (4, -2)$$

$$-2 = -3(4) + b$$

$$-2 = -12 + b$$

$$+12 \quad +12$$

$$10 = b$$

$$y = mx + b$$

$$y = -3x + 10$$

7. Find the equation of a line, in as many forms as possible, that is perpendicular to the line $x - y = 0$ and passes through the point (-2, 3).

$$1x - 1y = 0$$

$$1x = 1y$$

$$y = 1x + 0$$

Slope = 1

Perpendicular slope is $\frac{1}{-1}$ or just -1 .

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

$$(y - 3) = 1(x + 2)$$

$$y - 3 = x + 2$$

$$y = x + 5$$

$$y = x + 5$$

$$-y \quad -y$$

$$0 = x - y + 5$$

$$x - y + 5 = 0$$

8. Find the equation of a line, in as many forms as possible, that is parallel to the line $4x - y - 1 = 0$ and contains the point (3, -2).

What is initial slope?

$$4x - 1y - 1 = 0$$

$$4x - 1 = y$$

$$y = 4x - 1$$

Slope is $+4/1$

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

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

$$y + 2 = 4x - 12$$

$$y = 4x - 14$$

Same "slope"

$$y = 4x - 14$$

$$0 = 4x - 1y - 14$$

$$4x - 1y - 14 = 0$$

9. Find the equation of a line, in as many forms as possible, that is perpendicular to the line $y + 3 = 0$ and passes through the point (-5, -4).

$$y + 3 = 0$$

$$\text{So } y = -3$$

$$\text{Perpendicular would be } x = -5$$

One form only since slope is undefined.

