FLUENCY

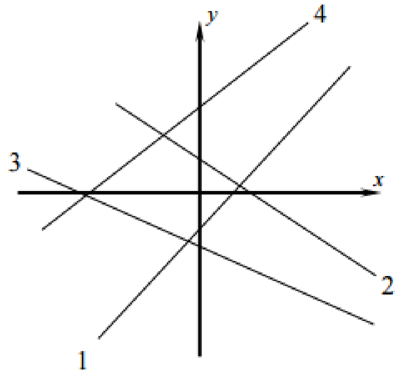
1. Four lines are shown graphed. Place the number of the line next to the equation that most appropriately models it.

$y=\frac{2}{3}x+5$ 4 ~~4,2~~

$y=x-3$ 1 ~~1,3~~

$y=-\frac{3}{4}x+3$ 2 ~~4,2~~

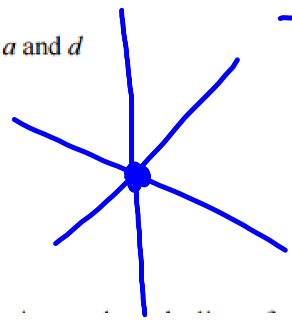
$y=-\frac{1}{2}x-4$ 3 1,3

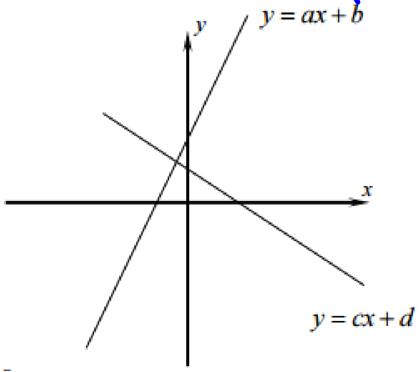


2. The two lines $y=ax+b$ and $y=cx+d$ are shown graphed below. The values of $a, b, c,$ and d are not given, but properties of them can be inferred from the graph. Circle the pair of values below that could be equal? Explain.

b and d a and d ~~a and c~~

Explain:





3. Which of the following is true about the linear function $2y + x = 18$. $-x$

~~(1) It has a slope of 2 and a y-intercept of 18.~~

(2) It has a slope of -2 and a y-intercept of 9.

(3) It has a slope of $-\frac{1}{2}$ and a y-intercept of 9.

(4) It has a slope of $\frac{1}{2}$ and a y-intercept of 18.

$$\frac{2y = -x + 18}{2}$$

$$y = -\frac{1}{2}x + 9$$

4. For the line $2y - 6x = 10$, for every unit increase in x which of the following is true?

$+6x \quad +6x$

~~(1) y decreases by 6~~

(2) y increases by 3

(3) y increases by 2

~~(4) y decreases by 10~~

$$\frac{2y = 6x + 10}{2}$$

$$\boxed{y = 3x + 5}$$

$y = 3(5) + 5$

$15 + 5$

17 20 23

+3 +3

5. Rewrite each of the following linear equations in equivalent $y = mx + b$ (slope-intercept) form. Identify the slope and the y-intercept and then graph on the grid given. Label each line with its original equation.

(a) $2y - 3x = 10$

$y = \frac{3}{2}x + 5$

Slope: $\frac{3}{2}$ y-intercept: 5

(b) $x + 2y = 6$

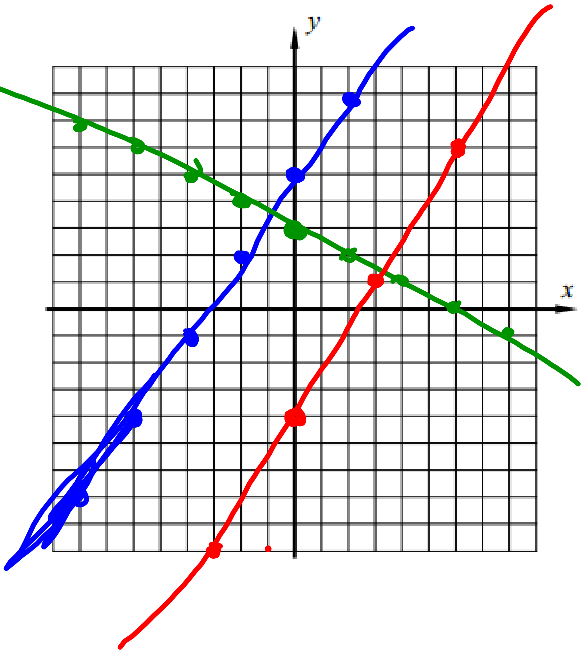
$y = -\frac{1}{2}x + 3$

Slope: $-\frac{1}{2}$ y-intercept: 3

(c) $3y + 12 = 5x$

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

Slope: $\frac{5}{3}$ y-intercept: -4

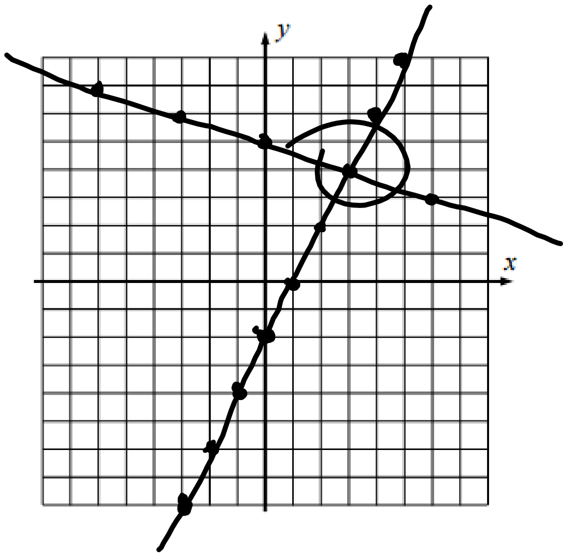


6. What are the coordinates of the one point shared in common between the two linear functions given below?

(3, 4)

$y = 2x - 2$

$3y + x = 15$



$y = -\frac{1}{3}x + 5$

$2x - \cancel{2} = -\frac{1}{3}x + 5 + 2$

$+\cancel{2}$

Do you remember what this type of problem is called from 8th grade Common Core Mathematics?

$2x = \cancel{-\frac{1}{3}x} + 7$

$\frac{1}{3}x \quad \cancel{+\frac{1}{3}x}$

$2\frac{1}{3}x = 7$

$\frac{\frac{7}{3}x = 7}{\frac{7}{3}}$

$x = \frac{\cancel{7}}{1} \cdot \frac{3}{\cancel{7}}$

$x = 3$

$2(3) - 2$

4

$-\frac{1}{3}(3) + 5$

4

Mindfulness:

Choose Your Breath:

Initial (monitor/keep rhythm)

Heart/Belly

Calming (2 in, 4 out)

Energizing (4 in, 2 out)

Bell Ringer:

Joey enlarged a 3-inch by 5-inch photograph on a copy machine. He enlarged it four times. The table below shows the area of the photograph after each enlargement.

$$\frac{36.6-15}{4-0}$$

Enlargement	0	1	2	3	4
Area (square inches)	15	18.8	23.4	29.3	36.6

What is the average rate of change of the area from the original photograph to the fourth enlargement, to the *nearest tenth*?

$$\frac{21.6}{4}$$

1) 4.3
2) 4.5
3) 5.4
4) 6.0

Writing Equations of Lines in Slope-Intercept Form
Common Core Algebra I

One skill that we need to become **fluent** at in Algebra I is creating the equation of a linear function. We will concentrate on learning how to form equations in the **slope-intercept form** that we have been working with.

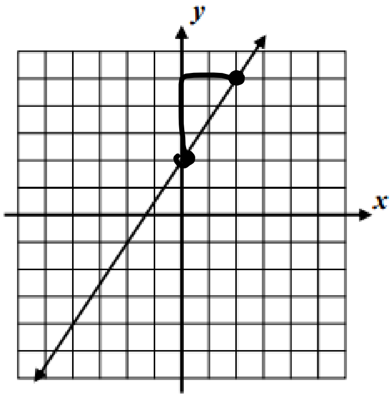
The Slope-Intercept Form of a Linear Function

Given a linear function, $f(x)$, it can be expressed in equation form by: $m=\frac{\Delta y}{\Delta x}=\frac{y_2-y_1}{x_2-x_1}$

$y-y_1=m(x-x_1)$ $f(x)=y=mx+b$

where the two **parameters** are m = average rate of change = slope = $\frac{\Delta y}{\Delta x}$ and $b = y$-intercept of the line

***Exercise* #1:** Consider the linear function whose graph is shown below.



(a) Determine an equation in the form $y = mx + b$ for this line.

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

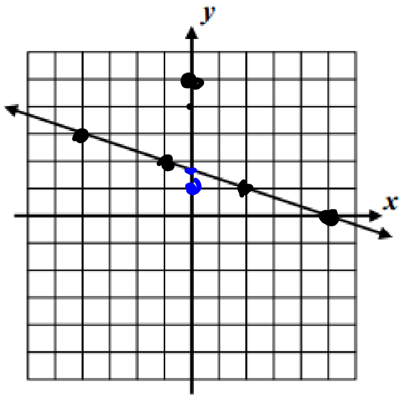
(b) Test your equation for the value $x = 2$.

5

When the y-intercept is an **integer**, such as in the last exercise, it is fairly easy to get the **exact relationship** between x and y. Let's try another graphical problem where the y-intercept is not an **integer.**

$y = -\frac{1}{3}x + \frac{5}{3}$

Exercise #2: Find the equation of the linear function shown in slope-intercept form. Test your equation for $x = -4$.



$y = mx + b \rightarrow y = -\frac{1}{3}x + \frac{5}{3}$

$(-4, 3)$

* $(-1, 2)$ $m = \frac{0-2}{5--1} = \frac{-2}{6} = -\frac{1}{3}$

$(2, 1)$

* $(5, 0)$

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

$y - 3 = -\frac{1}{3}(x + 4) + 3$

$+3$

$y = -\frac{1}{3}x - \frac{4}{3} + 3$

$y = -\frac{1}{3}x - \frac{4}{3} + \frac{9}{3}$

$y = -\frac{1}{3}x + \frac{5}{3}$

We need to also be able to find the equation for a linear function if we know two points that lie on it. Notice that this means we have to determine the value of the **two parameters** with two pieces of information.

Exercise #3: Find the equation of the line that passes through each of the following pairs of points in $y = mx + b$ form.

(a) $(2, 5)$ and $(5, 17)$

$$\frac{17-5}{5-2} = \frac{12}{3}$$

$$m = 4$$

(b) $(-2, 5)$ and $(2, 3)$

$$y - 5 = 4(x-2)$$

$$y - 5 \overset{+5}{=} 4x - 8 \overset{+5}{}$$

$$\boxed{y = 4x - 3}$$

(c) $(-1, 11)$ and $(4, -4)$

(d) $(3, 4)$ and $(12, 19)$