

## What's Going On?

**Minds on**

Workin' on the Basics

**Action!**

Where Do We Meet?  
Are You Sure?

**Consolidation**

'Twas My First Ever Smartphone.

**Learning Goal - I will explore and understand how to solve linear systems.**

## Minds on

# Workin' on the Basics

## We need to master these skills:

1. Finding the equation of a line given the slope and y-intercept.
2. Finding the y-intercept of a line given the slope and a point.
3. Finding the slope of a line given two points.

**Once we have mastered these skills, we can answer the big questions!**

**Example: Find the equation of a line through two points!**

## 41 Minds on

## Workin' on the Basics

We need to master these skills:

1. Finding the equation of a line given the slope and y-intercept.

a) slope is  $-2$   
y-intercept is  $6$  }  $\rightarrow y = -2x + 6$

b) slope is  $0$   
y-intercept is  $-7$  }  $\rightarrow y = -7$

c) vertical line  
goes through the point  
 $(6, 7)$

## Minds on

## Workin' on the Basics

We need to master these skills:

2. Finding the y-intercept of a line given the slope and a point.

$$\begin{aligned} \text{a) slope} &= 4 \\ \text{point} &= (1, 3) \end{aligned}$$

$$\begin{aligned} \text{b) slope} &= \frac{2}{3} \\ \text{point} &= (0, 5) \end{aligned}$$

$$\begin{aligned} \text{c) slope} &= -\frac{3}{5} \\ \text{point} &= (5, 2) \end{aligned}$$

$$c) m = -\frac{3}{5}$$

$$x = 5$$

$$y = 2$$

$$y = mx + b$$

$$2 = \left(-\frac{3}{5}\right)\left(\frac{5}{1}\right) + b$$

$$2 = -\frac{15}{5} + b$$

$$2 = -3 + b$$

$$\boxed{5 = b}$$

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

$$b) \quad m = \frac{2}{3}$$

$$x = 0$$

$$y = 5$$

$$y = mx + b$$

$$(5) = \left(\frac{2}{3}\right)(0) + b$$

$$5 = 0 + b$$

$$\boxed{5 = b}$$

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

$$a) \quad \begin{aligned} m &= 4 \\ x &= 1 \\ y &= 3 \end{aligned}$$

$$y = mx + b$$

$$(3) = (4)(1) + b$$

$$3 = \cancel{4} + b$$

-4      +4

$$\boxed{-1 = b}$$

$$y = 4x - 1$$

## Minds on

# Workin' on the Basics

**We need to master these skills:**

3. Finding the slope of a line given two points.

**Action!**

## Linear Systems

A linear system also known as a system of linear equations is just a set of two or more linear equations considered at the same time. *(two lines at the same time)*

The point where two lines in a linear system meet is called the point of intersection.

**Action!**

## Where Do We Meet?

With a partner, use the back of a whiteboard to determine where your assigned lines **intersect**.

**1**

$$y = \frac{1}{4}x - 4$$
$$3x + 2y = 6$$

**2**

$$y = x + 1$$
$$x - 3y = 3$$

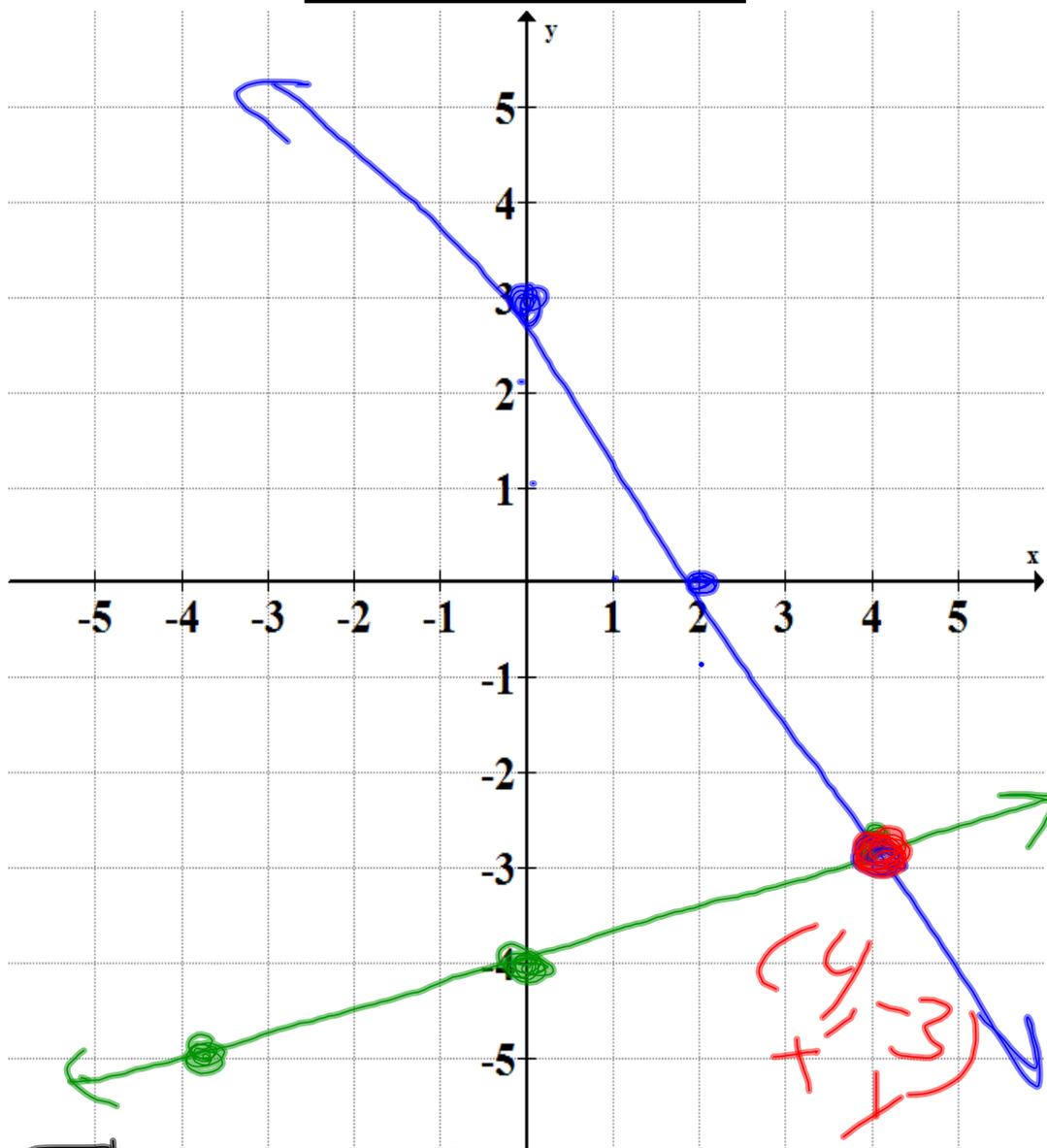
**3**

$$y = -x + 5$$
$$2x - 5y = 10$$

**Action!****1**

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

$$3x + 2y = 6$$



The point of intersection is  
(4, -3)

To graph the first line:

1. Plot the y-intercept at -4
2. Use the slope to plot more points (up 1, over 4)

To graph the second line:

1. Rearrange into  $y = mx + b$

$$\begin{array}{l} 3x + 2y = -6 \\ -3x \quad \quad -3x \\ \hline 2y = -3x + 6 \\ \frac{2y}{2} = \frac{-3x}{2} + \frac{6}{2} \\ y = -\frac{3}{2}x + 3 \end{array}$$

2. Find the x-intercept and the y-intercept of the line.

$$3x + 2y = 6$$

x-int

$$\begin{array}{r} \cancel{3}x = 6 \\ \cancel{3} \quad \underline{3} \end{array}$$
$$x = 2$$

y-int

$$\begin{array}{r} \cancel{2}y = 6 \\ \cancel{2} \quad \underline{2} \end{array}$$
$$y = 3$$

**Action!**

## Are You Sure?

To determine if your solution is correct, substitute the coordinates of the **Point of Intersection** into both equations. (use the blank side of your whiteboard)

Use the (L.S. R.S.) method!

**Action!**

## Are You Sure?

1

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

$$3x + 2y = 6$$

P.O.I. = (4, -3)

x      y

Equation 1

<u>L.S.</u>	<u>R.S.</u>
= y	= $\frac{1}{4}x - 4$
= -3	= $\frac{1}{4}(4) - 4$
	= 1 - 4
	= -3
L.S. = R.S. ✓	

Equation 2

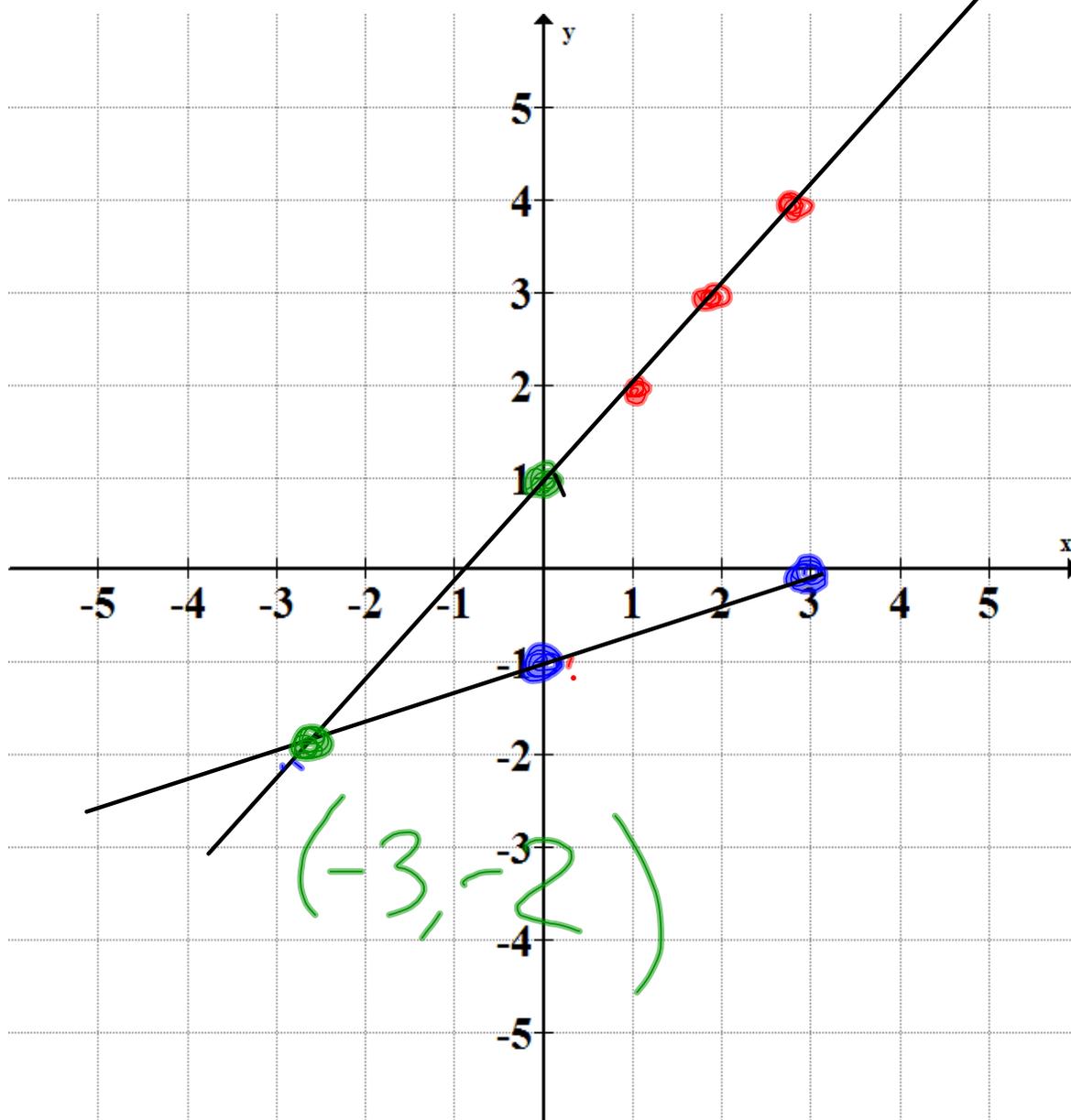
<u>L.S.</u>	<u>R.S.</u>
3x + 2y	6
= 3(4) + 2(-3)	
= 12 - 6	
= 6	
L.S. = R.S. ✓	

**Action!**

**2**

$$y = x + 1$$

$$x - 3y = 3$$



To graph the first line ( $y = x + 1$ )

1. Plot the y-intercept at +1
2. Use the slope to find additional points.
  - The slope is 1 (go over 1, up 1...)

To graph the second line ( $x - 3y = 3$ )

1. Rearrange into slope y-intercept form.
2. Plot the y-intercept.
3. Use the slope to find additional points.

OR

1. Determine the x-intercept by plugging in 0 for y and solving for x.
2. Determine the y-intercept by plugging in 0 for x and solving y.
3. Plot the intercepts and draw a straight line through them.

## Action!

# Are You Sure?

2

$$\begin{array}{l} y = x + 1 \\ x - 3y = 3 \end{array}$$

PDI =  $(-3, -2)$

Equation 1

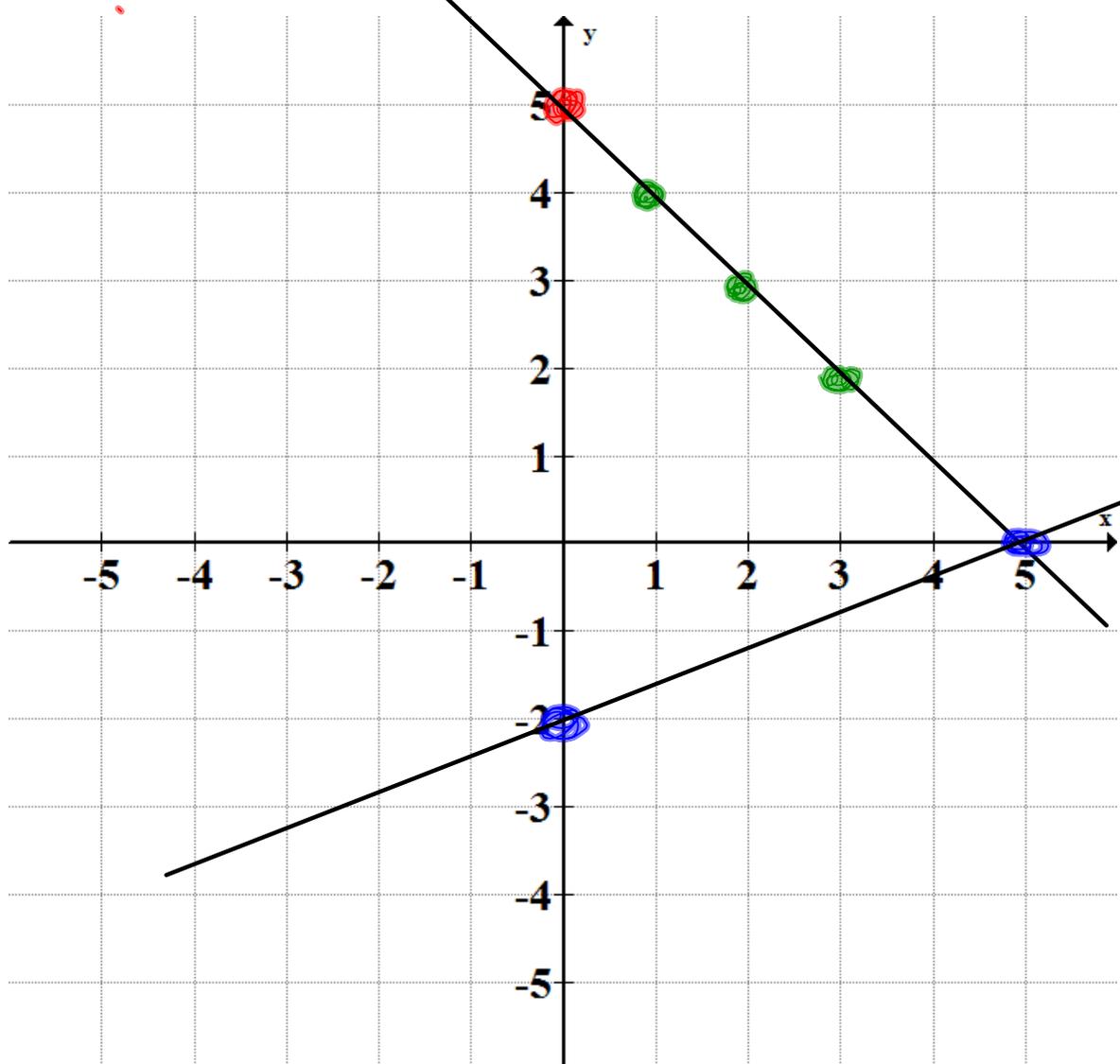
<u>L.S.</u>	<u>R.S.</u>
$y$	$x + 1$
$= -2$	$= -3 + 1$
	$= -2$
$L.S. = R.S.$	

Equation 2

<u>L.S.</u>	<u>R.S.</u>
$x - 3y$	$3$
$= -3 - 3(-2)$	
$= -3 + 6$	
$= 3$	
$L.S. = R.S.$	

**Action!****3**

$$y = -\frac{1}{5}x + 5$$
$$2x - 5y = 10$$



To graph the first line ( $y = -x + 5$ )

1. Plot the y-intercept at +5
2. Use the slope to find additional points.
  - The slope is -1 (go down 1, over 1...)

To graph the second line ( $2x - 5y = 10$ )

1. Rearrange into slope y-intercept form.
2. Plot the y-intercept.
3. Use the slope to find additional points.

OR

1. Determine the x-intercept by plugging in 0 for y and solving for x.
2. Determine the y-intercept by plugging in 0 for x and solving y.
3. Plot the intercepts and draw a straight line through them.

**Action!**

Are You Sure?

**3**

$$\begin{array}{l} y = -x + 5 \\ 2x - 5y = 10 \end{array}$$

**(5, 0)**

## Consolidation

# Linear Systems

Linear systems are my answer to the question:

*When would we ever use this in real life?*

## Consolidation

### 'Twas My First Ever Smartphone.

In August of 2011, a slightly younger yet somehow equally brilliant Mr. Gilbert walked into a Rogers store to purchase a smart phone.

Mr. Gilbert was very excited about his new phone and was all set to go when the Rogers staff member asked him a most puzzling question...

## Consolidation

'Twas My First Ever Smartphone.

She said:

"Would you rather pay a long distance **rate of 40 cents per minute** each month, or a **flat fee of 10 dollars plus 10 cents per minute?**"

With a smile, Mr. Gilbert said:

"Give me a moment to solve this little caper,  
but if you don't mind I'll need a scrap of paper."

## Consolidation

### rate of 40 cents per minute

To begin I noticed plan 1 starts out free,  
but plan 2 does not, it has a \$10 fee.

My goodness, I wondered, which plan is best,  
I'd need a little math to pass this life test.

In order to solve my problem with ease,  
I first found equations for each set of fees.

40 cents a minute, we'll call that 'point four',  
because working in cents is certainly a chore.

This first plan does not have any flat rate,  
it's y-intercept is 0, not 1, 4, not 8!

And thus the equation for long distance plan 1,  
is a direct variation, my goodness, what fun!

## Consolidation

# flat fee of 10 dollars plus 10 cents per minute

Now on to plan 2 declared Mr. G,  
and thought to himself no one's cooler than me.

This plans seems cheaper at 10 cents per minute,  
but what of that ten dollar flat fee that's in it?

The slope of this line, it must be 'point one',  
convert it to dollars and look, almost done!

We just have to add on the 10 dollar fee,  
well that's a y-intercept says I, yippee!

Now we combine them to see total cost,  
I hope that my poem has not found you lost.



## Consolidation

$$1. C = 0.4m$$

$$2. C = 0.1m + 10$$

So here we are with equations: number one, number two,  
but which plan's the better for me, not for you!

I think to myself these lines I could plot,  
my math teacher used to make me do this, a lot!

So I set to graphing line 1, then line 2,  
and a train went by and proclaimed choo choo choo.

Not now Mr. Train I'm solving a system,  
to your 'choo's I have no time to listen.

## Consolidation

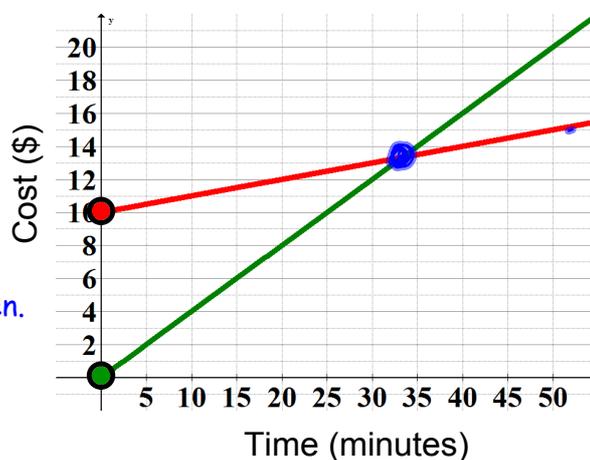
To start each graph I considered  $m$  as 0, then used the slopes, a true graphing hero!

And then just like that the graph it was done, I took a quick look and went with Plan 1.

In my new contract I got this 'My Ten', so I'd use long distance, well, just now and then.

As long as I talked for less than about 33, plan 1, it was cheaper, the best plan for me.

I'd like to end this story with a warning for you, if you talk more than me, you might choose Plan 2!



$$1) C = 0.4m$$

$$2) C = 0.1m + 10$$

## Consolidation

# Getting a Good Deal!

Often the linear systems we deal with involve real-life situations.

### Example

A couple has budgeted \$5000 for their wedding reception.

Which hotel offers the better deal, and under what conditions?

Hotel A:  
\$200 plus \$40 per guest

Hotel B:  
\$1000 plus \$30 per guest

## Action!

Which hotel offers the better deal, and under what conditions?

Hotel A:

\$200 plus \$40 per guest

Hotel B:

\$1000 plus \$30 per guest

The first step is to create an equation for each Hotel.

**Consolidation**

# Homework

Pg. 348

#1, 2, 7, 9

## Consolidation

# Practice Test

You will receive a completion mark for this tomorrow when you arrive.