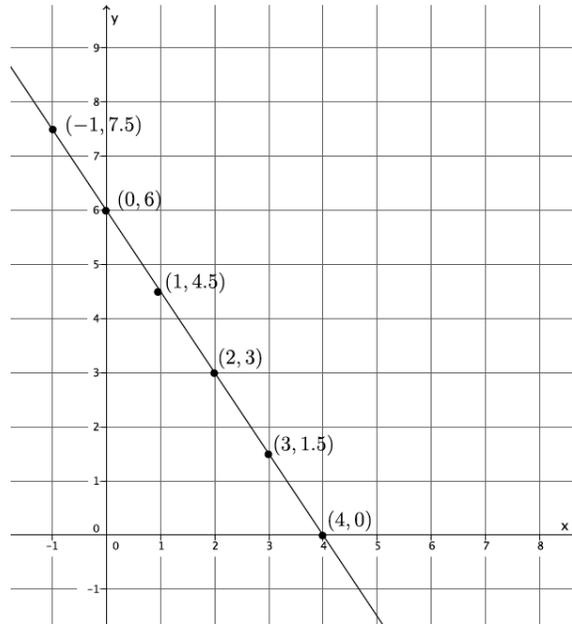


Name _____

Date _____

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

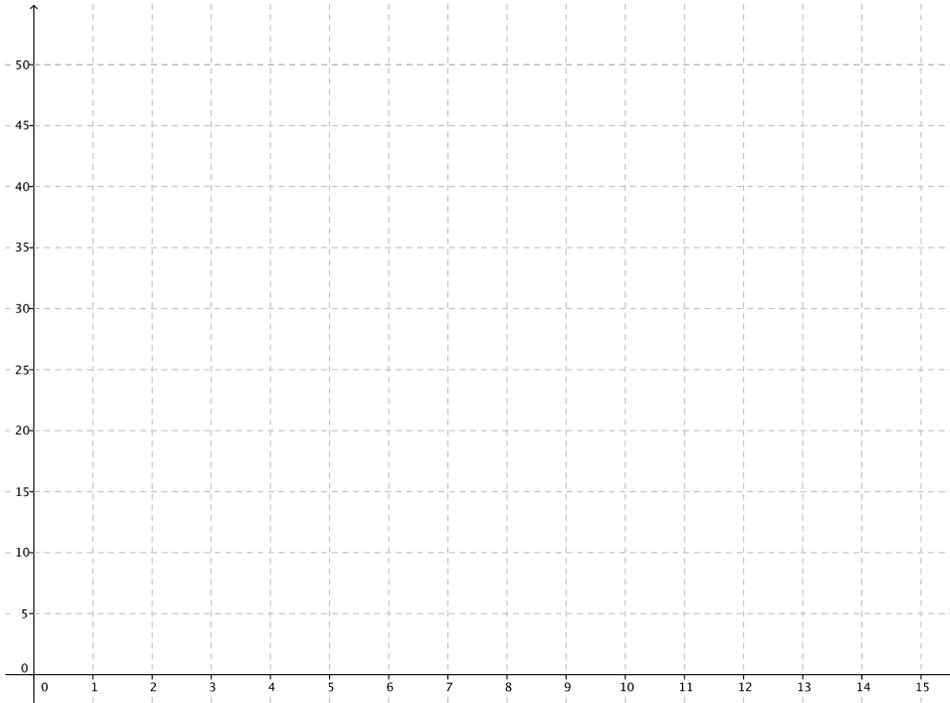


- a. Use any pair of points to calculate the slope of the line.
 - b. Use a different pair of points to calculate the slope of the line.
 - c. Explain why the slopes you calculated in parts (a) and (b) are equal.
2. Jeremy rides his bike at a rate of 12 miles per hour. Below is a table that represents 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

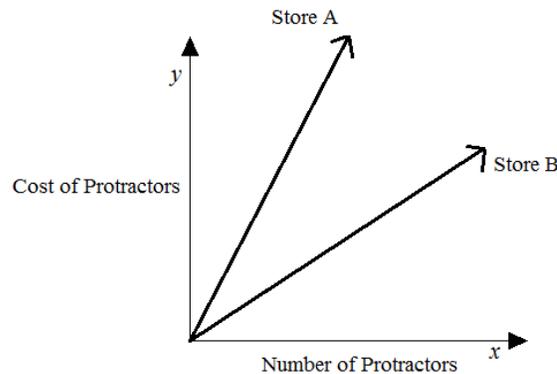
- a. Which biker rides at a greater speed? Explain your reasoning.

- 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.



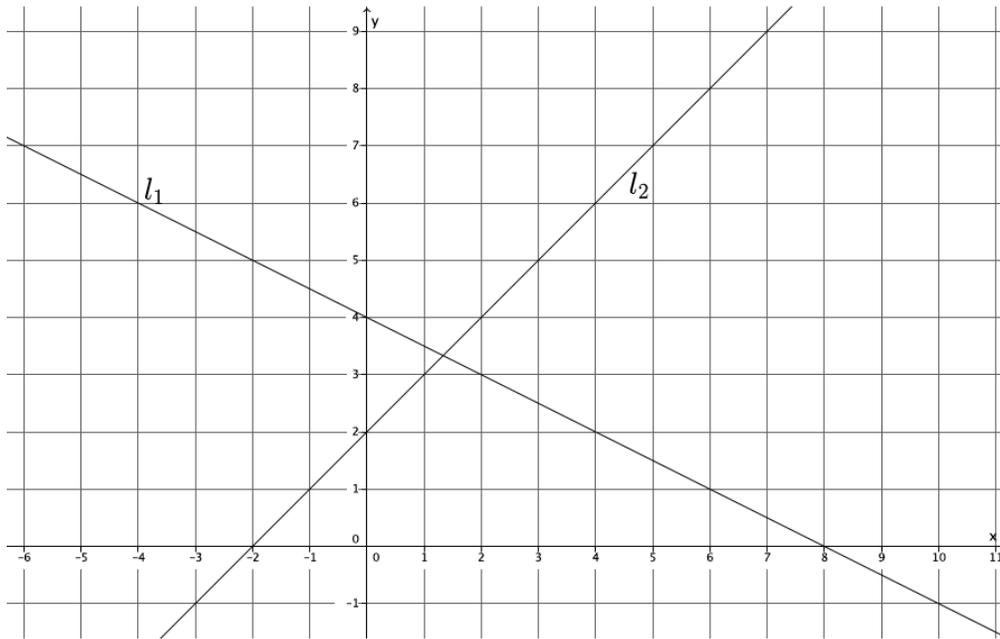
Estimate the cost of one protractor at Store B. Use evidence from the graph to justify your answer.

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 (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)–(d).



- What is the y -intercept of l_1 ?
- What is the y -intercept of l_2 ?
- Write a system of linear equations representing lines l_1 and l_2 .
- Use the graph to estimate the solution to the system.
- Solve the system of linear equations algebraically.
- Show that your solution from part (e) satisfies both equations.

A Progression Toward Mastery

Assessment Task Item		STEP 1 Missing or incorrect answer and little evidence of reasoning or application of mathematics to solve the problem.	STEP 2 Missing or incorrect answer but evidence of some reasoning or application of mathematics to solve the problem.	STEP 3 A correct answer with some evidence of reasoning or application of mathematics to solve the problem, <u>OR</u> an incorrect answer with substantial evidence of solid reasoning or application of mathematics to solve the problem.	STEP 4 A correct answer supported by substantial evidence of solid reasoning or application of mathematics to solve the problem.
1	a–b 8.EE.B.5	Student made no attempt to find the slope in part (a) and/or part (b).	Student computed the slope in parts (a) and (b), but made computational errors leading to slopes that were not equal. Student may have used the same two points for both parts (a) and (b).	Student computed slope, both times, but may have forgotten to include the negative sign, or made another simple computational error. Student found the slopes in both parts (a) and (b) to be equal.	Student correctly computed the slope, both times, and found $m = -\frac{3}{2}$ (or an equivalent fraction to $-\frac{3}{2}$). Student found the slopes in both parts (a) and (b) to be equal.
	c 8.EE.B.6	Student made no attempt to answer the question.	Student stated that the slopes in parts (a) and (b) were not equal.	Student made a weak argument by stating that the slopes are equal because the fractions are equal, or that the fractions representing the slope are equivalent.	Student made a convincing argument and referenced similar triangles to explain why the slopes between any two points on a line are equal.
2	a 8.EE.B.5	Student made no attempt to answer the question or wrote “Kevin” or “Jeremy” with no evidence of an application of mathematics to solve the problem.	Student wrote an incorrect answer but showed some evidence of reasoning in their explanation.	Student wrote the correct answer. Students’ explanation lacked precision or was incorrect. For example, student may have written that Jeremy travels a farther distance in 2 hours, instead of referencing the rates of each biker.	Student wrote the correct answer. Student provided a strong mathematical explanation as to which biker rides at a greater speed by referencing a graph (slopes of each line where one slope is steeper) or a numerical comparison of their rates.

	<p>b–d</p> <p>8.EE.B.5</p>	<p>Student made little or no attempt to complete parts (b)–(d). Student may have plotted points on the graph with no relevance to the problem.</p>	<p>Student wrote an incorrect equation in part (b) and/or graphed the equation incorrectly and/or calculated the slope incorrectly. Student did not connect the slope of the line to Lauren’s rate.</p>	<p>Student may have correctly identified the equation, graphed, and calculated slope and identified it as Lauren’s rate but may not have explained their reasoning in part (b). <u>OR</u> Student may have made a mistake in writing the equation for part (b) which led to an incorrect graph and slope in parts (c)–(d).</p>	<p>Student correctly wrote the equation, $y = 23x$ in part (b) or an equivalent equation. Student explained “twice as fast” in terms of distance traveled for a given time interval compared to the data for Kevin given in the table. Student correctly graphed the situation in (c) and correctly identified the slope of the line, 23, as the rate that Lauren rides for part (d).</p>
3	<p>8.EE.B.5</p>	<p>Student made no attempt to answer the question <u>OR</u> wrote a dollar amount with no explanation.</p>	<p>Student may or may not have correctly calculated the unit rate of protractors for Store A. Student wrote an estimate for Store B, but did not justify their estimate using evidence from the graph.</p>	<p>Student used the information provided about Store A to determine the unit rate of protractors buy may have made a computation error leading to a poor estimate. Student may or may not have used evidence from the graph to justify their estimate or made a weak connection between their estimate and the graph.</p>	<p>Student used the information provided about Store A to determine the unit rate of protractors and referenced the unit rate at Store A in the justification of their estimate. Student wrote an estimate that made sense (e.g., less than Store A, about half as much) and used evidence from the graph in their justification (e.g., comparison of slopes, size of angles).</p>
4	<p>a–c</p> <p>8.EE.C.7a 8.EE.C.8</p>	<p>Student made no attempt to answer any parts of (a)–(c) <u>OR</u> just rewrote the given equation as an answer.</p>	<p>Student answered at least one part of (a)–(c) correctly. Student may have left two parts blank. Student may or may not have explained their reasoning.</p>	<p>Student answered at least two parts of (a)–(c) correctly. Student may have left one part blank. Student explained their reasoning in at least two parts of (a)–(c) noting the characteristics required to achieve the desired number of solutions.</p>	<p>Student provided a correct equation and explanation for each of the parts of (a)–(c). Specifically, for part (a) an equation that represents a distinct line from the given equation will have a slope different than $-\frac{1}{3}$, for part (b) an equation that represents a line parallel to the given equation will have the same slope, and for part (c) an equation that represents the same line as the given equation whose graphs coincide.</p>

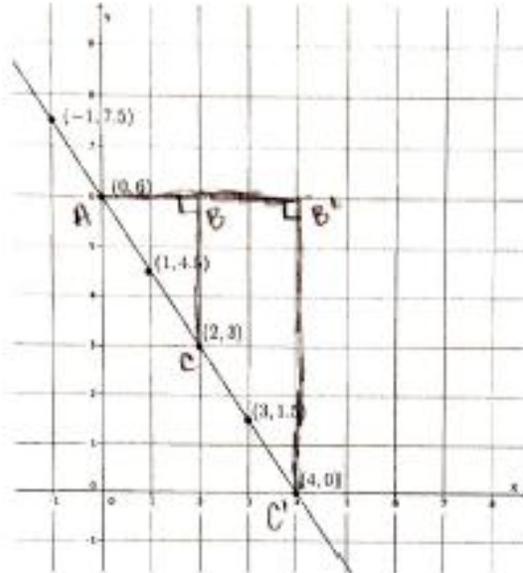
	d 8.EE.C.8	Student made little or no attempt to answer the question. Student did not provide a mathematical explanation or apply any mathematical reasoning to support their answer.	Student gave an incorrect answer. Student may have said that the point of intersection of the lines is the solution to the system, or that there is no solution because the lines are parallel.	Student may have tried to find the solution algebraically. Student stated that there are infinitely many solutions to the system, but may not have referenced what the graph would look like (i.e., each equation produced the same line on the graph). Student supplied weak mathematical reasoning to support their answer.	Student correctly stated that the graphs of the equations produce the same line. Student explained that one equation can be obtained by the other by multiplying the first equation by -2 , or the second equation by $-\frac{1}{2}$. <u>OR</u> Student explained that both lines had the same slope of $\frac{5}{2}$ and the same y -intercept of $(0,5)$. Student supplied strong mathematical reasoning to support their answer.
5	8.EE.C.8	Student made little or no attempt to write and solve a system of linear equations.	Student may have written an incorrect system of equations to represent the situation. Student may or may not have defined their variables. Student may have used another strategy to determine the numbers of tickets of each type were sold. There is some evidence of mathematical reasoning.	Student correctly wrote a system of linear equations to represent the situation, but made a computational error leading to an incorrect solution <u>OR</u> student correctly wrote and solved a system but did not define their variables.	Student correctly wrote and solved a system of linear equations to solve the problem. Student defined the variables used in the system. Student stated clearly that 175 children’s tickets and 100 adult’s tickets were sold.
6	a 8.EE.C.8	Student made little or no attempt to write the equation.	Student incorrectly computed the slope of the line as something other than 2. Student did not write the correct equation of the line.	Student used the points to correctly determine the slope of the line as 2, but may have written an incorrect equation.	Student used the points to determine the slope of the line, then wrote the equation of the line passing through those two points as $y = 2x - 1$ or equivalent.
	b 8.EE.C.8	Student made little or no attempt to answer the question. <u>OR</u> Student responded with “yes” or “no” only.	Student incorrectly computed the slope of the line as something other than 1 and may or may not have drawn an incorrect conclusion about whether or not the lines would intersect.	Student used the points to correctly determine the slope of the line as 1, but made an incorrect conclusion about whether or not the lines would intersect. <u>OR</u> Student made a computational error for the slope and drew the	Students used the points to determine the slope as 1 <u>AND</u> correctly concluded that the lines will intersect because the slopes are different.

				wrong conclusion about the lines. <u>OR</u> Student said the lines would intersect, but did not provide an explanation.	
7	a–b 8.EE.C.8	Student left both parts (a) and (b) blank. <u>OR</u> Student identified coordinates that do not fall on either the x or y axis.	Student identified one of the two y -intercepts, but may have inversed the coordinates. Student may have left one of (a) or (b) blank.	Student identified the y -intercepts of l_1 and l_2 , but may have inversed the coordinates, i.e., (4, 0) and (2, 0), or identified the slope of l_1 as (0, 2), and l_2 as (0, 4).	Student correctly identified the y -intercepts of l_1 and l_2 , (0, 4) and (0, 2), respectively.
	c–d 8.EE.C.8	Student left the item blank. <u>OR</u> Student only wrote one equation that may or may not have represented one of the lines on the graph. Student may or may not have written an estimate or wrote an estimate where the x -value was not between 1 and 2 and the y -value was not between 3 and 4.	Student wrote two equations to represent the system but the equations did not represent the lines on the graph. Student may or may not have written an estimate or wrote an estimate where the x -value was not between 1 and 2 and the y -value was not between 3 and 4.	Student wrote a system of equations but one of the equations may have been written incorrectly. Student wrote an estimate where the x -value was between 1 and 2 and the y -value was between 3 and 4.	Student correctly wrote the system as $\begin{cases} x - y = -2 \\ x + 2y = 8 \end{cases}$ or a system equivalent to this given one. Student wrote an estimate where the x -value was between 1 and 2 and the y -value was between 3 and 4.
	e–f 8.EE.C.8	Student was unable to solve the system algebraically.	Student solved the system algebraically, but made serious computational errors leading to an incorrect solution. Student was unable to complete part (f) or may have realized their error and did not correct it.	Student solved the system, but may have made a computational error leading to an incorrect x or y coordinate. Student verified their solution in part (f). Student may have made a computational error leading them to believe their solution was correct.	Student correctly solved the system and identified the solution as $\left(\frac{4}{3}, \frac{10}{3}\right)$. Student verified their solution in part (f).

Name _____

Date _____

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



a. Use any pair of points to calculate the slope of the line.

$$m = \frac{6-3}{0-2} = \frac{3}{-2} = -\frac{3}{2}$$

b. Use a different pair of points to calculate the slope of the line.

$$m = \frac{6-0}{0-4} = \frac{6}{-4} = -\frac{3}{2}$$

c. Explain why the slopes you calculated in parts (a) and (b) are equal.

THE SLOPES ARE EQUAL BECAUSE THE SLOPE TRIANGLES ARE SIMILAR, $\triangle ABC \sim \triangle AB'C'$. EACH TRIANGLE HAS A 90° ANGLE AT $\angle ABC$ & $\angle AB'C'$, RESPECTIVELY. THEY ARE 90° BECAUSE THEY ARE AT THE INTERSECTION OF THE GRID LINES. BOTH TRIANGLES SHARE $\angle BAC$. BY THE AA CRITERION $\triangle ABC \sim \triangle AB'C'$ WHICH MEANS THEIR CORRESPONDING SIDES ARE EQUAL IN RATIO. SPECIFICALLY, $\frac{AB'}{AC'} = \frac{AB}{AC}$ WHICH IS THE SAME AS $\frac{AB'}{AC'} = \frac{AB}{AC}$ WHERE $\frac{AB'}{AC'}$ IS THE SLOPE IN (b) AND $\frac{AB}{AC}$ IS THE SLOPE IN (a).

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

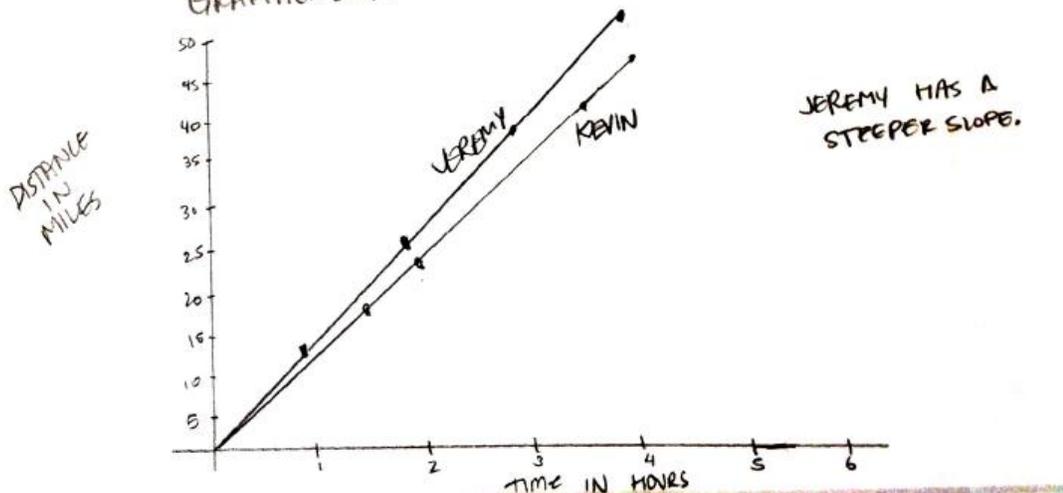
- a. Which biker rides at a greater speed? Explain.

LET y BE THE DISTANCE TRAVELED AND x BE THE NUMBER OF HOURS.
 THEN FOR JEREMY, $\frac{y}{x} = \frac{12}{1} \Rightarrow y = 12x$.

FOR KEVIN, $\frac{46-23}{4-2} = \frac{23}{2} = 11.5$, THEN $y = 11.5x$

WHEN YOU COMPARE THEIR RATES, $12 > 11.5$, THEREFORE
 JEREMY RIDES AT A GREATER SPEED.

GRAPHICALLY:



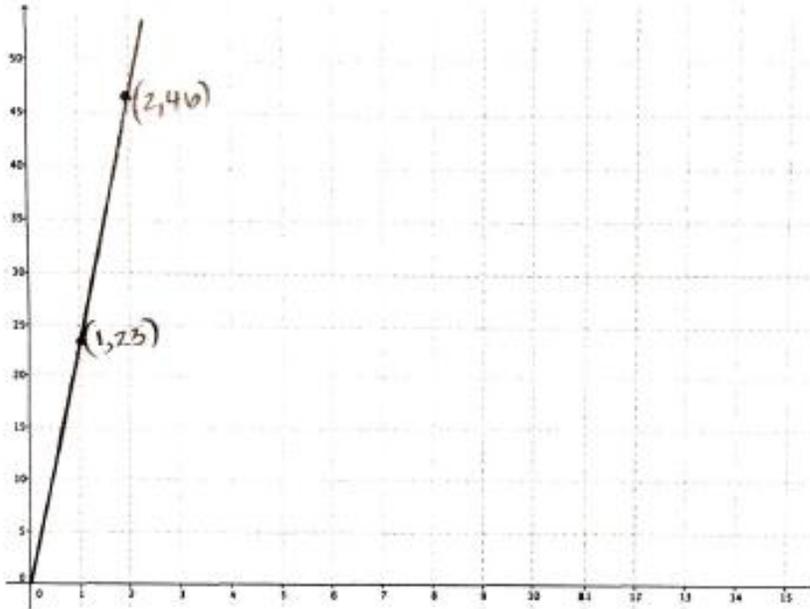
- b. Write an equation for a third biker, Lauren, who rides twice as fast as Kevin. Use y to represent the number of miles Lauren travels in x hours. Explain your reasoning.

"TWICE AS FAST" MEANS LAUREN GOES TWICE THE DISTANCE IN THE SAME TIME. THEN IN 2 HOURS SHE RIDES 46 MILES AND 8 HOURS, 92 MILES. IF y IS TOTAL DISTANCE IN x HOURS,

$$y = \frac{46}{2}x$$

$$y = 23x$$

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

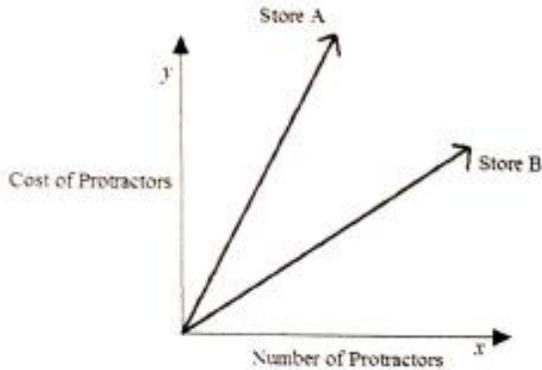


- d. Calculate the slope of the line in part (c) and interpret its meaning in this situation.

$$m = \frac{46 - 23}{2 - 1} = \frac{23}{1}$$

THE SLOPE IS THE RATE THAT LAUREN RIDES, 23 MILES PER HOUR.

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.

$$\begin{array}{r} 299 \\ 5 \overline{)1495} \\ \underline{10} \\ 49 \\ \underline{45} \\ 45 \\ \underline{45} \\ 0 \end{array}$$

THE COST OF PROTRACTORS AT STORE B IS PROBABLY ABOUT \$1.50. STORE A CHARGES \$2.99 PER PROTRACTOR AND IT LOOKS LIKE THE SLOPE FOR STORE B IS ABOUT HALF OF THE SLOPE FOR STORE A.

* ANSWERS WILL VARY

4. Given the equation, $3x + 9y = -8$, write a second linear equation to create a system that:

a. Has exactly one solution. Explain your reasoning.

$4x + 9y = -10$ THIS EQUATION HAS A SLOPE DIFFERENT FROM $3x + 9y = -8$ SO THE GRAPHS OF THE EQUATIONS WILL INTERSECT.

b. Has no solution. Explain your reasoning.

$x + 3y = 10$ THIS EQUATION HAS THE SAME SLOPE AS $3x + 9y = -8$, AND NO COMMON POINTS (SOLUTIONS) THEREFORE THE GRAPHS OF THE EQUATIONS ARE PARALLEL LINES

c. Has infinitely many solutions. Explain your reasoning.

$6x + 18y = -16$ THIS EQUATION DEFINES THE SAME LINE AS $3x + 9y = -8$ AND THE GRAPHS OF THE EQUATIONS WILL COINCIDE.

d. Interpret the meaning of the solution, if it exists, in the context of the graph of the following system of equations.

$$\begin{cases} -5x + 2y = 10 & m = \frac{5}{2} \quad (0, 5) \\ 10x - 4y = -20 & m = \frac{5}{2} \quad (0, 5) \end{cases}$$

THIS SYSTEM WILL HAVE INFINITELY MANY SOLUTIONS BECAUSE THE GRAPHS OF THESE LINEAR EQUATIONS ARE THE SAME LINE. EACH EQUATION HAS A SLOPE OF $m = \frac{5}{2}$ AND A Y-INTERCEPT AT $(0, 5)$. THERE EXISTS ONLY ONE LINE THROUGH A POINT AND A GIVEN SLOPE. THEREFORE THIS SYSTEM GRAPHS AS THE SAME LINE AND HAS INFINITELY MANY SOLUTIONS.

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?

LET x BE THE # OF KIDS TICKETS
LET y BE THE # OF ADULTS TICKETS

$$\begin{cases} x + y = 275 \\ 3x + 5y = 1025 \end{cases}$$

$$\begin{array}{r} 3x + 5y = 1025 \\ -3x - 3y = -825 \\ \hline \end{array}$$

$$2y = 200$$

$$y = 100$$

$$x + 100 = 275$$

$$x = 175$$

$(175, 100)$

175 CHILDREN'S TICKETS AND 100 ADULTS TICKETS
WERE SOLD.

6.

- a. Determine the equation of the line connecting the points $(0, -1)$ and $(2, 3)$.

$$m = \frac{3 - (-1)}{2 - 0} = \frac{4}{2} = 2$$

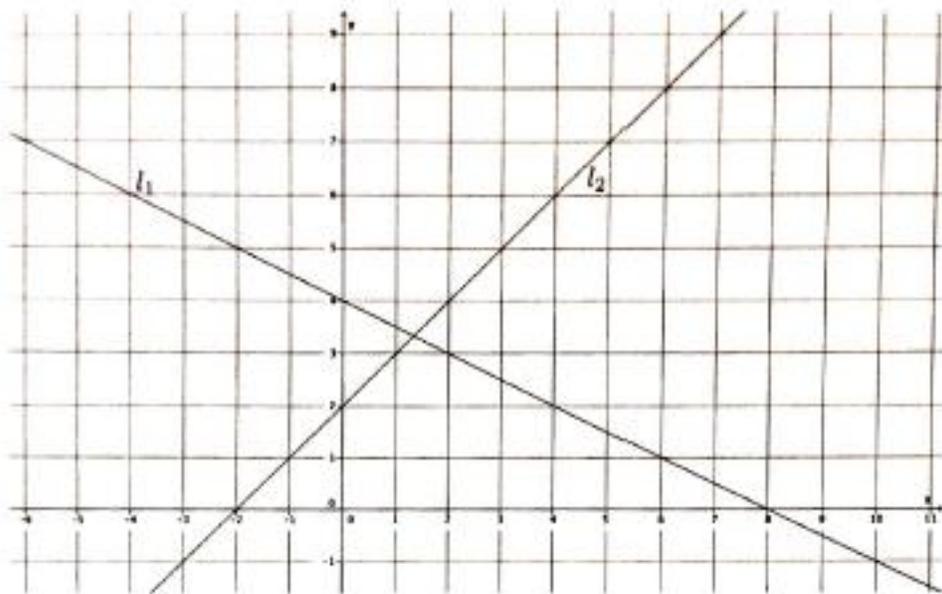
$$y = 2x - 1$$

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

$$m = \frac{4 - 3}{-2 - (-3)} = \frac{1}{1}$$

YES, THE LINES WILL INTERSECT BECAUSE THEY HAVE DIFFERENT SLOPES THEY WILL EVENTUALLY INTERSECT.

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



a. What is the y-intercept of l_1 ?

$(0, 4)$

b. What is the y-intercept of l_2 ?

$(0, 2)$

c. Write a system of linear equations representing lines l_1 and l_2 .

$$\begin{cases} l_1: y = -\frac{1}{2}x + 4 \\ l_2: y = x + 2 \end{cases}$$

d. Use the graph to estimate the solution to the system.

$(1.2, 3.3)$

e. Solve the system of linear equations algebraically.

$$\begin{cases} y = -\frac{1}{2}x + 4 \\ y = x + 2 \end{cases} \quad \begin{aligned} -\frac{1}{2}x + 4 &= x + 2 \\ 4 &= \frac{3}{2}x + 2 \\ 2 &= \frac{3}{2}x \\ \frac{4}{3} &= x \end{aligned} \quad \begin{aligned} y &= \frac{4}{3} + 2 \\ &= \frac{10}{3} \\ &\left(\frac{4}{3}, \frac{10}{3}\right) \end{aligned}$$

f. Show that your solution from part (e) satisfies both equations.

$$\begin{aligned} \frac{10}{3} &\stackrel{?}{=} -\frac{1}{2}\left(\frac{4}{3}\right) + 4 \\ \frac{10}{3} &= -\frac{2}{3} + 4 \\ \frac{10}{3} &= \frac{10}{3} \end{aligned} \quad \begin{aligned} \frac{10}{3} &\stackrel{?}{=} \frac{4}{3} + 2 \\ \frac{10}{3} &= \frac{10}{3} \end{aligned}$$