



Name \_\_\_\_\_

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## Lesson 2: Linear and Nonlinear Expressions in $x$

### Exit Ticket

Write each of the following statements as a mathematic expression. State whether the expression is a linear or nonlinear expression in  $x$ .

1. Seven subtracted from five times a number, and then the difference added to nine times a number.

2. Three times a number subtracted from the product of fifteen and the reciprocal of a number.

3. Half of the sum of two and a number multiplied by itself three times.



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## Lesson 4: Solving a Linear Equation

### Exit Ticket

1. Guess a number for  $x$  that would make the equation true. Check your solution.

$$5x - 2 = 8$$

2. Use the properties of equality to solve the equation  $7x - 4 + x = 12$ . State which property justifies your first step and why you chose it. Check your solution.

3. Use the properties of equality to solve the equation  $3x + 2 - x = 11x + 9$ . State which property justifies your first step and why you chose it. Check your solution.



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## Lesson 6: Solutions of a Linear Equation

### Exit Ticket

Transform the equation if necessary, and then solve to find the value of  $x$  that makes the equation true.

1.  $5x - (x + 3) = \frac{1}{3}(9x + 18) - 5$

2.  $5(3x + 9) - 2x = 15x - 2(x - 5)$

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## Lesson 7: Classification of Solutions

### Exit Ticket

Give a brief explanation as to what kind of solution(s) you expect the following linear equations to have. Transform the equation into a simpler form if necessary.

1.  $3(6x + 8) = 24 + 18x$

2.  $12(x + 8) = 11x - 5$

3.  $5x - 8 = 11 - 7x + 12x$

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## Lesson 8: Linear Equations in Disguise

### Exit Ticket

Solve the following equations for  $x$ .

1.  $\frac{5x - 8}{3} = \frac{11x - 9}{5}$

2.  $\frac{x + 11}{7} = \frac{2x + 1}{-8}$

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

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## Lesson 9: An Application of Linear Equations

### Exit Ticket

1. Rewrite the equation that would represent the sum in the fifth step of the Facebook problem:

$$S_5 = 7 + 7 \cdot 5 + 7 \cdot 5^2 + 7 \cdot 5^3 + 7 \cdot 5^4.$$

2. The sum of four consecutive integers is 74. Write an equation and solve to find the numbers.



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## Lesson 11: Constant Rate

### Exit Ticket

Vicky reads at a constant rate. She can read 5 pages in 9 minutes. We want to know how many pages,  $p$ , Vicky can read after  $t$  minutes.

- a. Write a linear equation in two variables that represents the number of pages Vicky reads in any given time interval.

- b. Complete the table below. Use a calculator and round answers to the tenths place.

$t$ (time in minutes)	Linear equation:	$p$ (pages read)
0		
20		
40		
60		

- c. About how long would it take Vicky to read 25 pages? Explain.

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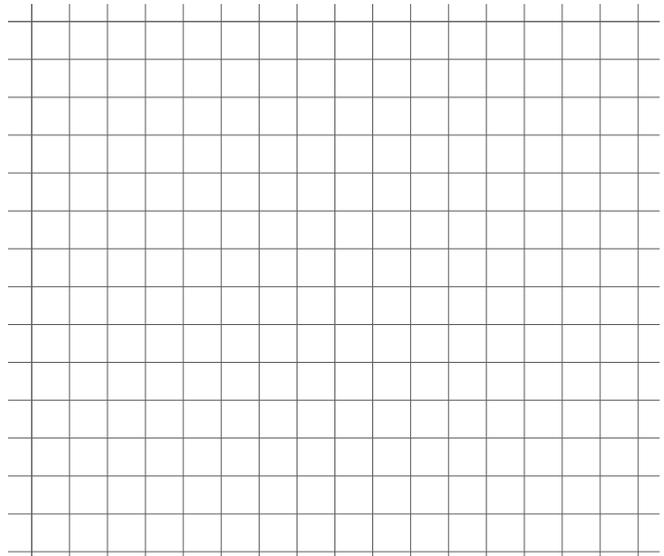
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## Lesson 12: Linear Equations in Two Variables

### Exit Ticket

- Is the point  $(1, 3)$  a solution to the linear equation  $5x - 9y = 32$ ? Explain.
- Find three solutions for the linear equation  $4x - 3y = 1$ , and plot the solutions as points on a coordinate plane.

$x$	Linear equation: $4x - 3y = 1$	$y$



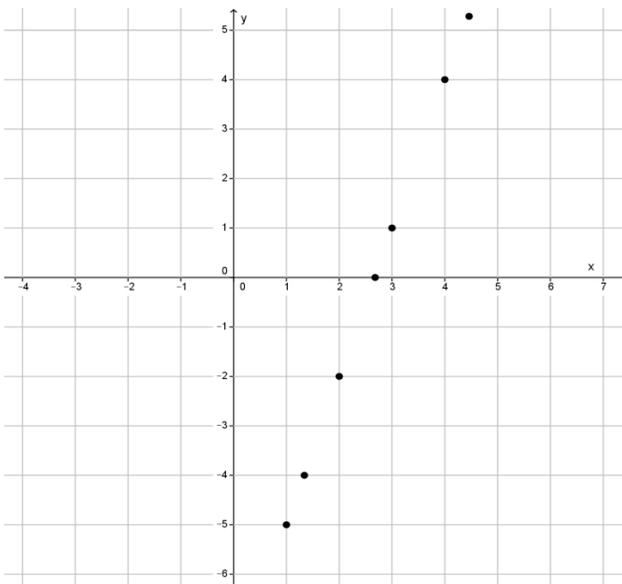
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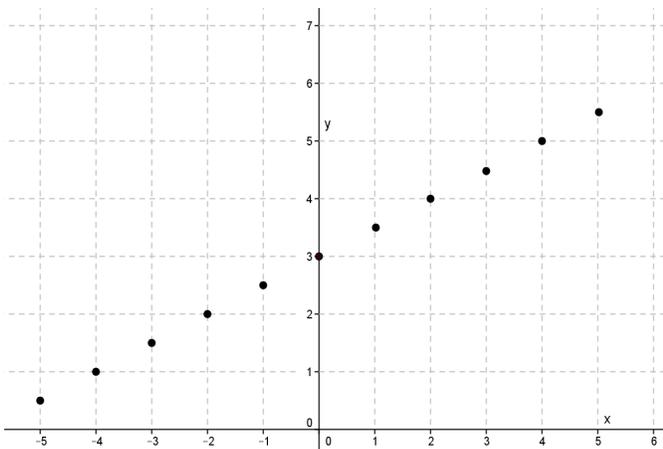
## Lesson 13: The Graph of a Linear Equation in Two Variables

### Exit Ticket

- Ethan found solutions to the linear equation  $3x - y = 8$  and graphed them. What shape is the graph of the linear equation taking?



- Could the following points be on the graph of  $-x + 2y = 5$ ?



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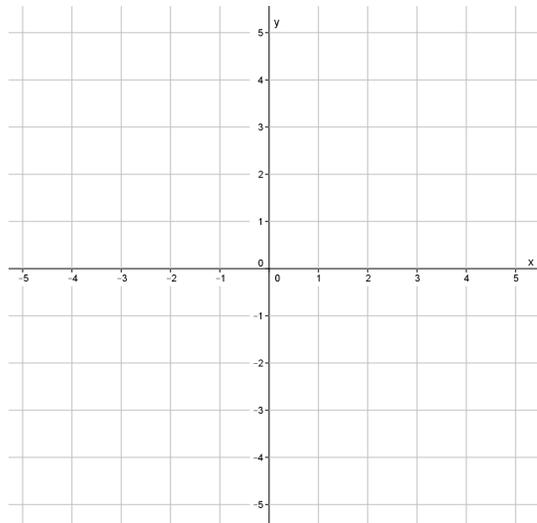
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## Lesson 14: Graph of a Linear Equation—Horizontal and Vertical Lines

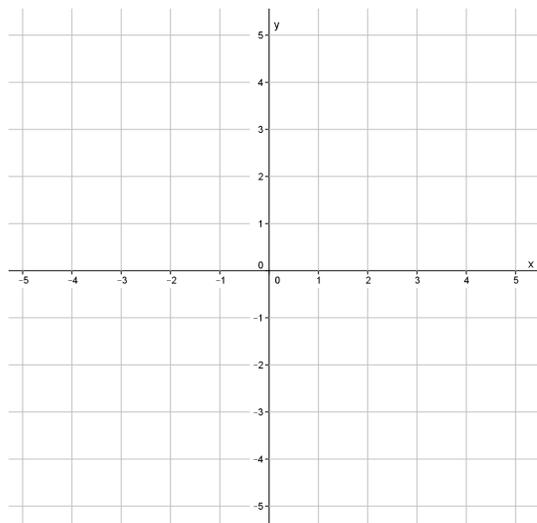
### Lines

#### Exit Ticket

1. Graph the linear equation  $ax + by = c$ , where  $a = 0$ ,  $b = 1$ , and  $c = 1.5$ .



2. Graph the linear equation  $ax + by = c$ , where  $a = 1$ ,  $b = 0$ , and  $c = -\frac{5}{2}$ .





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1. Write and solve each of the following linear equations.

a. Ofelia has a certain amount of money. If she spends \$12, then she has  $\frac{1}{5}$  of the original amount left. How much money did Ofelia have originally?

b. Three consecutive integers have a sum of 234. What are the three integers?

c. Gil is reading a book that has 276 pages. He already read some of it last week. He plans to read 20 pages tomorrow. By then, he will be  $\frac{2}{3}$  of the way through the book. How many pages did Gil read last week?

2. a. Without solving, identify whether each of the following equations has a unique solution, no solution, or infinitely many solutions.

i.  $3x + 5 = -2$

ii.  $6(x - 11) = 15 - 4x$

iii.  $12x + 9 = 8x + 1 + 4x$

iv.  $2(x - 3) = 10x - 6 - 8x$

v.  $5x + 6 = 5x - 4$

- b. Solve the following equation for a number  $x$ . Verify that your solution is correct.

$$-15 = 8x + 1$$

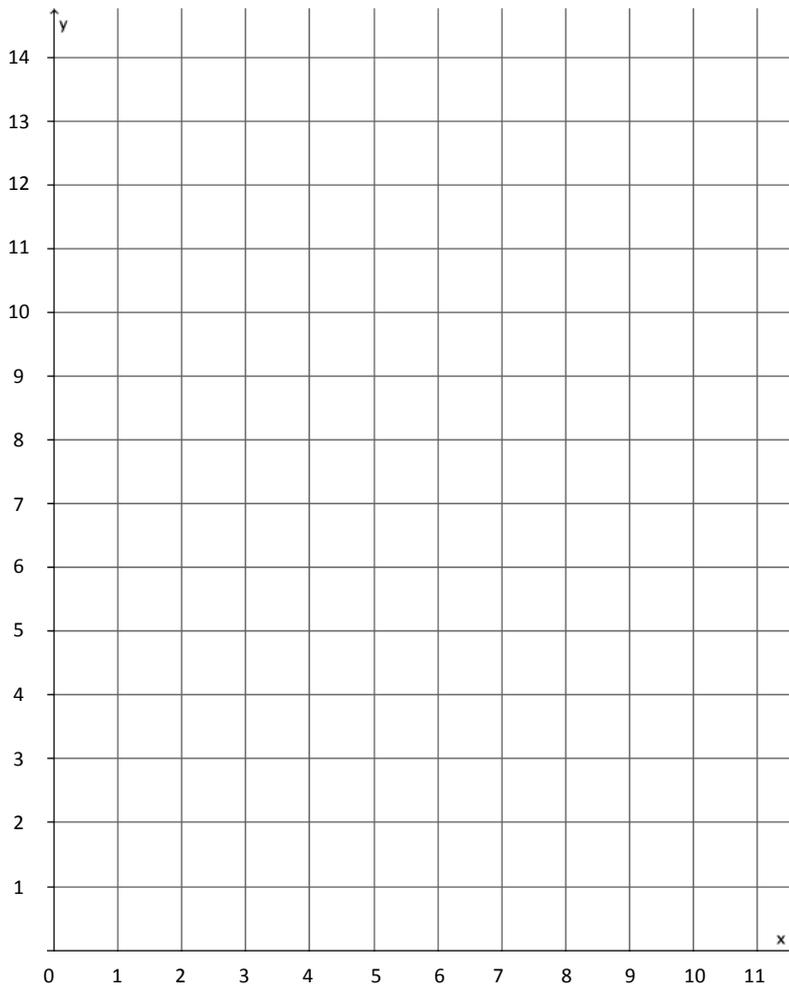
- c. Solve the following equation for a number  $x$ . Verify that your solution is correct.

$$7(2x + 5) = 4x - 9 - x$$

3. a. Parker paid \$4.50 for three pounds of gummy candy. Assuming each pound of gummy candy costs the same amount, complete the table of values representing the cost of gummy candy in pounds.

Gummy Candy in Pounds ( $x$ )	1	2	3	4	5	6	7	8	9
Cost ( $y$ )			\$4.50						

- b. Graph the data on the coordinate plane.



- c. On the same day, Parker's friend, Peggy, was charged \$5 for  $1\frac{1}{2}$  lb. of gummy candy. Explain in terms of the graph why this must be a mistake.

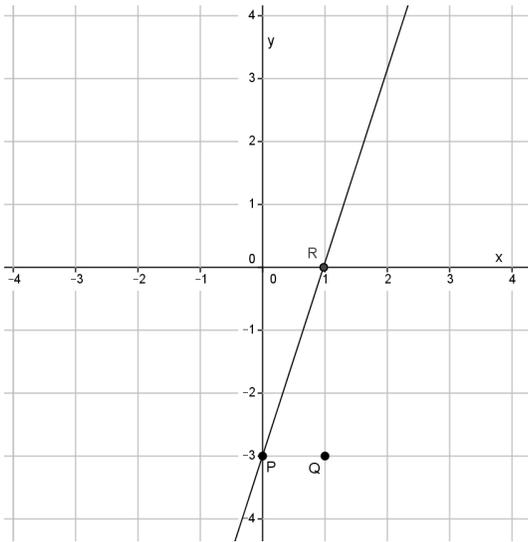
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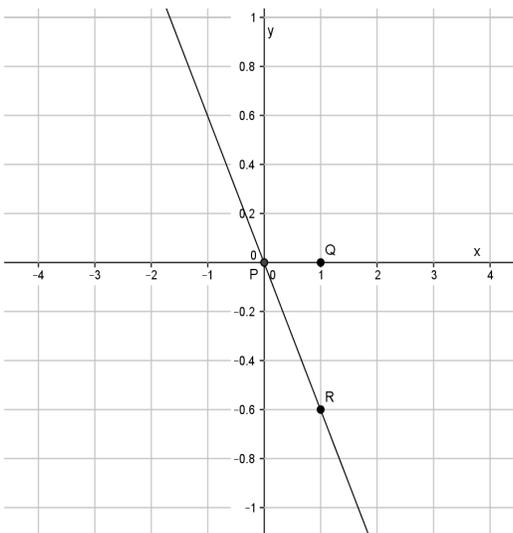
## Lesson 15: The Slope of a Non-Vertical Line

### Exit Ticket

1. What is the slope of this non-vertical line? Use your transparency if needed.



2. What is the slope of this non-vertical line? Use your transparency if needed.



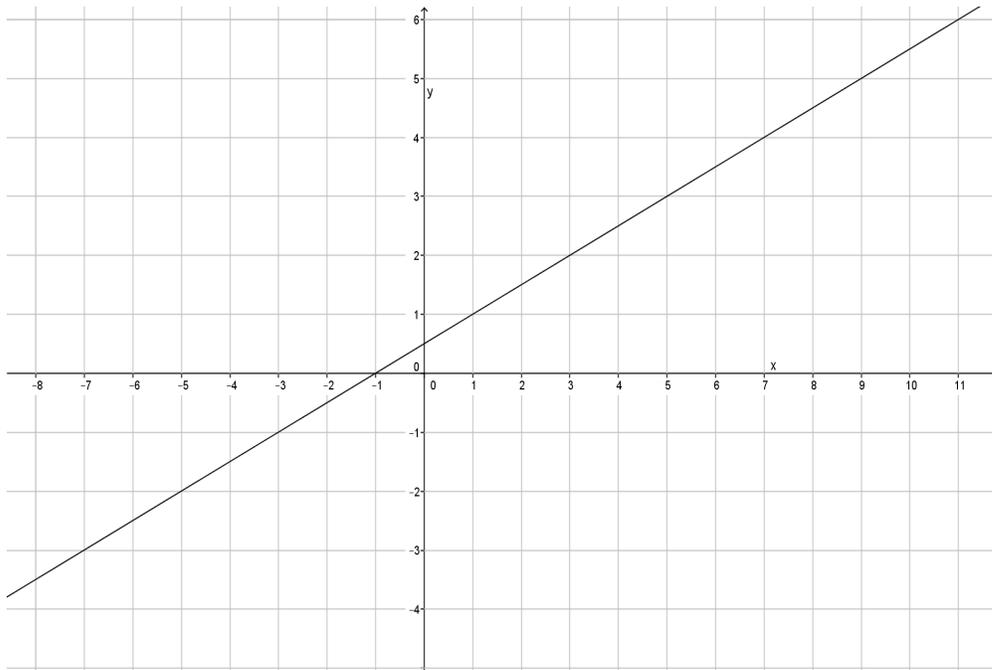
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## Lesson 16: The Computation of the Slope of a Non-Vertical Line

### Exit Ticket

Find the rate of change of the line by completing parts (a) and (b).



- Select any two points on the line to label as  $P$  and  $R$ . Name their coordinates.
- Compute the rate of change of the line.

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## Lesson 17: The Line Joining Two Distinct Points of the Graph

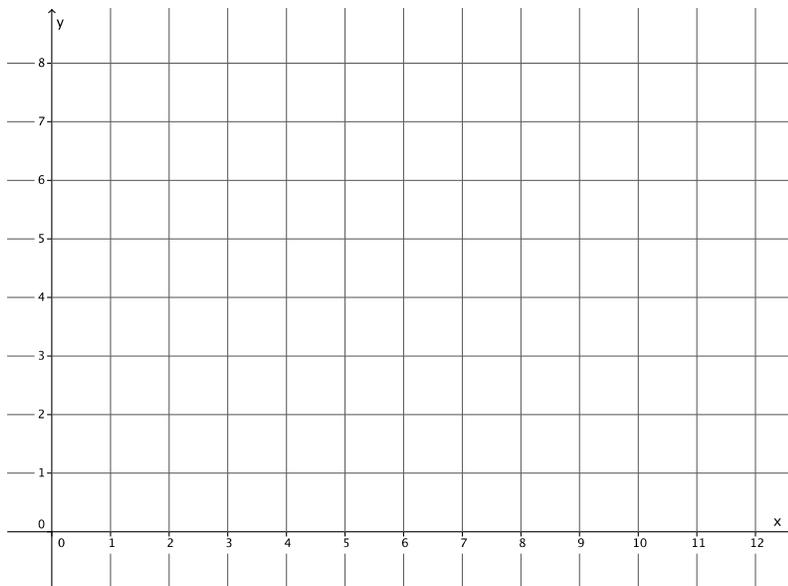
$$y = mx + b \text{ has Slope } m$$

### Exit Ticket

1. Solve the following equation for  $y$ :  $35x - 7y = 49$ .

2. What is the slope of the equation in Problem 1?

3. Show, using similar triangles, why the graph of an equation of the form  $y = mx$  is a line with slope  $m$ .



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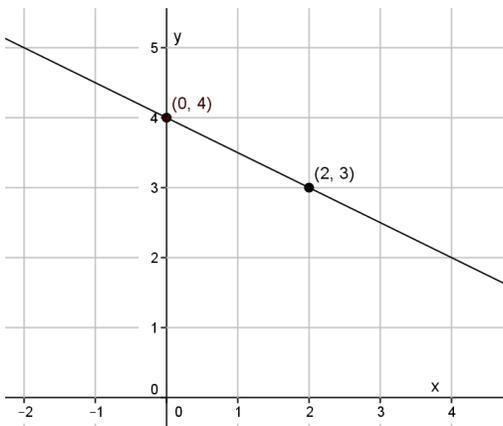
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## Lesson 18: There Is Only One Line Passing Through a Given Point with a Given Slope

### Exit Ticket

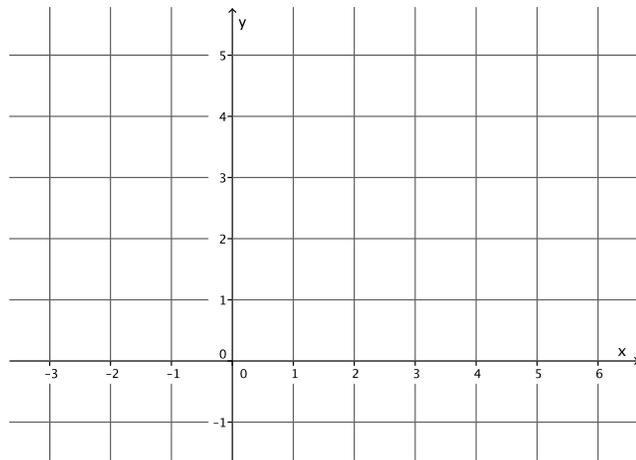
Mrs. Hodson said that the graphs of the equations below are incorrect. Find the student’s errors and correctly graph the equations.

1. Student graph of  $y = \frac{1}{2}x + 4$ .

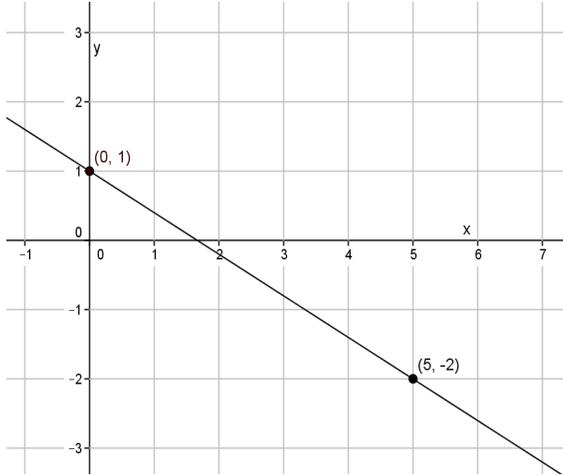


Error:

Correct graph of equation:

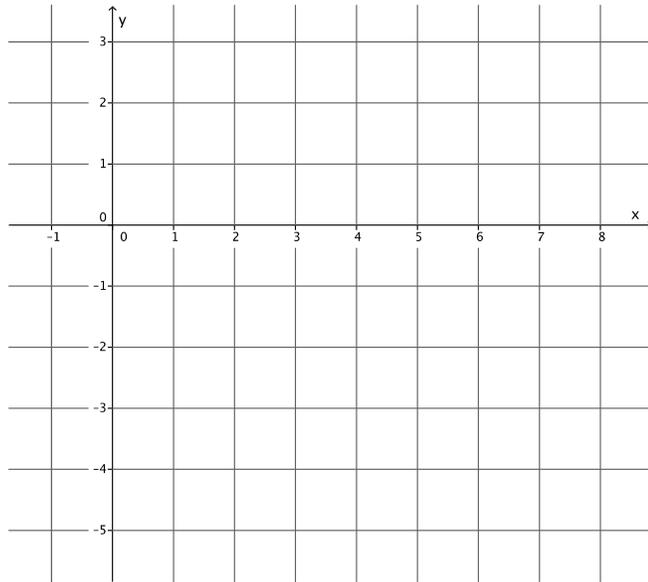


2. Student graph of  $y = -\frac{3}{5}x - 1$ .



Error:

Correct graph of equation:



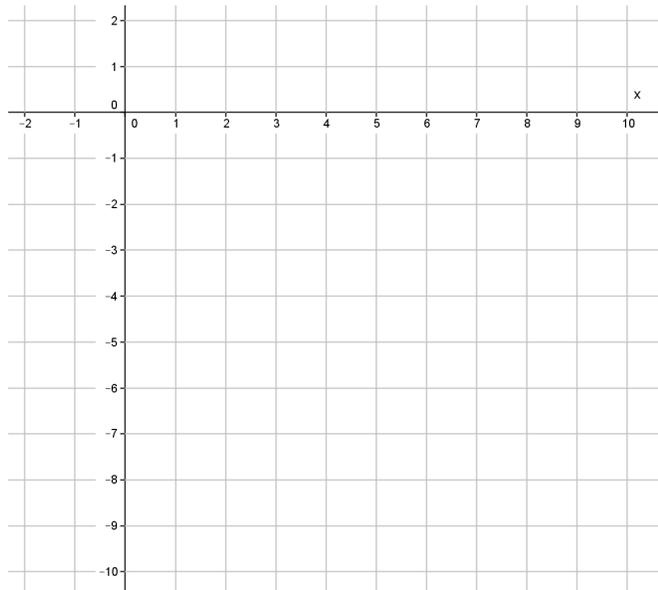
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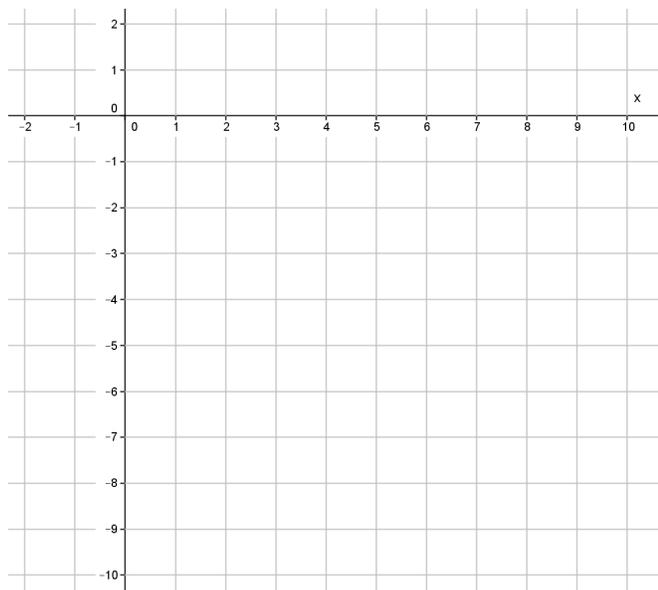
# Lesson 19: The Graph of a Linear Equation in Two Variables Is a Line

## Exit Ticket

- Graph the equation  $y = \frac{5}{4}x - 10$  using the  $y$ -intercept and slope.



- Graph the equation  $5x - 4y = 40$  using intercepts.



3. What can you conclude about the equations  $y = \frac{5}{4}x - 10$  and  $5x - 4y = 40$ ?

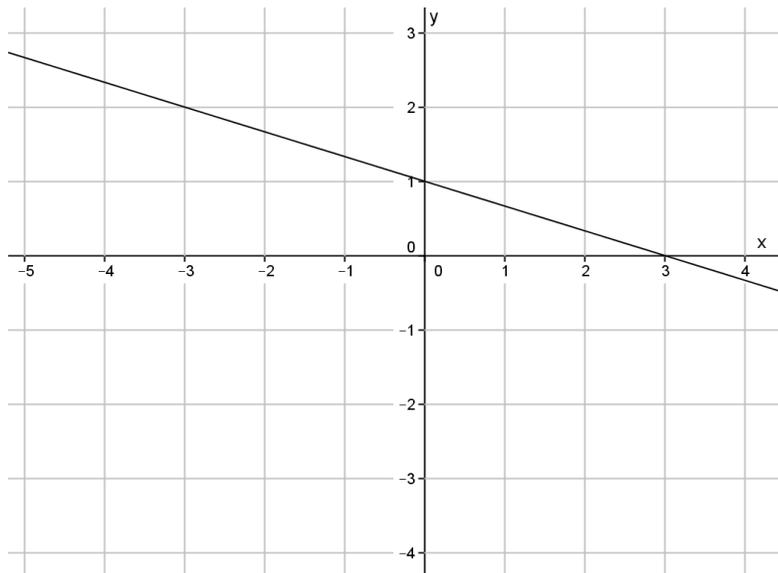
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## Lesson 20: Every Line Is a Graph of a Linear Equation

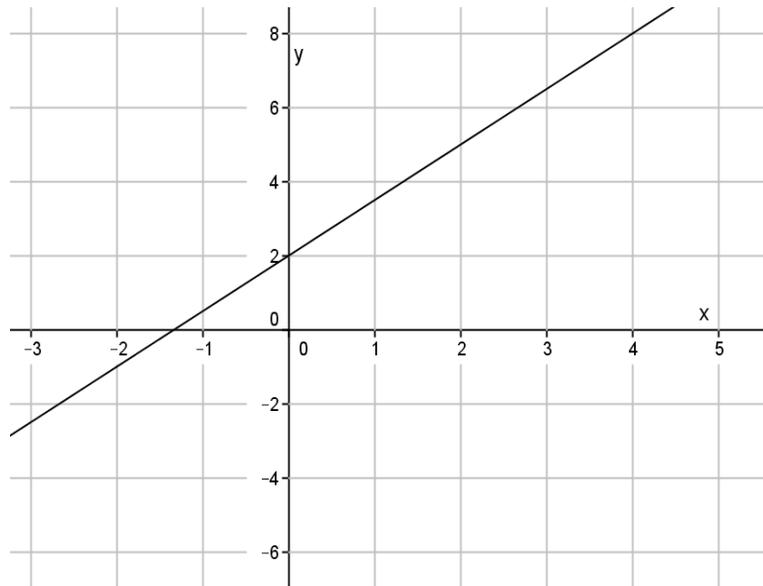
### Exit Ticket

1. Write an equation in slope-intercept form that represents the line shown.



2. Use the properties of equality to change the equation you wrote for Problem 1 from slope-intercept form,  $y = mx + b$ , to standard form,  $ax + by = c$ , where  $a$ ,  $b$ , and  $c$  are integers, and  $a$  is not negative.

3. Write an equation in slope-intercept form that represents the line shown.



4. Use the properties of equality to change the equation you wrote for Problem 3 from slope-intercept form,  $y = mx + b$ , to standard form,  $ax + by = c$ , where  $a$ ,  $b$ , and  $c$  are integers, and  $a$  is not negative.

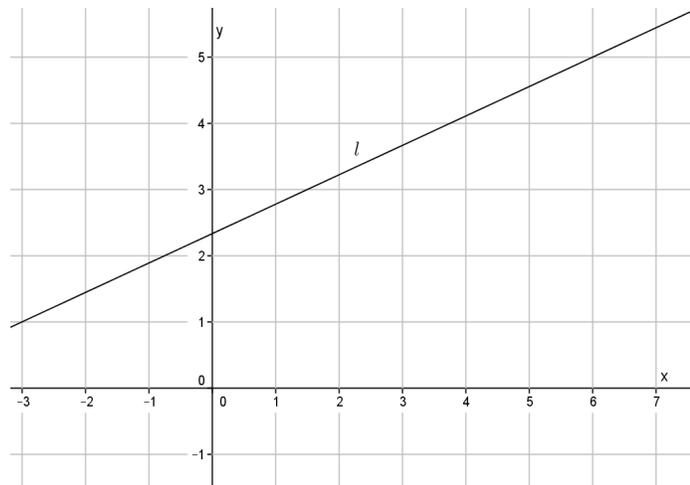
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## Lesson 21: Some Facts about Graphs of Linear Equations in Two Variables

### Exit Ticket

1. Write the equation for the line  $l$  shown in the figure below.



2. A line goes through the point  $(5, -7)$  and has slope  $m = -3$ . Write the equation that represents the line.

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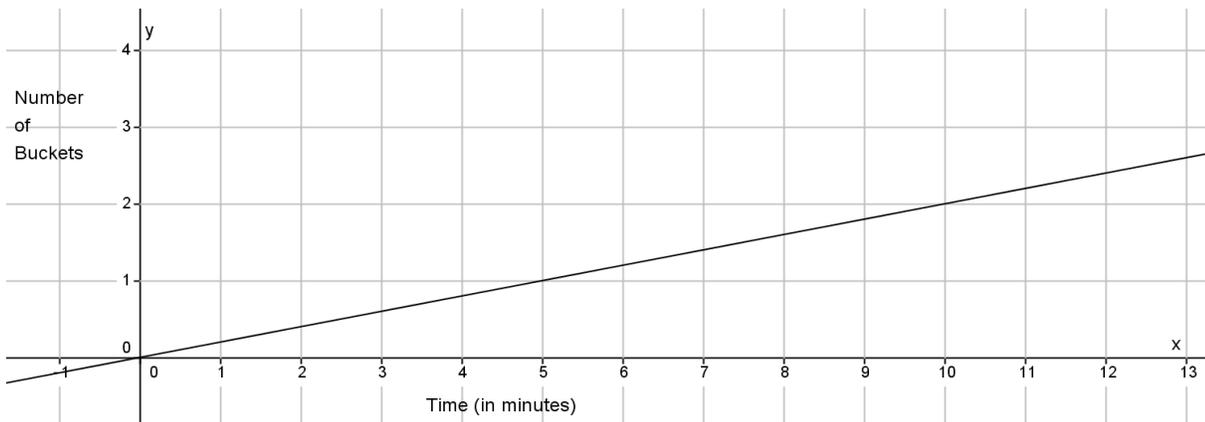
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## Lesson 22: Constant Rates Revisited

### Exit Ticket

1. Water flows out of Pipe A at a constant rate. Pipe A can fill 3 buckets of the same size in 14 minutes. Write a linear equation that represents the situation.

2. The figure below represents the rate at which Pipe B can fill the same sized buckets.

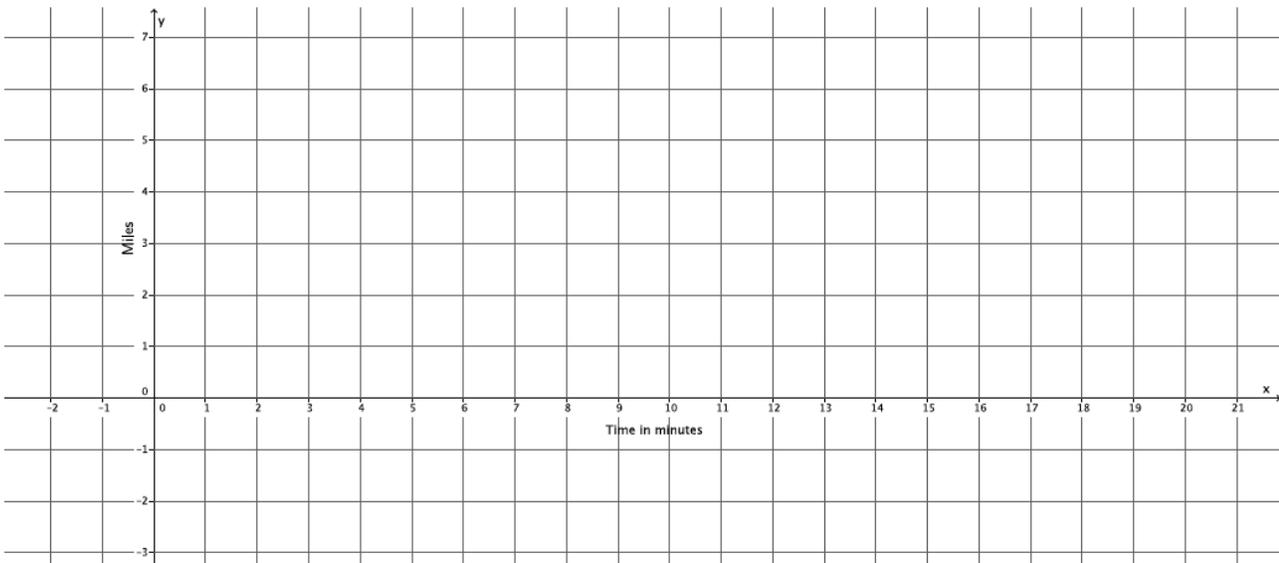


Which pipe fills buckets faster? Explain.





d. Sketch the graphs of the two equations.



e. Will Hector catch up to Darnell before he gets home? If so, approximately when?

f. At approximately what point do the graphs of the lines intersect?

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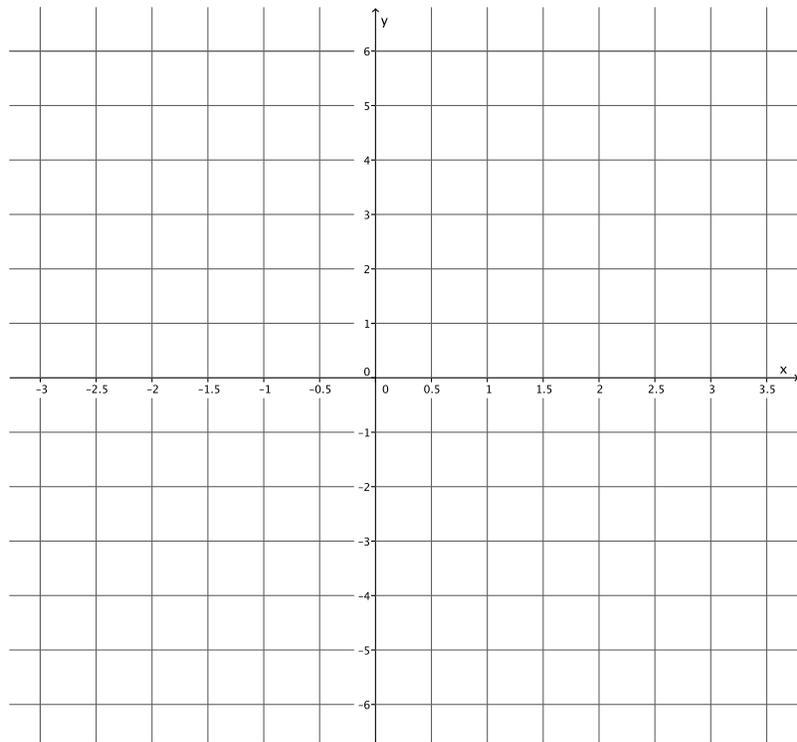
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## Lesson 25: Geometric Interpretation of the Solutions of a Linear System

### Exit Ticket

Sketch the graphs of the linear system on a coordinate plane:  $\begin{cases} 2x - y = -1 \\ y = 5x - 5 \end{cases}$

- a. Name the ordered pair where the graphs of the two linear equations intersect.



- b. Verify that the ordered pair named in part (a) is a solution to  $2x - y = -1$ .

- c. Verify that the ordered pair named in part (a) is a solution to  $y = 5x - 5$ .

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## Lesson 26: Characterization of Parallel Lines

### Exit Ticket

Does each system of linear equations have a solution? Explain your answer.

1. 
$$\begin{cases} y = \frac{5}{4}x - 3 \\ y + 2 = \frac{5}{4}x \end{cases}$$

2. 
$$\begin{cases} y = \frac{2}{3}x - 5 \\ 4x - 8y = 11 \end{cases}$$

3. 
$$\begin{cases} \frac{1}{3}x + y = 8 \\ x + 3y = 12 \end{cases}$$

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## Lesson 27: Nature of Solutions of a System of Linear Equations

### Exit Ticket

Determine the nature of the solution to each system of linear equations. If the system has a solution, then find it without graphing.

1. 
$$\begin{cases} y = \frac{1}{2}x + \frac{5}{2} \\ x - 2y = 7 \end{cases}$$

2. 
$$\begin{cases} y = \frac{2}{3}x + 4 \\ 2y + \frac{1}{2}x = 2 \end{cases}$$

3. 
$$\begin{cases} y = 3x - 2 \\ -3x + y = -2 \end{cases}$$

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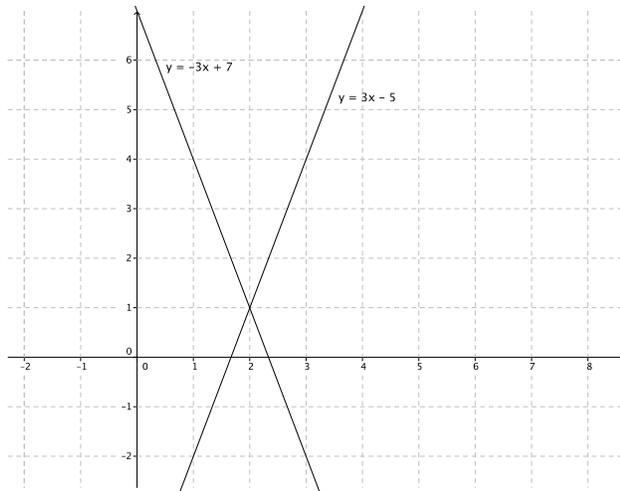
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# Lesson 28: Another Computational Method of Solving a Linear System

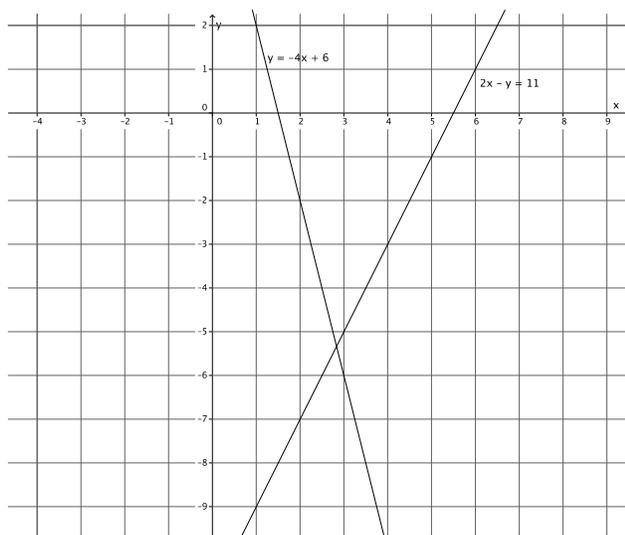
## Exit Ticket

Determine the solution, if it exists, for each system of linear equations. Verify your solution on the coordinate plane.

1. 
$$\begin{cases} y = 3x - 5 \\ y = -3x + 7 \end{cases}$$



2. 
$$\begin{cases} y = -4x + 6 \\ 2x - y = 11 \end{cases}$$





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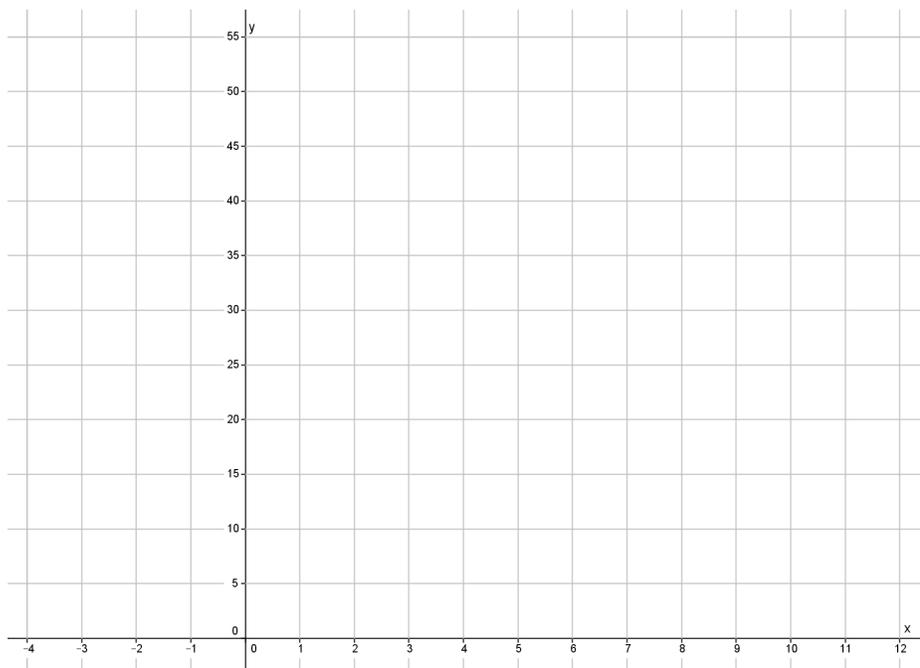
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## Lesson 30: Conversion Between Celsius and Fahrenheit

### Exit Ticket

Use the equation developed in class to answer the following questions:

1. How many degrees Fahrenheit is  $11^{\circ}\text{C}$ ?
2. How many degrees Fahrenheit is  $-3^{\circ}\text{C}$ ?
3. Graph the equation developed in class, and use it to confirm your results from Problems 1 and 2.



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## Lesson 31: System of Equations Leading to Pythagorean Triples

### Exit Ticket

Use a calculator to complete Problems 1–3.

1. Is 7, 20, 21 a Pythagorean triple? Is  $1, \frac{15}{8}, \frac{17}{8}$  a Pythagorean triple? Explain.

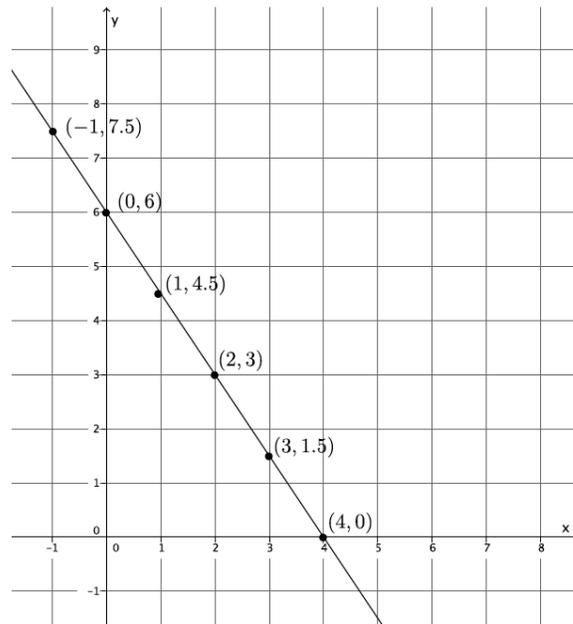
2. Identify two Pythagorean triples using the known triple 9, 40, 41.

3. Use the system  $\begin{cases} x + y = \frac{t}{s} \\ x - y = \frac{s}{t} \end{cases}$  to find Pythagorean triples for the given values of  $s = 2$  and  $t = 3$ . Recall that the solution in the form of  $\left(\frac{c}{b}, \frac{a}{b}\right)$  is the triple  $a, b, c$ . Verify your results.

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1. Use the graph below to answer parts (a)–(c).



- a. Use any pair of points to calculate the slope of the line.
- b. Use a different pair of points to calculate the slope of the line.
- c. Explain why the slopes you calculated in parts (a) and (b) are equal.

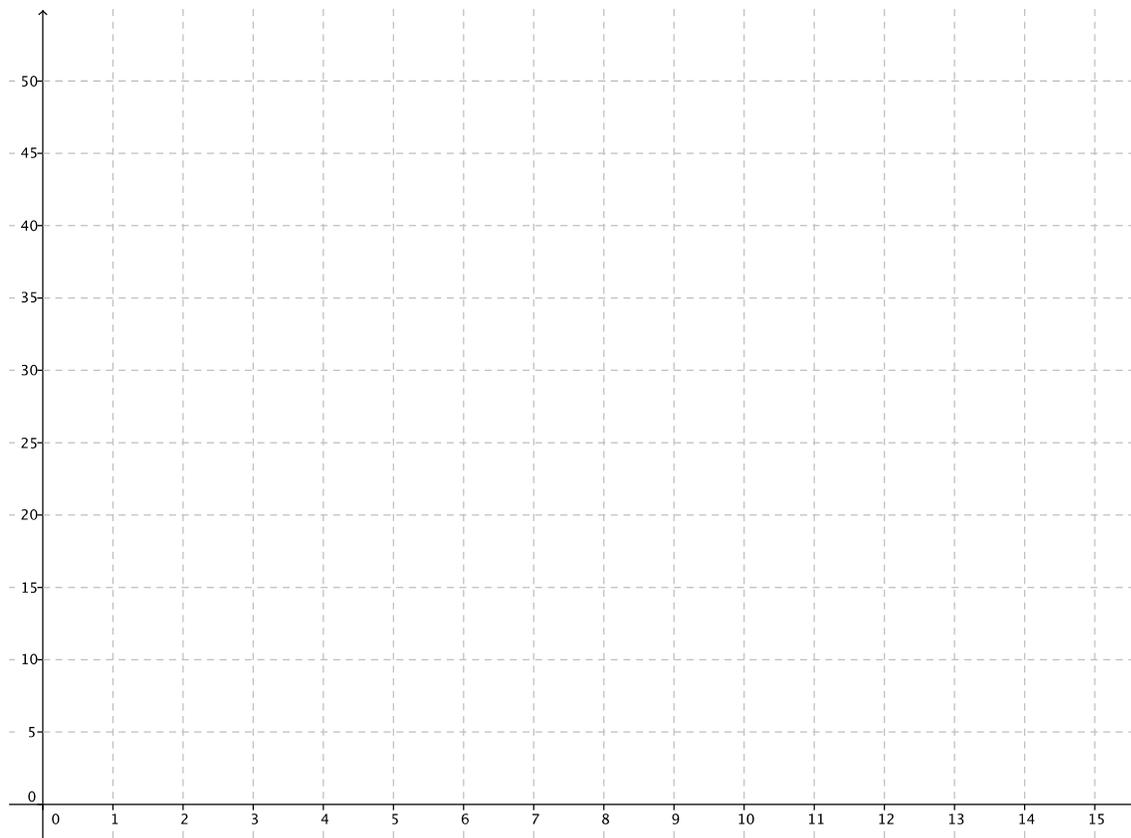
2. Jeremy rides his bike at a rate of 12 miles per hour. Below is a table that represents the number of hours and miles Kevin rides. Assume both bikers ride at a constant rate.

Time in hours ( $x$ )	Distance in miles ( $y$ )
1.5	17.25
2	23
3.5	40.25
4	46

- a. Which biker rides at a greater speed? Explain your reasoning.

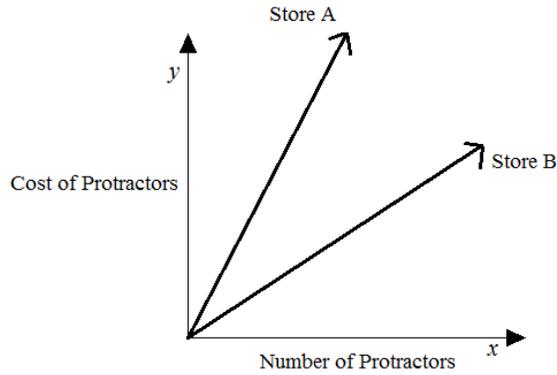
- b. Write an equation for a third biker, Lauren, who rides twice as fast as Kevin. Use  $y$  to represent the number of miles Lauren travels in  $x$  hours. Explain your reasoning.

- c. Create a graph of the equation in part (b).



- d. Calculate the slope of the line in part (c) and interpret its meaning in this situation.

3. The cost of five protractors is \$14.95 at Store A. The graph below compares the cost of protractors at Store A with the cost at Store B.



Estimate the cost of one protractor at Store B. Use evidence from the graph to justify your answer.

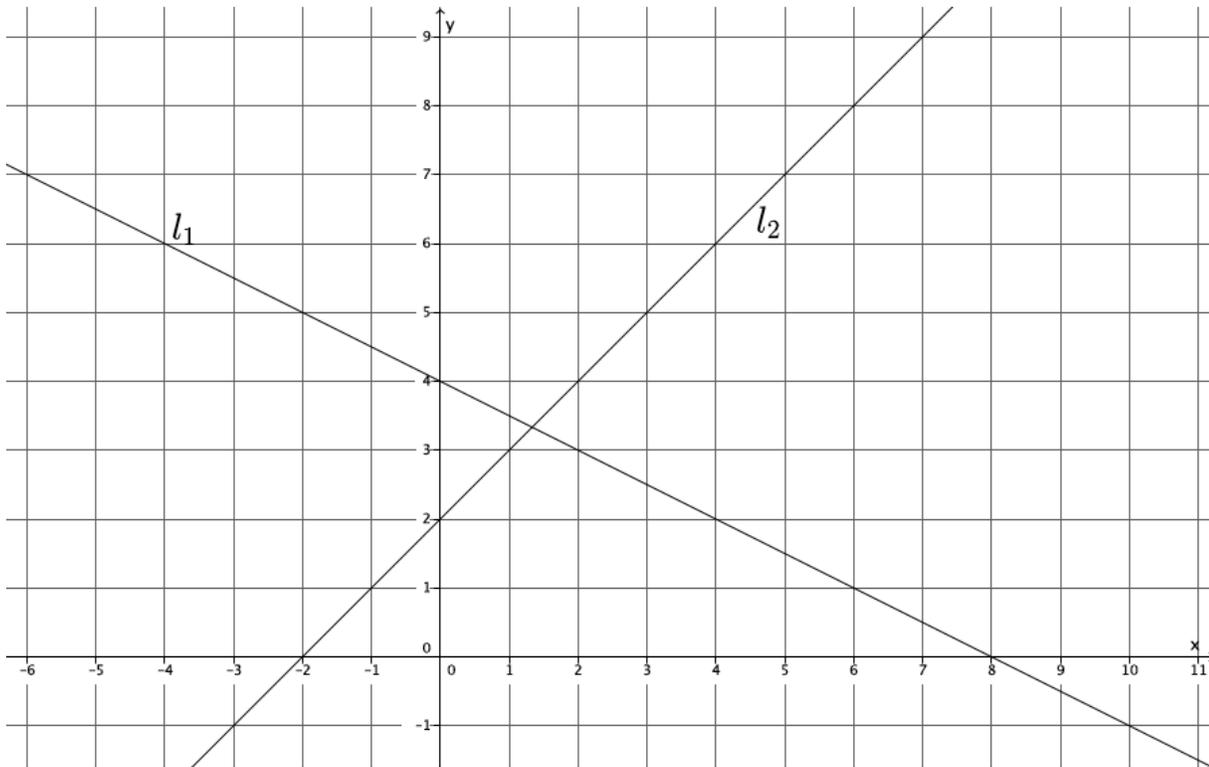
4. Given the equation,  $3x + 9y = -8$ , write a second linear equation to create a system that
- Has exactly one solution. Explain your reasoning.
  - Has no solution. Explain your reasoning.
  - Has infinitely many solutions. Explain your reasoning.
  - Interpret the meaning of the solution, if it exists, in the context of the graph of the following system of equations.

$$\begin{cases} -5x + 2y = 10 \\ 10x - 4y = -20 \end{cases}$$

5. Students sold 275 tickets for a fundraiser at school. Some tickets are for children and cost \$3, while the rest are adult tickets that cost \$5. If the total value of all tickets sold was \$1,025, how many of each type of ticket was sold?

6. a. Determine the equation of the line connecting the points  $(0, -1)$  and  $(2, 3)$ .
- b. Will the line described by the equation in part (a) intersect the line passing through the points  $(-2, 4)$  and  $(-3, 3)$ ? Explain why or why not.

7. Line  $l_1$  and line  $l_2$  are shown on the graph below. Use the graph to answer parts (a)–(f).



- a. What is the  $y$ -intercept of  $l_1$ ?
  
- b. What is the  $y$ -intercept of  $l_2$ ?
  
- c. Write a system of linear equations representing lines  $l_1$  and  $l_2$ .
  
- d. Use the graph to estimate the solution to the system.

- e. Solve the system of linear equations algebraically.
- f. Show that your solution from part (e) satisfies both equations.