Getting Ready for the 2015 Florida Standards Assessment (FSA)

Grade 8 Mathematics

Educators Resource — FSA Mathematics
Equation Editor Item Tutorial [PDF]
FSA Scientific Calculator
Florida Computer-Based Testing Work Folder [PDF]
Spring 2016 Testing Times
Grade 6 Mathematics Test Item Specifications [PDF] Grade 7 Mathematics Test Item Specifications [PDF] Grade 8 Mathematics Test Item Specifications [PDF]
Mathematics Test Design Summary[PDF]

Florida Department of Education
http://www.flstandards.org/home.aspx

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MAFS.8.NS.1.1

1. Select all of the numbers that are rational.

☐ $\sqrt{9}$	☐ $\sqrt{2}$	☐ $0.\overline{345}$
☐ 4.6	☐ 3.14	☐ 1.123123412345…
☐ $-4\frac{2}{3}$	☐ $\frac{-1}{2}$	☐ $\frac{22}{7}$
☐ -12	☐ π	

2. Explain how you can determine whether or not a number is rational in the Open Response Box.

3. To what number system do the numbers that are not rational belong?

4. Convert the fraction $\frac{5}{11}$ to a decimal, showing all work.

5. When $\frac{5}{11}$ is written as a decimal, does it repeat? Explain why or why not.

MAFS.8.NS.1.1 FSA PRACTICE

A CALCULATOR IS NOT ALLOWED

1. Which decimal is the equivalent of $\frac{6}{11}$?

   Ⓐ $0.18\overline{3}$

   Ⓑ $0.1\overline{83}$

   Ⓒ $0.5\overline{4}$

   Ⓓ $0.\overline{54}$

2. Determine whether 0.12345 is rational or irrational and explain why in the Open Response Box below.

3. Select all of the numbers that are irrational.

   ☐ $-\frac{2}{3}$

   ☐ $\sqrt{144}$

   ☐ $\sqrt{50}$

   ☐ $-\sqrt{144}$

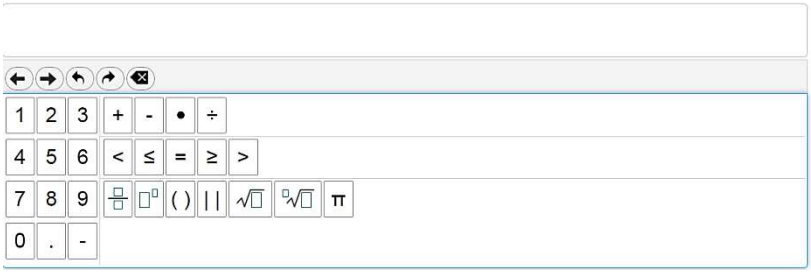
   ☐ $-2.\overline{3145}$

   ☐ π

4. Select rational or irrational for each number shown.

Number	Rational	Irrational
$\sqrt{2}$	☐	☐
$-\sqrt{11}$	☐	☐
$\sqrt{\frac{16}{9}}$	☐	☐
0.3030030003	☐	☐

5a. Write $0.58\overline{3}$ as a rational number in the Equation Response Field.

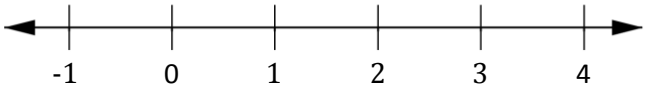


5b. Draw the sequence of buttons you would click on the equation editor to display the correct answer.

MAFS.8.NS.1.2

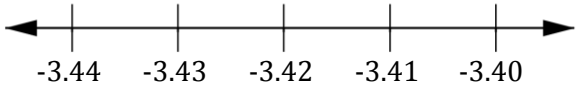
A CALCULATOR IS NOT ALLOWED

1. Graph $\sqrt{6}$ on the number line below and explain how you determined its location.



2. Graph π on the number line below and explain how you determined its location.

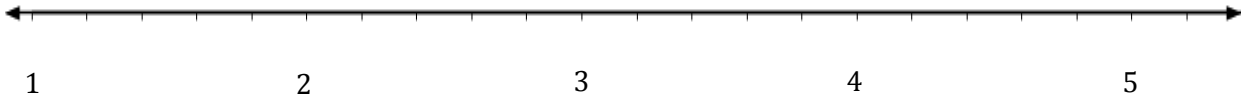
3. Graph the approximate location of $-3.428571\ldots$ on the number line below and explain how you determined its location.



4. Order the numbers in problems 1-3 from least to greatest.

5. Graph the approximate locations for the following numbers on the number line below.

$\sqrt{2}$ π $\frac{7\sqrt{3}}{5}$ $\sqrt{6}$



MAFS.8.NS.1.2 FSA PRACTICE

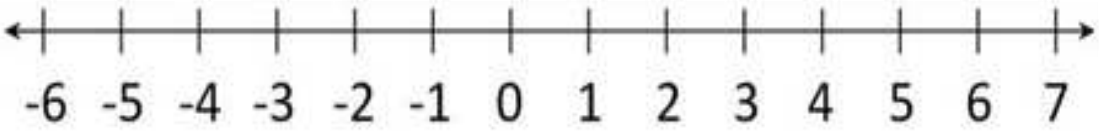
A CALCULATOR IS NOT ALLOWED

1. Select whether each number is between 0 and 1, 1 and 2, or 4,5 and 4.9.

Number (n)	$0 < n < 1$	$1 < n < 2$	$4.5 < n < 4.9$
$\sqrt{\frac{\pi}{4}}$	☐	☐	☐
$\sqrt{\frac{\pi}{2}}$	☐	☐	☐
$\frac{3\pi}{2}$	☐	☐	☐
$\sqrt{\pi}$	☐	☐	☐
$\sqrt{23}$	☐	☐	☐

2. Graph the approximate locations for the following numbers on the number line below.

(1) π
(2) $-(\frac{1}{2}\pi)$
(3) $2\sqrt{2}$
(4) $\sqrt{17}$



3. For each pair of numbers, decide which is larger without using a calculator. Insert < or > in the space below. Explain your choices.

Number	Write < or >	Number	Explanation
π^2		9	
$\sqrt{50}$		$\sqrt{51}$	
$\sqrt{50}$		8	
-2π		-6	

4. Jessica evaluates $\sqrt{2}$ on her calculator which shows a value of 1.4142136. She then writes $\sqrt{2}$ = 1.4142136.Is Jessica correct? Explain.

5. What is the approximate value of $\sqrt{20}$?

Ⓐ 5

Ⓑ 10

Ⓒ 4.5

Ⓓ 5.4

MAFS.8.EE.1.1

A CALCULATOR IS NOT ALLOWED

1. Circle all expressions below that are equivalent to 7^{-2}. Show or explain how you determined your choices.

$(7)^2$ $(-7)^2$ $-(7)^2$ -49 $\frac{1}{49}$ $\frac{1}{7^2}$ $-\frac{1}{49}$ $\frac{1}{7^{-2}}$

2. Circle all expressions below that are equivalent to $\left(\frac{25}{50}\right)^{15}$. Show or explain how you determined your choices.

$\frac{25^{15}}{50^{15}}$ $\frac{25^{15}}{50}$ $\left(\frac{50}{25}\right)^{-15}$ $(0.5)^{15}$ 2^{15} $\left(\frac{25^5}{50^5}\right)^3$

Anne packed expressions in boxes, but now the box is too heavy. She is going to unpack the expressions and put them in solution boxes. Match the expressions in the table with one of the correct solution from the boxes below.

$\mathbf{b^{(x+y)}}$ $\mathbf{\frac{1}{b^{(x)}}}$ $\mathbf{b^{(x\cdot y)}}$ $\mathbf{b^{(x-y)}}$

$\mathbf{-b^{(x\div y)}}$ $\mathbf{\frac{1}{b^{(x\cdot y)}}}$ $\mathbf{\frac{b^{(y)}}{b^{(x)}}}$ $\mathbf{b^{(x^y)}}$

3.

Expression	Matches	Solution
$\mathbf{b^x \cdot b^y}$	⟷	
$\mathbf{b^x \div b^y}$	⟷	
$\mathbf{b^{-x}}$	⟷	
$\mathbf{(b^x)^y}$	⟷	

4. What is the value of $(2^4 \div 2^2)^3$?

A CALCULATOR IS NOT ALLOWED

MAFS.8.EE.1.1 FSA PRACTICE

1. Which expressions are equivalent to $\frac{1}{2^6}$? Select all that apply.

☐	$2^{-5} \cdot 2^{-1}$
☐	$2^{-3} \cdot 2^{2}$
☐	$2^{-2} \cdot 2^{-4}$
☐	$2^{1} \cdot 2^{5}$
☐	$2^{1} \cdot 2^{6}$
☐	$2^{2} \cdot 2^{-8}$
☐	$2^{2} \cdot 2^{3}$

2. Choose the expressions that are not equivalent to $\frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4}$? Select all that apply.

☐	$\frac{1}{4^5}$
☐	$\left(\frac{1}{4}\right)^{-5}$
☐	$4^{-3} \cdot 4^{-2}$
☐	4^5
☐	$\frac{1}{256}$
☐	$\frac{1}{20}$

3. What is the value of $(3^6 \div 3^5)^2$?

Ⓐ 1

Ⓑ 3

Ⓒ 9

Ⓓ 27

Evaluate the following expressions. Show work

4.

Expression	Work	Evaluated Expression
$(4^{-3})(4^{6})$		
$6^{-3} \div 6^{1}$		
$\frac{3^{2}}{3^{-2}}$		
$4^{-3} \times 2^{-3}$		

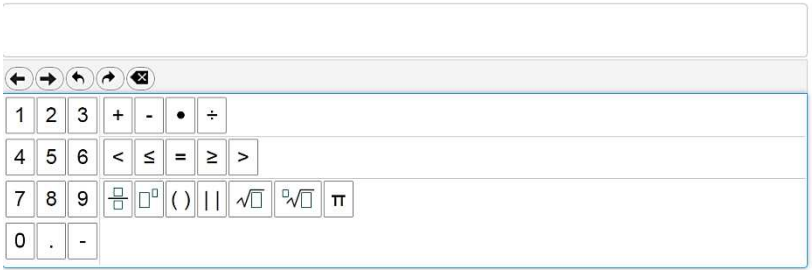
MAFS.8.EE.1.2

Neutral – Items Appear on Calculator and No Calculator Session

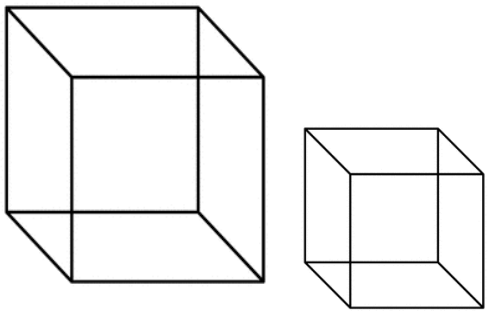
1. Evaluate the following expressions.

Expression	Evaluated Expression
$\sqrt{121}$	
$\sqrt{\frac{4}{9}}$	
$\sqrt[3]{512}$	
$\frac{\sqrt{4}}{\sqrt{9}}$	
$\frac{4}{\sqrt{9}}$	
$\sqrt[3]{\frac{1}{27}}$	

2. The square tile below has an area of 324 square inches. What is the perimeter of the square tile in inches?



3. The volume of the large cube is 125 cubic inches. The volume of the small cube is 27 cubic inches. What is the difference between the length of one side of the large cube and the length of one side of the small cube? Show your work.



MAFS.8.EE.1.2 FSA PRACTICE

Neutral – Items Appear on Calculator and No Calculator Session

1. Which equation has 4 as a possible value of y?

Ⓐ $\mathbf{y^2 = 8}$
Ⓑ $\mathbf{y^3 = 8}$
Ⓒ $\mathbf{y^2 = 16}$
Ⓓ $\mathbf{y^3 = 16}$

2. Which of the following statements best describe the positive solution of the equation $x^2 = 2$? Select all that apply.

☐	The solution is 1
☐	The solution is a rational number
☐	The solution is an irrational number
☐	The solution is greater than 0 but less than 1
☐	The solution is a repeating decimal
☐	The solution is greater than 1 but less than 2

3.

Tammy wants to grow cube watermelons like the ones that are sold in Japan. She found the following directions on the internet:

"You will need 6, square, sheets of polycarbonate plastic. The volume of the cube when assembled will be 512in^3. See picture below"

What is the length of the side of the cube?

4.

Jenny's grandmother is making a quilt for her 18th birthday. When she ran out of material she asked Jenny to go to the store and pick up more patches.

She only had one square cut in half at the diagonal, creating 2 equal triangles left. Each triangle has an area of 0.18 units.

What is the length of the side of the square?

5.

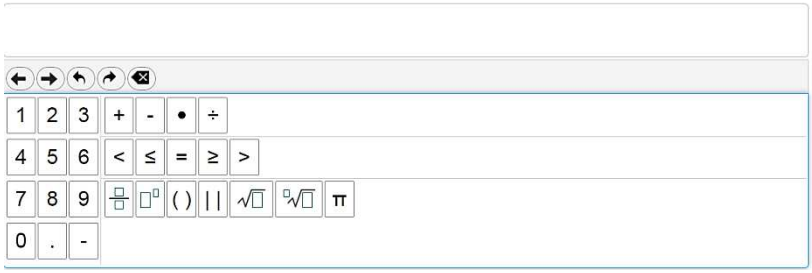
Solve for *q* when

$$q^3 = 27$$

MAFS.8.EE.1.3

1. The distance in kilometers to Proxima Centauri, the closest star to earth is 39,900,000,000,000

   Estimate the distance in kilometers to Proxima Centauri by writing it in the form of a single digit times an integer power of 10.



2. The Bohr radius of a hydrogen atom is 0.0000000000529

   Estimate the Bohr radius of a hydrogen atom by writing it in the form of a single digit times an integer power of 10.

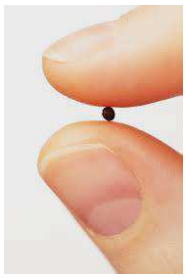
3. Complete the table by using >, =, or <. Explain how you made each choice.

Number 1	>, =, or <	Number 2	Explanation
6×10^{16}		$\mathbf{4 \times 10^{17}}$	
$\mathbf{-5 \times 10^{12}}$		$\mathbf{3 \times 10^{-12}}$	
-5×10^{12}		$\mathbf{9 \times 10^{-19}}$	
$\mathbf{7 \times 10^{-14}}$		$\mathbf{7 \times 10^{-11}}$	
$\mathbf{-2 \times 10^{15}}$		$\mathbf{-2 \times 10^{13}}$	

4.

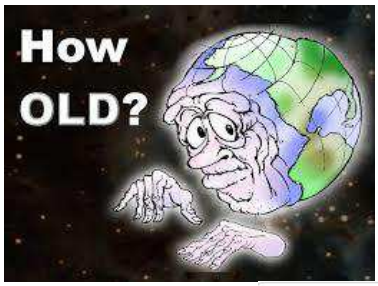
The diameter of fishing line varies. Fishing lines can have a diameter as small as 2×10^{-2} inch and as large as 6×10^{-2} inch. How many times larger is the thick line compared to the thin line?

MAFS.8.EE.1.3 FSA PRACTICE

1. 

A mustard seed weighs approximately 0.000004409 pounds.

Estimate the weight of a mustard seed in pounds by writing it in the form of a single digit times an integer power of 10.

2. 

The Earth is said to be 4,540,000,000 years old.

Estimate the age of the earth by writing it in the form of a single digit times an integer power of 10.

3. The average weight of a blue whale is 4×10^5 pounds. The average weight of an elephant is 1×10^4 pounds.

Approximately how many times heavier is a blue whale than an elephant in pounds?

4. Determine which of the following numbers below has the same values as 8.67×10^{-5}?

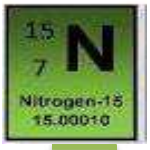
Ⓐ 86.7×10^{-6}
Ⓑ 8.67×10^{5}
Ⓒ 0.00000867
Ⓓ 867000

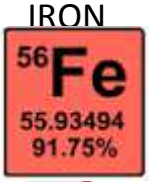
5a. Determine which of the following numbers below has the larger value.

Ⓐ 2×10^{-2}
Ⓑ 3×10^{-1}
Ⓒ 3.2×10^{-1}
Ⓓ 2.5×10^{-1}

5b. What is the largest value from problem 5a in standard form?

6.





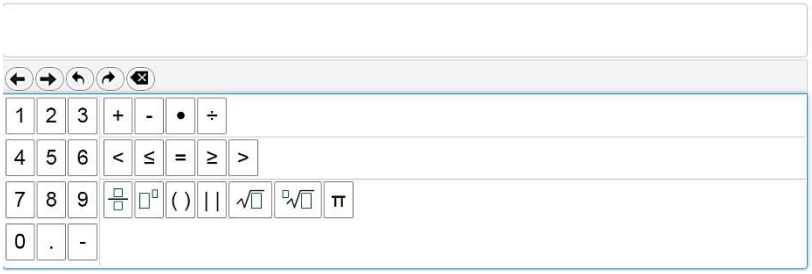
	Isotope	Minimum mole fraction
NITROGEN		
	^{2}H	0 .000 0255
	^{7}Li	0 .9227
	^{11}B	0 .7961
	^{13}C	0 .009 629
	^{15}N	0 .003 462
	^{18}O	0 .001 875
IRON	^{26}Mg	0 .1099
	^{30}Si	0 .030 816
	^{34}S	0 .0398
	^{37}Cl	0 .240 77
	^{44}Ca	0 .020 82
	^{53}Cr	0 .095 01
	^{56}Fe	0 .917 42
	^{65}Cu	0 .3066

Comparing the minimum mole fractions only, estimate the minimum mole fractions to a single digit times an integer power of 10 in the spaces below.

NITROGEN _____

IRON _____

Approximately, how many times larger is Iron than Nitrogen?



MAFS.8.EE.1.4

A CALCULATOR IS NOT ALLOWED

1. After Tyree completed a calculation on his scietific calculator, the display showed:

4.22 E 5

Write this number in both scientific notation and in standard form.

2. After Grace completed a calculation on her scietific calculator, the display showed:

8.04 E -6

Write this number in both scientific notation and in standard form.

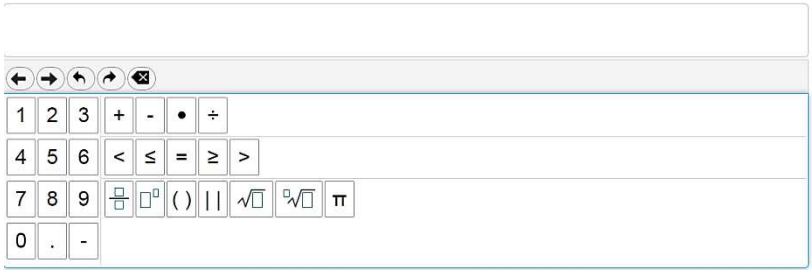
3.

Measures of population density indicate how crowded a place is by giving the approximate number of people per square unit of area. In 2009, the population of Puerto Rico was approximately 3.98×10^6 people and the population density was about 1000 people per square mile. What is the approximate area of Puerto Rico in square miles? Write your answer in scientific notation.

4. A collection of meteorites includes three meteorites that weigh 1.1×10^2 grams, 6.8×10^0 grams, and 8.4×10^{-2} grams. What is the difference between the mass of the heaviest meteorite and the mass of the lightest meteorite? Show work and write your answer in standard notation.

5. Write the expression shown as one scientific number.

$$\frac{(6 \text{ x } 10^{-2})(1.5 \text{ x } 10^{-3} + 2.5 \text{ x } 10^{-3})}{1.5 \text{ x } 10^{3}}$$



MAFS.8.EE.1.4 FSA PRACTICE

A CALCULATOR IS NOT ALLOWED

1. The erosion rate along a section of the coast is approximately 3 feet per year. Which of these best approximates this rate of erosion?

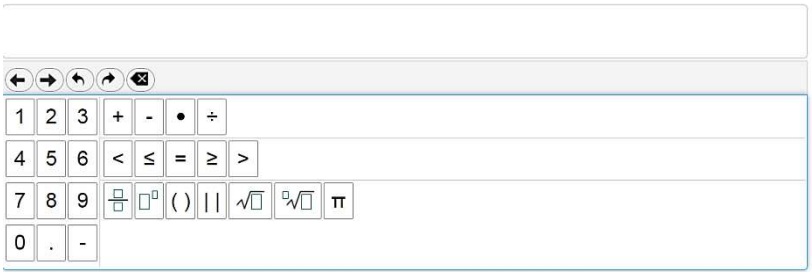
   Ⓐ $\mathbf{9.9 \times 10^{-2}}$ **inches per day**
   Ⓑ $\mathbf{9.9 \times 10^{-2}}$ **inches per month**
   Ⓒ $\mathbf{9.9 \times 10^{-2}}$ **feet per day**
   Ⓓ $\mathbf{9.9 \times 10^{-2}}$ **feet per month**

2. Write the expression shown as one scientific number.

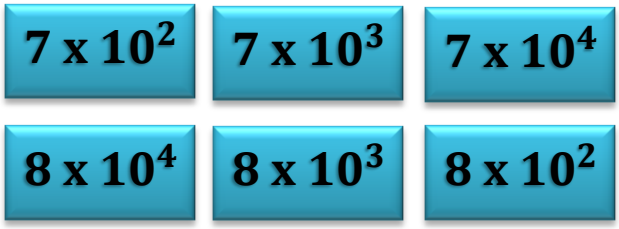
$$\frac{(8 \text{ x } 10^2)(7.5 \text{ x } 10^4)}{5 \text{ x } 10^2}$$

3. The Amazon River releases 5.5×10^7 gallons of water into the Atlantic Ocean every second. There are about 3.2×10^9 seconds in a year. How many gallons are released into the ocean in one year? Show all work, and give your answer in scientific notation.

4. What is the sum of 7×10^{-8} and 2×10^{-8}?



5. Match the expressions in the table below with one of the scientific numbers below.



Expression	Matches	Scientific number
$14000 - (6 \times 10^3)$	⟷	
$\frac{28,000,000}{(4 \times 10^3)}$	⟷	
$(3 \times 10^4) + (4 \times 10^4)$	⟷	
$(4 \times 10^2)(2 \times 10^2)$	⟷	

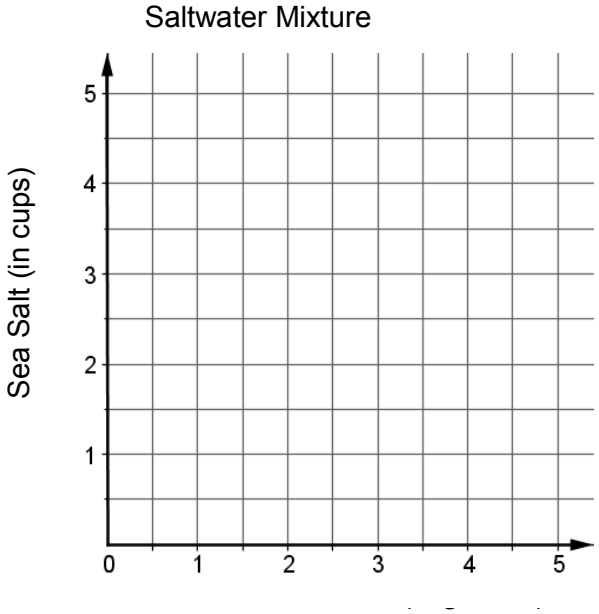
MAFS.8.EE.2.5

A CALCULATOR IS ALLOWED

1. Rodnika has a saltwater fish tank. She knows the water in the tank must have the right amount of salt in order for the fish to survive. To get the proper salinity, Rodnika mixes the water and salt according to the measurements shown in the table.

Graph the line that represents the relationship shown in the table.

Distilled Water (in gallons)	Sea Salt (in cups)
0	0
1	$\frac{1}{2}$
2	1
4	2



Part A

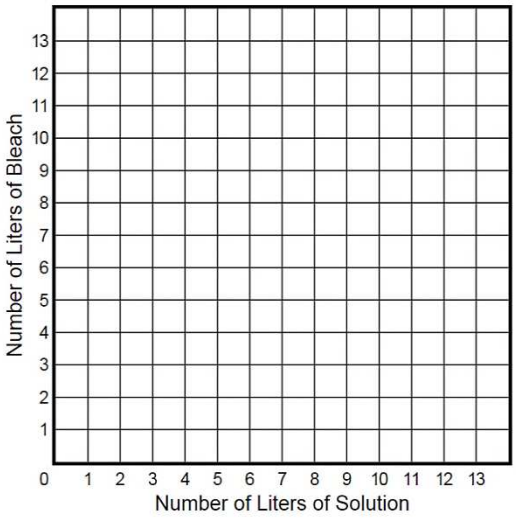
What is the slope of the line?

Part B

What does the slope mean in this situation?

2. A solution is 20% bleach.

Create a graph that represents all possible combinations of the number of liters of bleach, contained in number of liters of solution.



3. Two utility companies sell electricity in units of kilowatt-hours. The cost of electricity for company P is shown in the table below. The cost of electricity for company M can be found by using the equation shown belwo, where y represents the total cost in dollars for x kilowatt-hours of electricity.

Electricity Costs

Company P

Number of Kilowatt-hours	Total Cost (dollars)
1,250	150.00
1,650	198.00

Company M

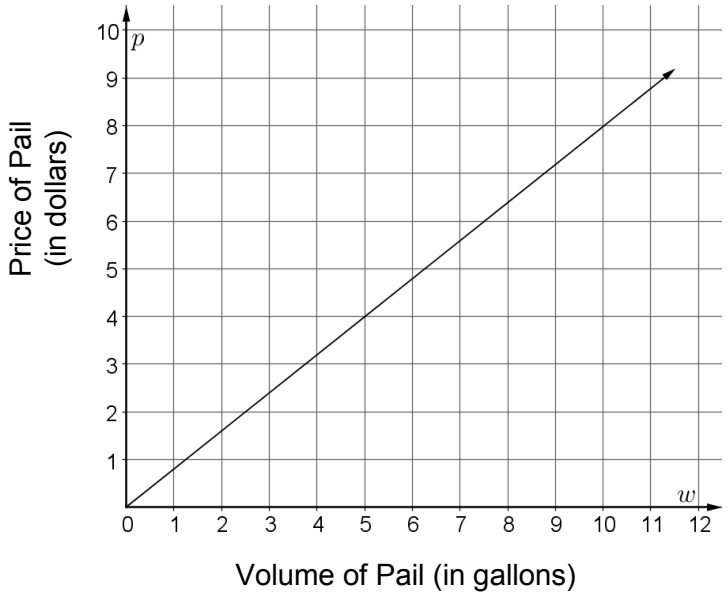
y = 0.15x

- Use this information provided to find the unit rate, in dollars per kilowatt-hour, for each company. Show your work or explain your answers.
- Find the total cost, in dollars, of buying 2,375 kilowatt-hours of electricity from the **least** exprensive company.

4.

Jack and Jill are selling pails that carry water. The cost of Jack's pail is represented by the equation $p = \frac{5}{4}w$ where *p* is the price of the pail in dollars and *w* is the volume of the pail, in gallons.

Jill's pail prices can be modeled with this graph:



Part A

Suppose Jack graphed his equation. Identify the slope of his graph and explain what it means.

Part B

Identify the slope of Jill's graph and explain what it means.

Part C

How do the slopes of the graphs compare? Explain.

MAFS.8.EE.2.5 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. Two different proportional relationships are represented by the equation and the table.

Proportion A

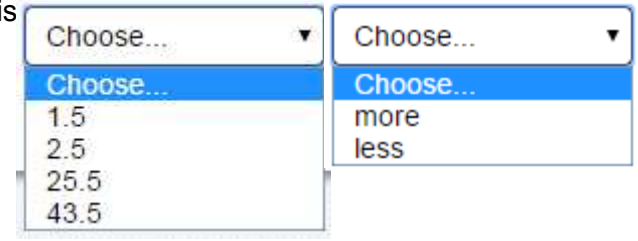
$y = 9x$

Proportion B

x	y
0	0
3	34.5
5	57.5
8	92

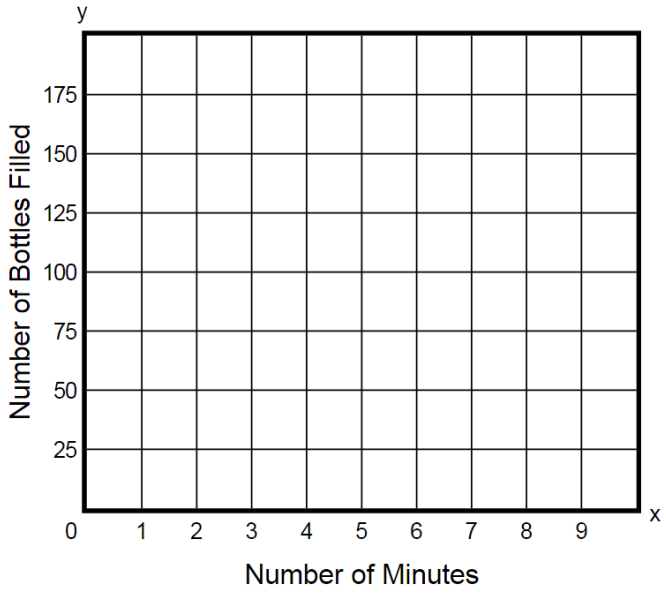
Circle the correct answer from the drop-down menus to complete the sentence, comparing the rates of change of the proportional relationships.

The rate of change in Proportion A is

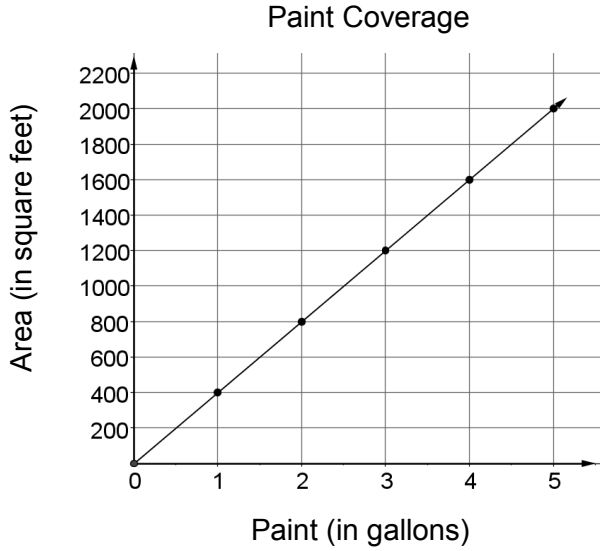


than the rate of change in Proportion B.

2. The number of bottles a machine fills is proportional to the number of minutes the machine operates. The machine fills 250 bottles every 20 minutes. Create a graph that shows the number of bottles, y, the machine fills in x minutes.



3. Antwan is painting all the rooms in his house this year. Below is a graph representing the relationship between quantity of paint and the area covered by the paint.



Part A

Determine a unit rate for this relationship and describe it in words.

Part B

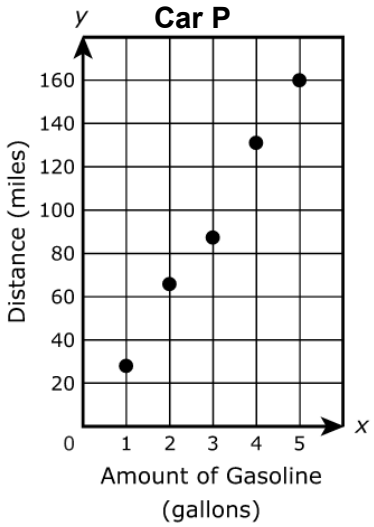
Determine the slope of the graph and describe it in words.

4. The gasoline mileage for two cars can be compared by finding the distance each car traveled and the amount of gasoline used. The table shows the distance that car M traveled using, *x,* gallons of gasoline. The graph shows the distance, *y*, that car P traveled using x gallons of gasoline.

Car M

Amount of Gasoline (gallons)	Distance (miles)
2	50.4
3	80.5
7	181.3
5	137.5

Car P



Based on the information in the table and the graph, compare the approximatte miles per gallon of car M to car P. Show your work or explain your answer.

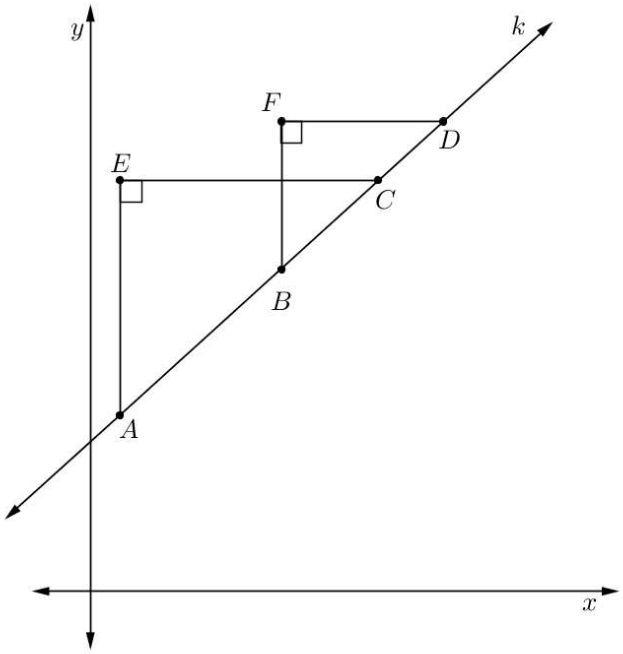
Enter your answer and your work or explanation in the space provided.

MAFS.8.EE.2.6 FSA

A CALCULATOR IS ALLOWED

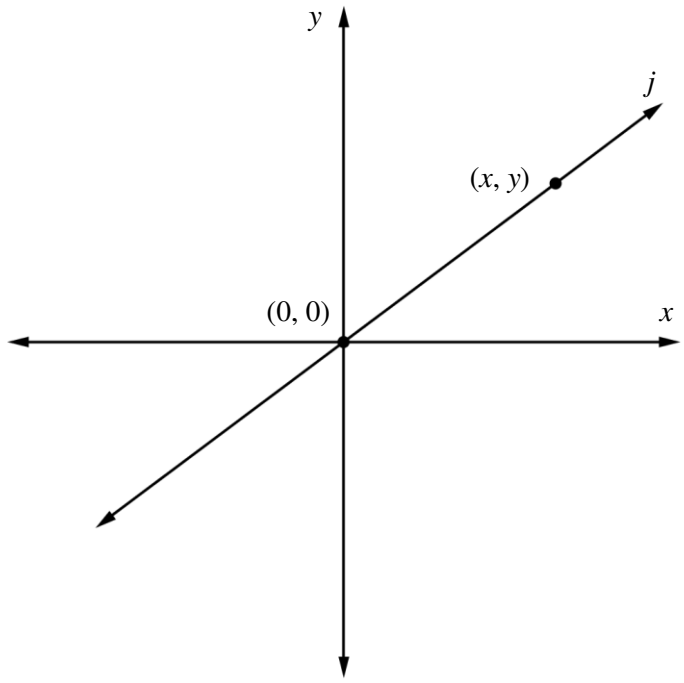
1. Line *k* contains points *A,B,C,* and *D*. *EA* represents the difference between the *y*-coordinates and *EC* represents the difference between the *x*-coordinates of points *A* and *C.* Likewise, *FB* represents the difference between the *y*-coordinates and *FD* represents the difference between the *x*-coordinates of points *B* and *D*.

   Use similar triangles to explain why the slope of line *k* is the same whether the slope is calculated using points *A* and *C* or points *B* and *D*.



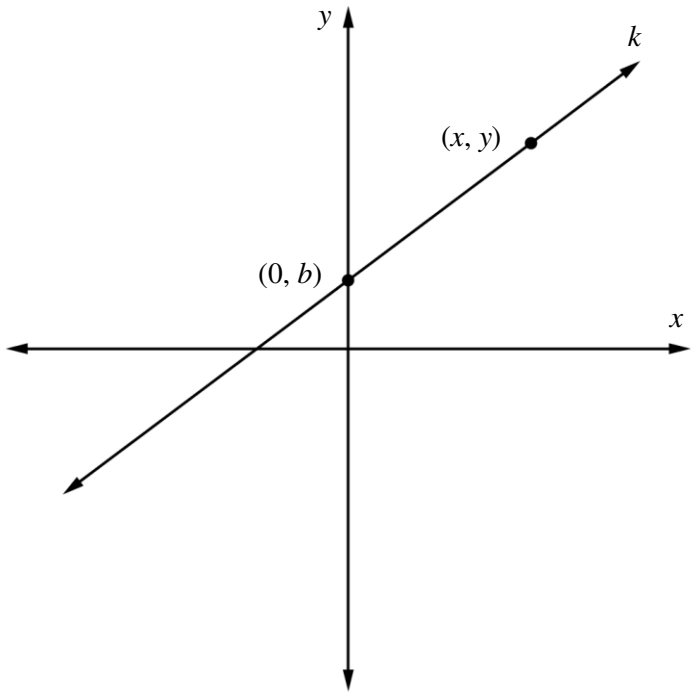
Line j passes through the origin and some point (x, y). Derive the equation of line j.

2.



3.

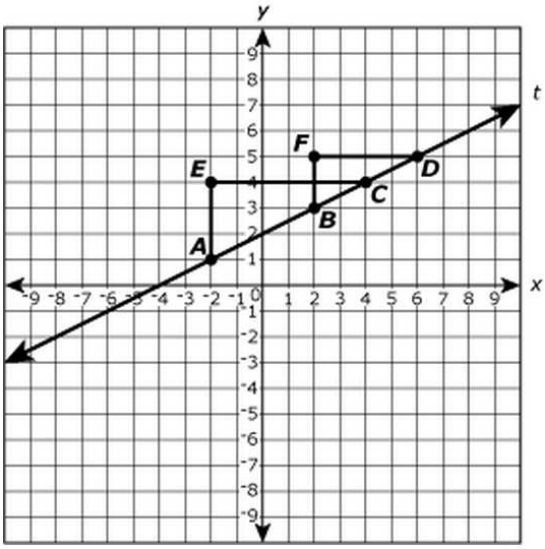
Line k passes through $(0, b)$ and some point (x, y). Derive the equation of line j.



MAFS.8.EE.2.6 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. Line *t* and ΔECA and ΔFDB are shown on the coordinate plane.



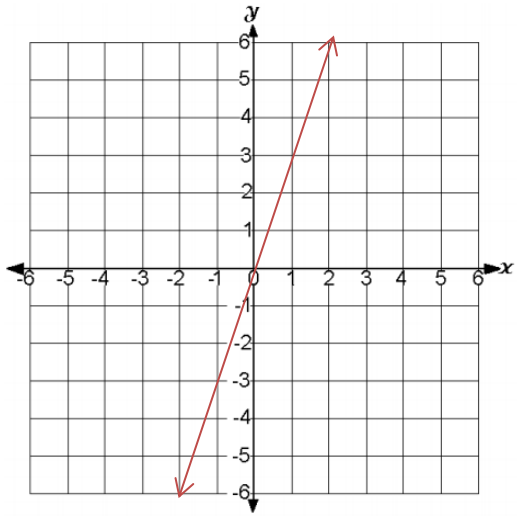
Which statements are true? Select all that apply.

- ☐ The slope of $\overline{AC}$ is equal to the slope of $\overline{BC}$.
- ☐ The slope of $\overline{AC}$ is equal to the slope of $\overline{BD}$.
- ☐ The slope of $\overline{AC}$ is equal to the slope of line t.
- ☐ The slope of line t is equal to $\frac{EC}{AE}$.
- ☐ The slope of line t is equal to $\frac{FB}{FD}$.
- ☐ The slope of line t is equal to $\frac{AE}{FD}$.

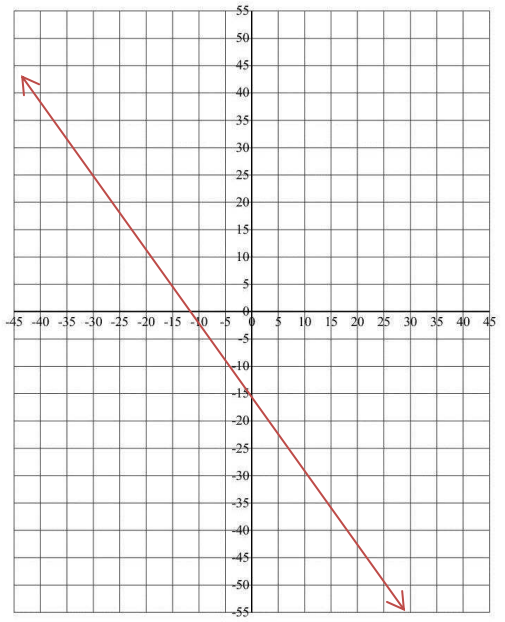
2. Points *A*, *B*, *C*, and *D* are collinear. Which of the following must be true?

Ⓐ $\overline{\boldsymbol{AB}}$ and $\overline{\boldsymbol{CD}}$ have the same slope
Ⓑ $\overline{\boldsymbol{AB}} + \overline{\boldsymbol{BC}} = \overline{\boldsymbol{CD}}$
Ⓒ $\overline{\boldsymbol{AB}}$ is congruent to $\overline{\boldsymbol{CD}}$
Ⓓ $\overline{\boldsymbol{AB}}$ is parallel to $\overline{\boldsymbol{BC}}$

3. What is the equation of the line below?



4. What is the equation of the line below?



MAFS.8.EE.3.7

A CALCULATOR IS ALLOWED

1. Solve the equation shown for x.

$$\frac{2}{3}x - 4\frac{1}{2} = -8$$

2. For each equation, state whether there is *no solution*, *one solution*, or *infinitely many solutions*. Explain your reasoning.

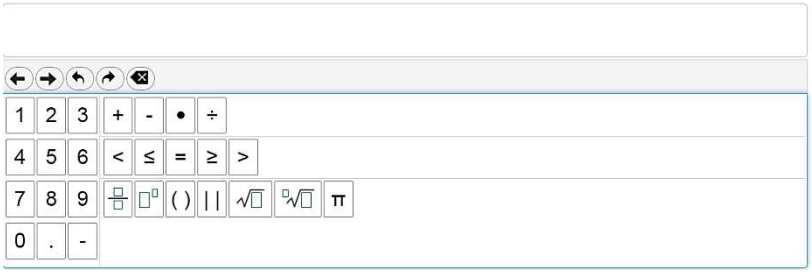
Equation	No solution, One Solution, Infinitely many solutions, or None	Explanation
$3x - 6 = 3(x - 1) - 3$		
$2x + 7 = -2x + 7$		
$2x + 7 = 2x$		

3. Solve the equation shown for x.

$$-3.5(10x - 2) = -176.75$$

4. Solve the equation shown for x.

$$\frac{1}{5}(2x - 10) + 4x = -3\left(\frac{1}{5}x + 4\right)$$

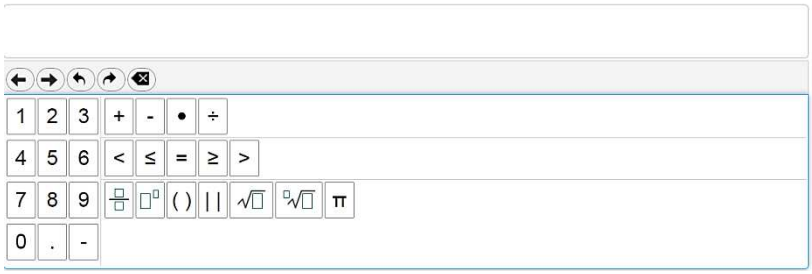


MAFS.8.EE.3.7 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. Solve the equation shown for x.

$$9(3 - 2x) = 2(10 - 8x)$$



2 Solve the equation shown for x.

$$-4(2x + 9) + 3x = 6 - 4(x - 3)$$

3. Select whether each equation has no solution, one solution, or infinitely many solutions.

Equations	No Solution	Exactly 1 Solution	Infinitely Many Solutions
$9 = 4x + 7$	☐	☐	☐
$x + 5 = x + 8$	☐	☐	☐
$y = \frac{x}{2}$	☐	☐	☐
$3x + 6y - 9 = 0$	☐	☐	☐
$y = 3y + 5$	☐	☐	☐

4. An equation is shown.

$$2j + 7 = 2j + 7$$

How many solutions does the equation have? Explain your reasoning.

5. An equation is shown

$$3x + 10 = 4x + 10$$

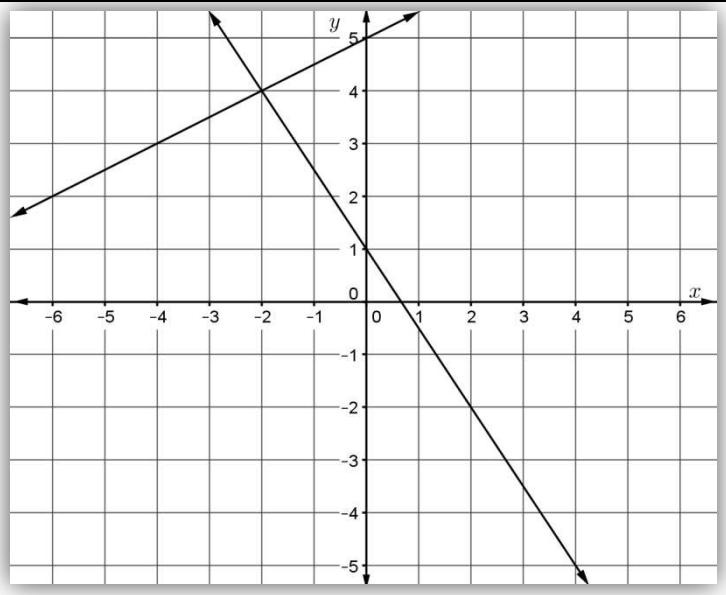
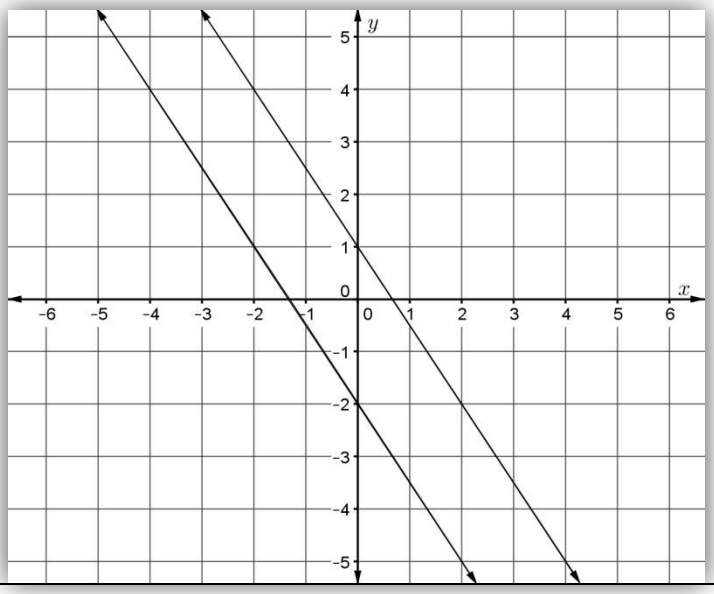
How many solutions does the equation have?

Ⓐ **No solution**
Ⓑ **1 Solution**
Ⓒ **Infinitely many solutions**

MAFS.8.EE.3.8

A CALCULATOR IS ALLOWED

1. For each graph, identify the solution of the graphed system of equations and explain how you know it is the solution.

Graph	Solution & Explanation
	
	

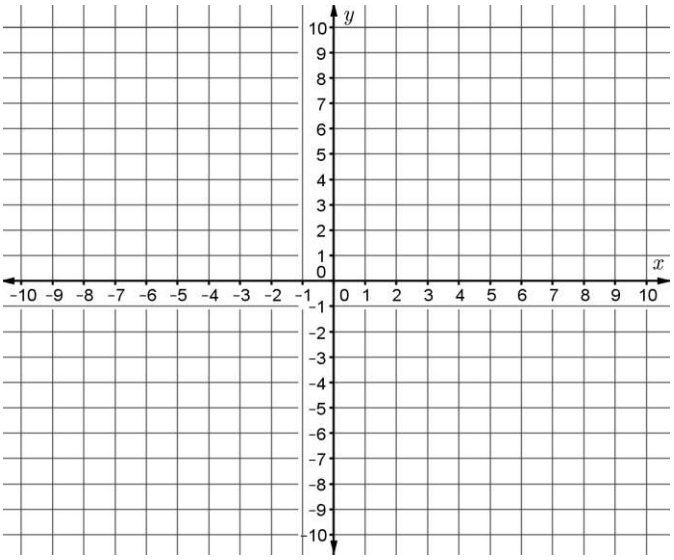
2. Solve each system of linear equations algebraically. Check your solution. Show your work.

$y = x + 5$ $y = 3x - 3$	$-2y = -x + 7$ $8y = 4x + 10$	$y = -3x$ $x + y = 16$

3. Solve the system of linear equations by graphing.

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

$$y = -4x - 5$$



Write the solution as an ordered pair and explain why it is a solution.

4. A school is selling t-shirts and sweatshirts for a fund-raiser. The table shows the number of t-shirts and the number of sweatshirts in each of three recent orders. The total cost of orders A and B are given. Each t-shirt has the same cost, and each sweatshirt has the same cost.

Order	Number of T-shirts	Number of Sweatshirts	Total Cost of Order (dollars)
A	2	2	38
B	3	1	35
C	1	2	?

A system of two equations is shown.

$$\begin{cases} 2x + 2y = 38 \\ 3x + y = 35 \end{cases}$$

Part A

What is the cost of 1 t-shirt and 1 sweatshirt? [ ]

Part B

Select a choice from each drop-down menu to correctly complete the statement.

In the system of equations, x represents [Choose...]

- Choose...
- the number of t-shirts in the order
- the number of sweatshirts in the order
- the cost, in dollars, of each t-shirt
- the cost, in dollars, of each sweatshirt

and y represents [Choose...]

- Choose...
- the number of t-shirts in the order
- the number of sweatshirts in the order
- the cost, in dollars, of each t-shirt
- the cost, in dollars, of each sweatshirt

Part C

If the system of equations is graphed in a coordinate plane, what are the coordinates (x, y) of the intersection of the two lines? ([ ] , [ ])

Part D

What is the total cost, in dollars, of order C? $ [ ]

MAFS.8.EE.3.8 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. Select whether each equation has no solution, one solution, or infinitely many solutions.

System of Equations	No Solution	Exactly 1 Solution	Infinitely Many Solutions
$x = y$ $1.25x = 1.25y$	☐	☐	☐
$9.9 = 6x + 8y$ $9x = 2.5y - 8.8$	☐	☐	☐
$11x - 2y = 1.5$ $11x - 2y = 2.5$	☐	☐	☐
$y = -x$ $8y = -8x$	☐	☐	☐
$y = (3x + 1)$ $y = -4$	☐	☐	☐

2. Two lines are graphed on the same coordinate plane. The lines intersect at the point **(3, 6).** Which of these systems of linear equations could represent the two lines?

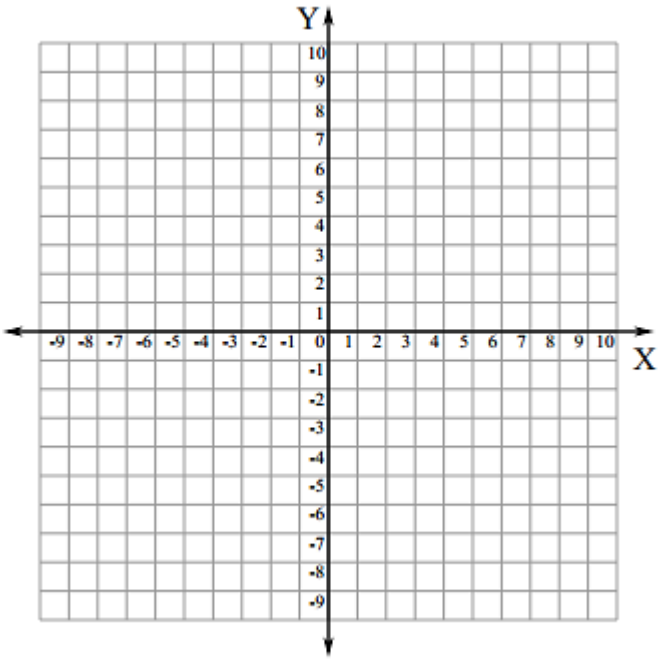
Select all that apply.

☐	$\begin{cases} x = 3 \\ y = 6 \end{cases}$
☐	$\begin{cases} x = 6 + y \\ y = 3 + x \end{cases}$
☐	$\begin{cases} y = 3x - 3 \\ y = x - 1 \end{cases}$
☐	$\begin{cases} x = 3 + y \\ y = 6 + x \end{cases}$
☐	$\begin{cases} y = x + 3 \\ y = 2x \end{cases}$

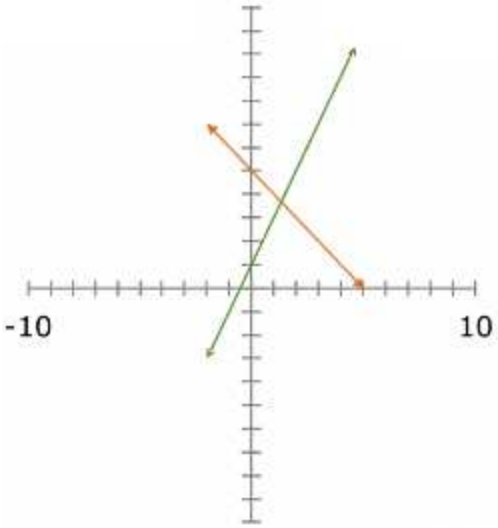
3. A system of two equations is shown.

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

Graph the two lines below and identify the solution of the system on the graph.



4. A graph of a system of two equations is shown.



What is the approximate solution of the system?

x = _____

y = _____

5. A system of two equations is shown.

$$\begin{cases} x = 10 \\ 3x + 5y = 20 \end{cases}$$

What is the solution of the system?

x = ____

y = ____

6. Cedro bought five games and eight songs for a total cost of $22.87. Benita bought seven songs and four games for a total cost of $18.89. The cost of their purchases can be represented by the following equations:

5g + 8s = 22.87
7s + 4g = 18.89

Where *g* is the cost of each game and *s* is the cost of each song purchased. What was the cost of each game and each song purchased?

MAFS.8.F.1.1

Neutral – Items Appear on Calculator and No Calculator Session

1. Define the term *function* as completely and precisely as you can.

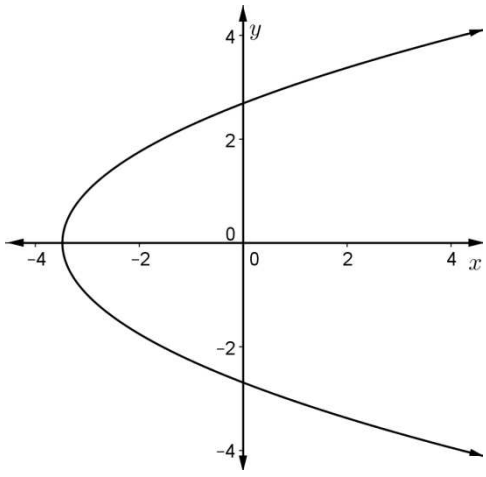
2. Three relations are described algebraically. In each, x represents an input (the independent variable) and y represents the output (the dependent variable). Decide whether each *is a function* or *is not a function*. Explain why or why not.

Relations	Function –Yes Function –No	Explanation
$-3x + 8 = y$		
$y = x^2 + 3$		
$y^2 = x$		

3. A relation is shown in the table below. In each, *x* represents an input (the independent variable) and *y* represents the output (the dependent variable). Decide whether the table *can represent a function* or *cannot represent a function*. Explain why or why not.

Table	Function –Yes Function –No	Explanation
<table><tr><th>x</th><th>y</th></tr><tr><td>3</td><td>–2</td></tr><tr><td>1</td><td>–1.8</td></tr><tr><td>5</td><td>–2.2</td></tr><tr><td>–4</td><td>3</td></tr><tr><td>–2</td><td>0</td></tr><tr><td>1</td><td>1.8</td></tr><tr><td>–6</td><td>3.8</td></tr></table>		

4. The graph of a relation is shown below. In each, *x* represents an input (the independent variable) and *y* represents the output (the dependent variable). Decide whether the graph represents a function or does not represent a function and justify your decision. If you reference the vertical line test in your justification, explain how and why the vertical line test works.

Graph	Function –Yes Function –No	Explanation
		

MAFS.8.F.1.1 FSA PRACTICE

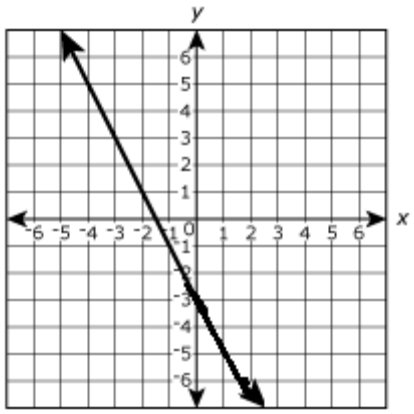
Neutral – Items Appear on Calculator and No Calculator Session

1. When the input to a function is -2, the output is 4.

Which statement about this function must be true?

Ⓐ An input of $-\mathbf{2}$ has infinitely many possible outputs.
Ⓑ An input of $-\mathbf{2}$ has exactly one possible output.
Ⓒ An output of 4 has infinitely many inputs.
Ⓓ An output of 4 has exactly one input.

2. The graph of a function is shown on the coordinate plane. In the graph, y is a function of x.



When the input of the function is -4 , what is the output of the function?

Ⓐ $-\mathbf{5}$
Ⓑ $-\mathbf{1}$
Ⓒ $\mathbf{1}$
Ⓓ $\mathbf{5}$

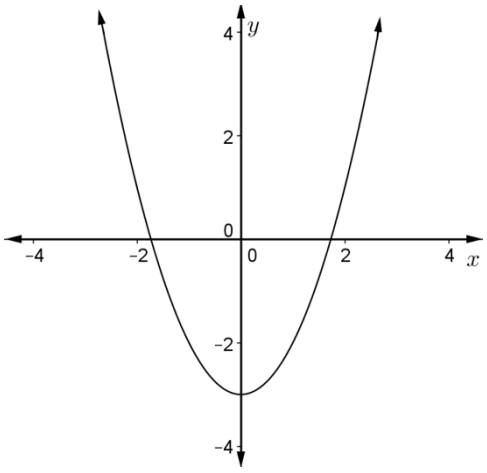
3. A table that shows the relationship of the values of x and y is shown.

Place the correct number into the correct Input or Output box.

1	5	8	10

Input	Output
1	4
	6
5	

4. The graph of a relation is shown below. In each, *x* represents an input (the independent variable) and *y* represents the output (the dependent variable). Decide whether the graph represents a function or does not represent a function and justify your decision.

Graph	Function –Yes Function –No	Explanation
		

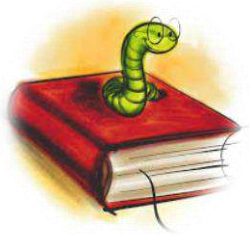
5. A relation is shown in the table below. In each, *x* represents an input (the independent variable) and *y* represents the output (the dependent variable). Decide whether the table *can represent a function* or *cannot represent a function*. Explain why or why not.

Table	Function –Yes Function –No	Explanation
<table><tr><th>x</th><th>y</th></tr><tr><td>4</td><td>12</td></tr><tr><td>–1</td><td>–3</td></tr><tr><td>0</td><td>–4</td></tr><tr><td>–5</td><td>–21</td></tr><tr><td>1</td><td>–3</td></tr><tr><td>4</td><td>12</td></tr><tr><td>–2</td><td>0</td></tr></table>		

MAFS.8.F.1.2

A CALCULATOR IS ALLOWED

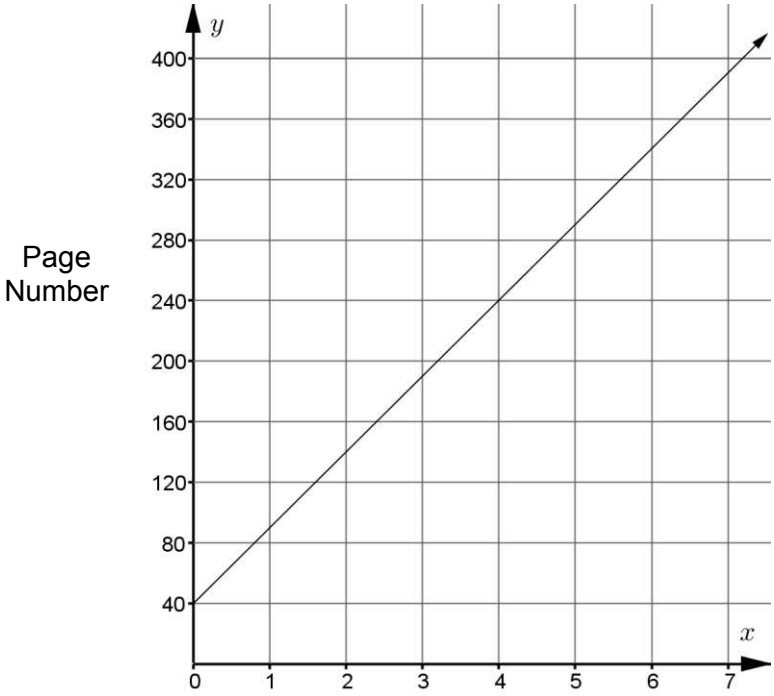
1. Jordan and Alyssa find out they are reading the same book. Although they will be starting on different page numbers, they decide to record their progress to determine who is the faster reader. Using the results below, determine who is reading at a faster rate. Explain your reasoning.



Jordan's Reading Rate

Reading Time (in hours)	Page Number
2	215
3	260
5	350

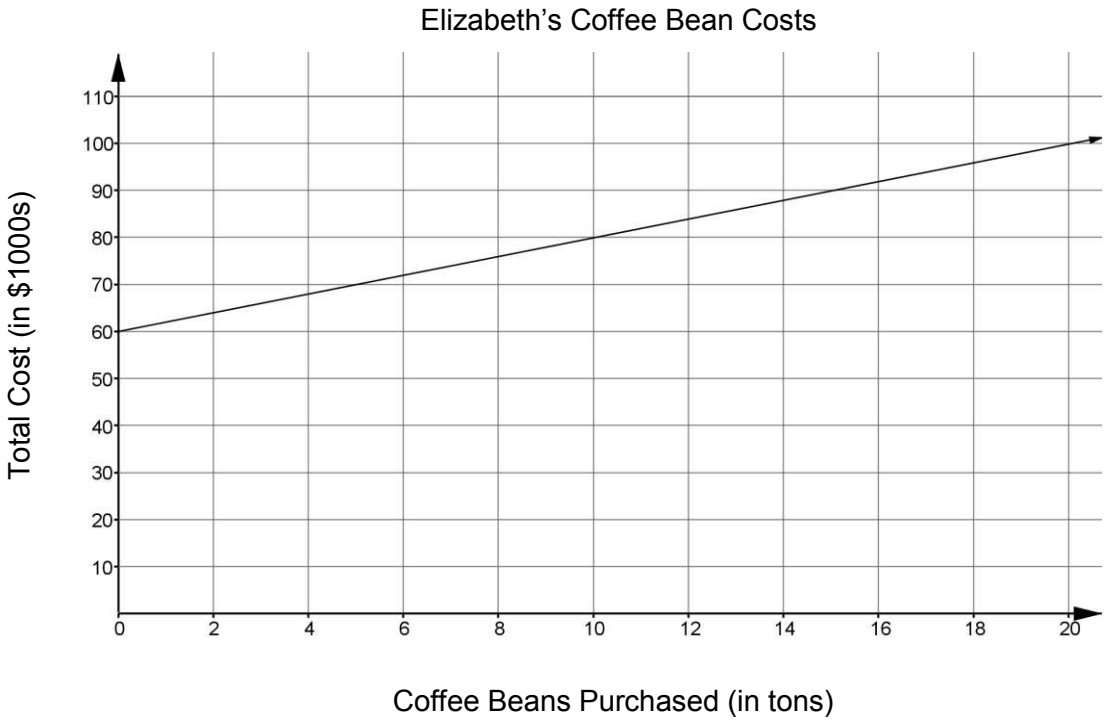
Alyssa's Reading Rate



2. Elizabeth and Daniel are starting competing coffee roasting businesses. They each first buy a large coffee roasting machine and then spend money to buy coffee beans as they need them.

For Daniel, these costs can be described by the equation $y = 7x + 55$ where y is total cost in thousands of dollars and x is the number of tons of coffee beans roasted.

For Elizabeth, these costs are given in the graph below.



Use the information provided to determine who paid the least for their coffee roasting machine. Explain how you determined this.

MAFS.8.F.1.2 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. Functions A, B, and C are linear functions.

Some values of Function A are shown in the table.

Function A

x	*y*
3	3
5	7
6	9

The graph of Function B has a *y* –intercept of (0, 3) and an x –intercept of (-5, 0).

Function C is defined by the equation y = (3x + 1).

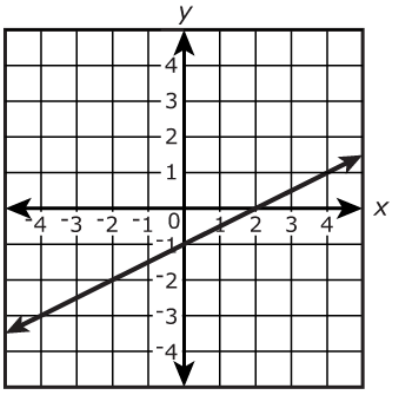
Order the linear functions based on rate of change, from least to greatest.

Least Rate of Change **Greatest Rate of Change**

Function A | Function B | Function C

2. Functions W and Z are both linear functions of x.

Function W



Function Z

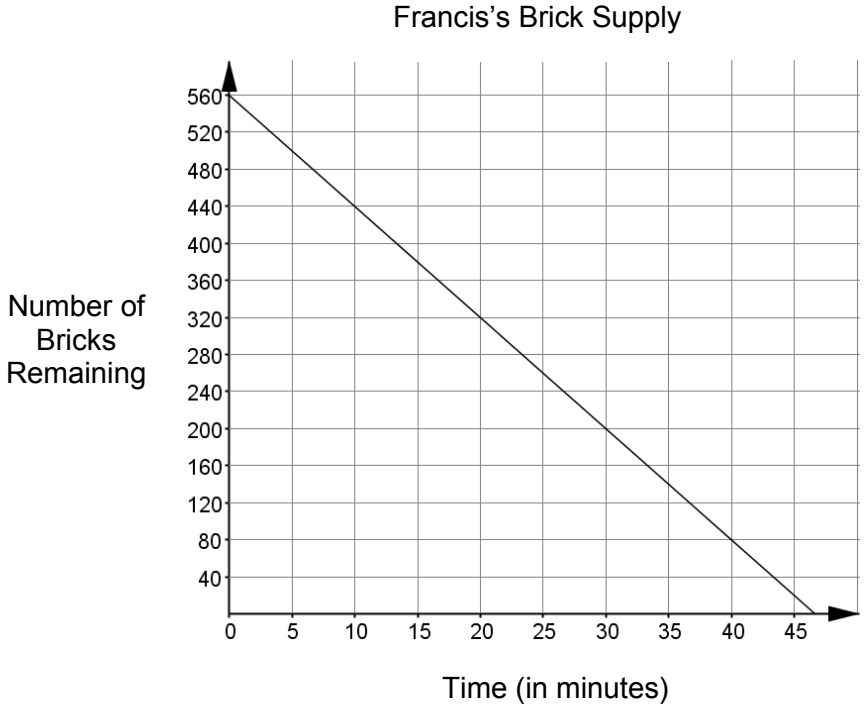
x	*y*
-2	-2.5
0	-2
2	-1.5
4	-1

Which statement comparing the functions are true? Select all that apply.

- ☐ The slope of Function W is less than the slope of Function Z.
- ☐ The slope of Function W is greater than the slope of Function Z.
- ☐ The y-intercept of Function W is equal to the y-intercept of Function Z.
- ☐ The y-intercept of Function W is less than the y-intercept of Function Z.
- ☐ The y-value when x = -4 for Function W is greater than the y-value when x = -4 for Function Z.
- ☐ The y-value when x = -4 for Function W is greater than the y-value when x = -4 for Function Z.

3. Frank and Francis are building houses in a computer game. Frank started with 630 bricks and is using his bricks at a rate of 15 bricks per minute.

The graph shows the number of bricks that Francis has remaining as a function of time.



Who will have the fewest bricks left after twenty minutes? Explain your reasoning.

MAFS.8.F.1.3

A CALCULATOR IS ALLOWED

1. Describe as many *defining* properties of linear functions as you can. List only properties that are unique to linear functions.

2. Give an example of a nonlinear function. You can describe this function in one or more of the following ways: with a table, graph, or equation. Be sure to specify what are the inputs (the independent variable) and what are the outputs (the dependent variable). Then explain how you know your example is nonlinear.

3. The area, *A*, of an isosceles right triangle is a function of the length of its legs, *s*, and is represented by the equation: $A = \frac{1}{2}s^2$. Is this function linear or nonlinear? Explain and justify your answer.

Select whether each function is linear or nonlinear.

4.

Function	Linear	Nonlinear
$y = \frac{x}{2}$	☐	☐
$y = 2x^3 + 1$	☐	☐

MAFS.8.F.1.3 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. Select whether each function is linear or nonlinear.

Function	Linear	Nonlinear
$y = 7 \cdot 4x$	☐	☐
$y = (2x + 5)^2$	☐	☐
$y = 10x^2$	☐	☐
$y = 5x - 3$	☐	☐

2. A relationship between x and y is defined by the equation, $y = -\frac{4}{3}x + \frac{1}{3}$ where x is the input and y is the output. Which statements about the relationship are true? Select all that apply.

- ☐ y is a function of x.
- ☐ The graph of the relationship is a line.
- ☐ When the input is -3, the output is 4.
- ☐ When the input is -2, the output is 3.
- ☐ The y-intercept of the relationship is (0,1)

3. The equation $y = \frac{2}{3}x + 5$ represents a function where *x* is the independent variable (the inputs) and *y* is the dependent variable (the outputs).

Part A

What kind of function does this equation represent? Explain.

Part B

Describe the general shape of its graph.

MAFS.8.F.2.4

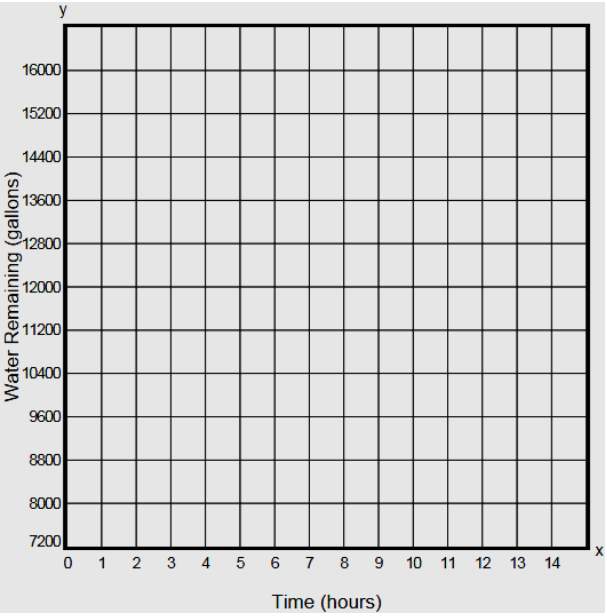
Neutral – Items Appear on Calculator and No Calculator Session

A pool cleaning service drained a full pool. The following table shows the number of hours it drained and the amount of water remaining in the pool at that time.

1.

Pool Draining

Time (hours)	3	5	7	9	11
Water Remaining (gallons)	13,200	12,000	10,800	9,600	8,400



Part A

Plot the points that show the relationship between the numbers of hours elapsed and the number of gallons of water left in the pool.

Select a place on the grid to plot each point.

Part B

The data suggests a linear relationship between the number of hours the pool has been draining and the number of gallons of water remaining in the pool. Assuming the relationship is linear, what does the rate of change represent in the context of this relationship?

A. The number of gallons of water in the pool after 1 hour.
B. The number of hours it took to drain 1 gallon of water.
C. The number of gallons drained each hour
D. The number of gallons of water in the pool when it is full.

Part C

What does the *y* –intercept of the linear function represent in the context of this relationship?

A. The number of gallons of water in the pool after 1 hour.
B. The number of hours it took to drain 1 gallon of water.
C. The number of gallons drained each hour
D. The number of gallons of water in the pool when it is full.

Part D

Which equation describes the relationship between the time elapsed and the number of gallons of water remaining in the pool?

A. $y = -600x + 15{,}000$
B. $y = -600x + 13{,}200$
C. $y = -1{,}200x + 13{,}200$
D. $y = -1{,}200x + 15{,}000$

2. A construction supply store sells steel bars for a certain price per kilogram. No matter how much steel is ordered, the company adds on the same delivery charge.

The cost for an order of 100 kilograms of steel bars is $230. The cost for an order of 150 kilograms of steel bars is $320.

Write an equation for the cost of an order of steel bars (y) in terms of the weight of steel bars ordered (x). Show or explain how you found your equation.

3. Taro and Jiro climbed a mountain and hiked back down. At the summit and at every station along the way back down, they recorded their altitude and the amount of time they had been travelling.

Hiking Data

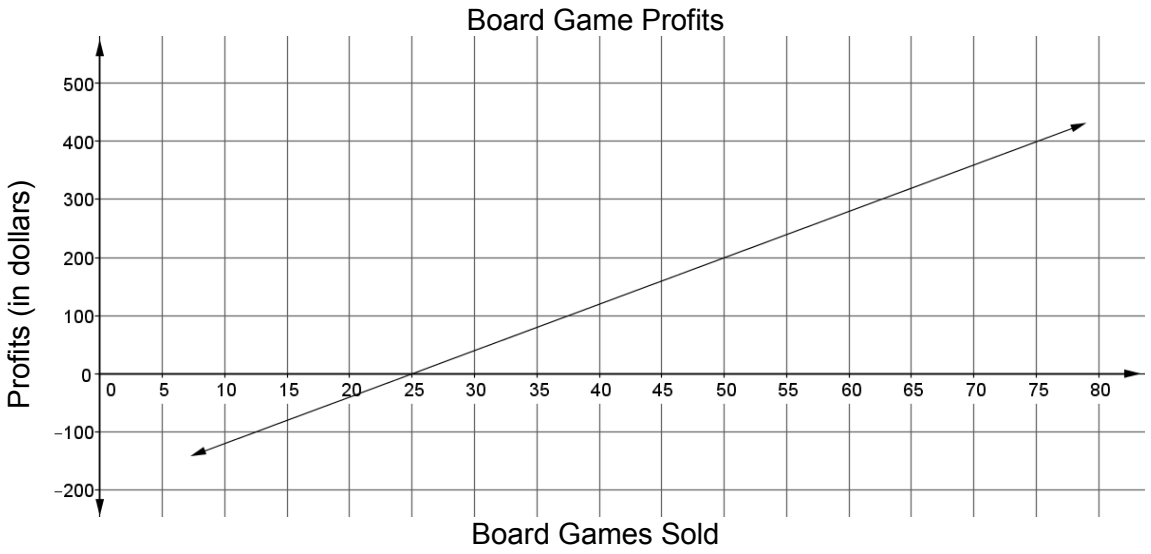
Time Travelled (in minutes)	Altitude (in meters)
0	3776
$29\frac{1}{3}$	3600
126	3020
$179\frac{1}{3}$	2700
231	2390

Write an equation that models Taro's and Jiro's altitude in terms of the amount of time they had travelled. Explain how you found your equation.

MAFS.8.F.2.4 FSA PRACTICE

Neutral – Items Appear on Calculator and No Calculator Session

1. Victoria owns a store that sells board games. She made the following graph to relate the number of board games she sells to her overall profits.



Write an equation to describe this relation. Explain how you found your equation.

2. Brent wants to buy a 60" LED Smart TV, so he opened a savings account and added money to it every month. The chart below shows the relationship between the number of months Brent has been saving and the total amount of money in his account.

Savings Account

Number of Months	Total Savings
1	$160
4	$415
6	$585
9	$840
12	$1,095

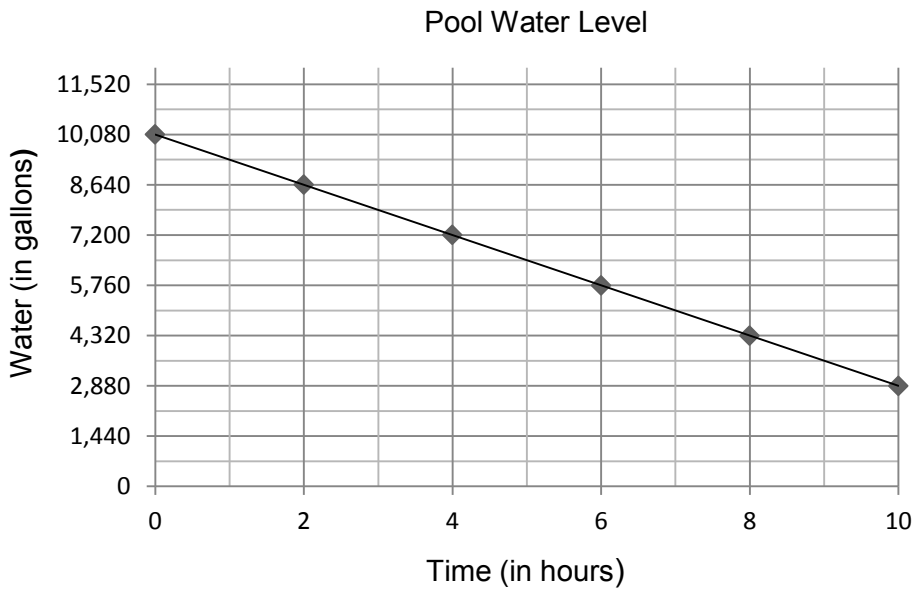
Part A

Determine the rate of change for this relationship and explain what it means in terms of Brent's savings account.

Part B

Determine the initial value for this relationship and explain what it means in terms of Brent's savings account.

3. Mr. Elliot needs to drain his above ground pool before the winter. The graph below represents the relationship between the number of gallons of water remaining in the pool and the number of hours that the pool has drained.



Part A

Determine the rate of change for this relationship and explain what it means in this situation.

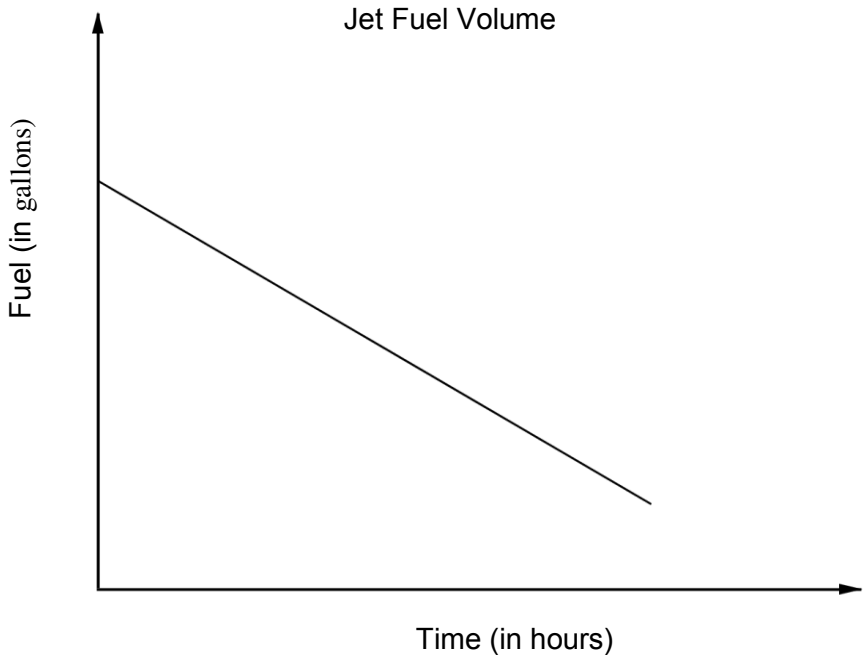
Part B

Determine the initial value for this relationship and explain what it means in this situation.

Neutral – Items Appear on Calculator and No Calculator Session

MAFS.8.F.2.5

1. The graph models the volume of fuel in a jet's tank as it flies over the Atlantic Ocean.



Part A

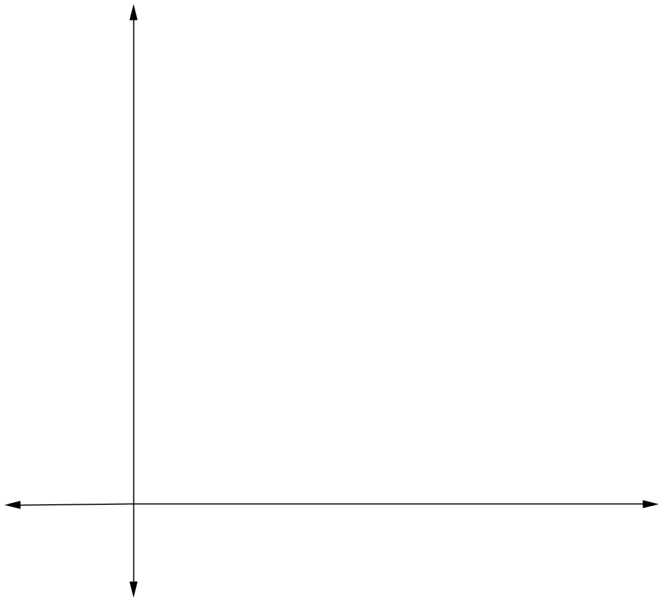
Use the graph to describe the relationship between the volume of fuel in the jet's tank over time.

Part B

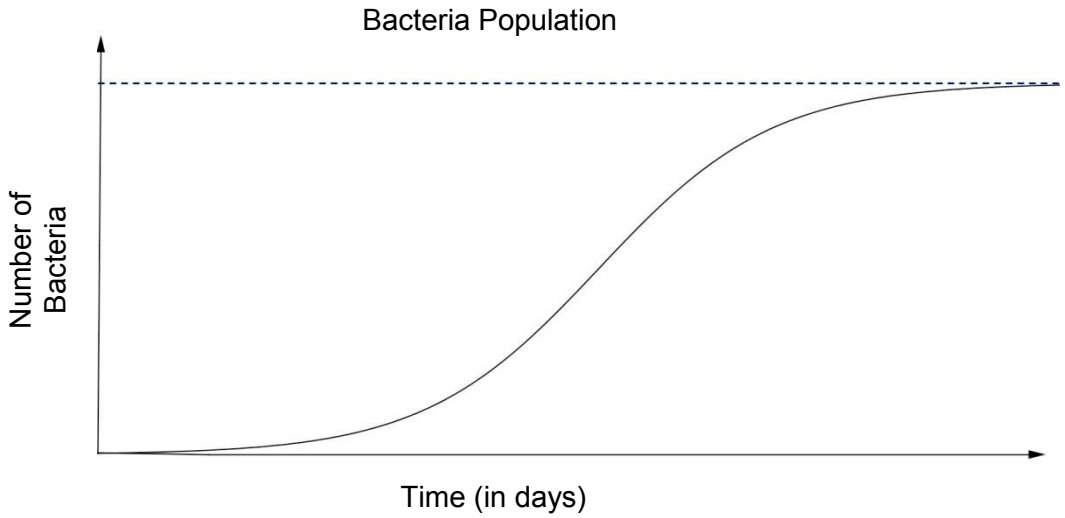
Suppose the graph intersected the time-axis. What would this indicate with regard to the variables in this context?

2. Sophia gets on her bike and accelerates until she reaches a constant speed, which she maintains for 10 minutes. She then reaches a large hill where her rate slows considerably. She maintains this slower rate for five minutes until she gets to the top of the hill where she stops.

   Sketch a graph that models the relationship between Sophia's rate and the passage of time (from getting on her bike until stopping at the top of the hill). Be sure to label each axis with the appropriate variable.



3. The graph describes the number of bacteria in a culture over time.



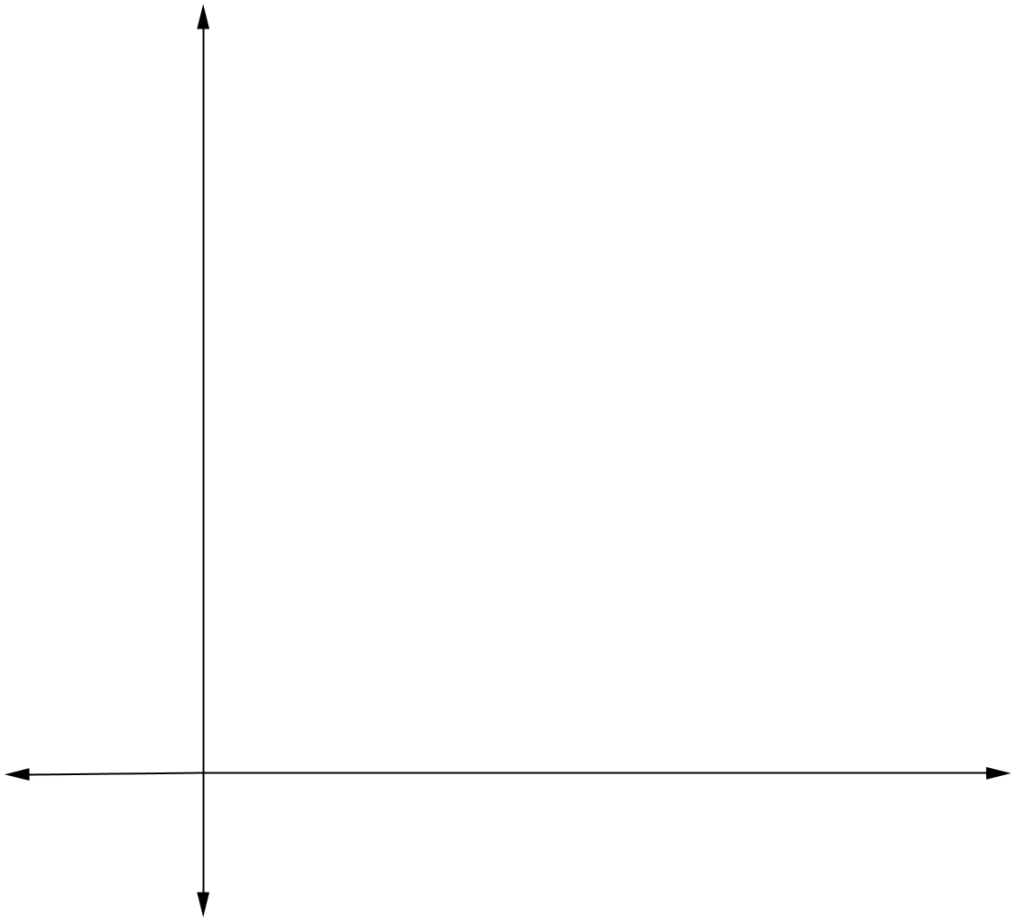
Describe in detail the relationship between the number of bacteria in the culture and time.

MAFS.8.F.2.5 FSA PRACTICE

Neutral – Items Appear on Calculator and No Calculator Session

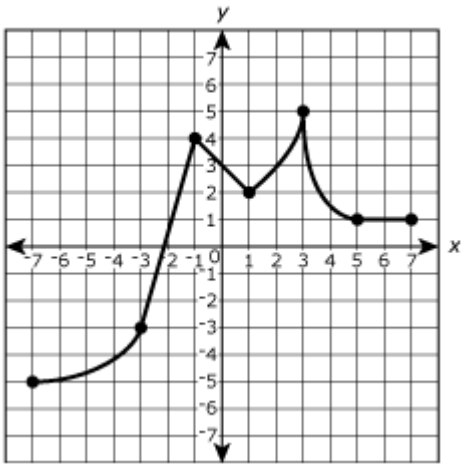
1. Madison is studying the growth of bacteria in food and learned it has four phases. Label the axes and show a graph of the four stages, assuming an initial bacteria count of 50.

   - Lag Phase: Bacteria are introduced to the food, causing biochemical activity but no growth in the number of cells for the first hour.
   - Log Phase: Rapid exponential growth in the number of bacteria for the next two hours.
   - Stationary Phase: Growth stops for one hour as nutrients are used up and waste accumulates.
   - Death Phase: All bacteria gradually die off during the final four hour phase.



2.

The graph shows y as a function of x.



For each interval in the table, indicate whether the function is increasing, decreasing or neither increasing nor decreasing over the interval.

Interval	Increasing	Decreasing	Neither Increasing not Decreasing
$-7 < x < -3$	☐	☐	☐
$-3 < x < 1$	☐	☐	☐
$-1 < x < 1$	☐	☐	☐
$1 < x < 3$	☐	☐	☐
$3 < x < 5$	☐	☐	☐
$5 < x < 7$	☐	☐	☐

MAFS.8.G.1.1

Neutral – Items Appear on Calculator and No Calculator Session

1.

1. Suppose $\overline{AB}$ is translated in some way.
   a. Will the image of $\overline{AB}$ also be a segment? Is it possible to translate $\overline{AB}$ in a way that results in a figure that is not a segment?

   b. How will the lengths of $\overline{AB}$ and its image compare?

2. Suppose $\overline{AB}$ is rotated in some way.
   a. Will the image of $\overline{AB}$ also be a segment? Is it possible to rotate $\overline{AB}$ in a way that results in a figure that is not a segment?

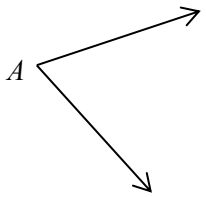
   b. How will the lengths of $\overline{AB}$ and its image compare?

3. Suppose $\overline{AB}$ is reflected in some way.
   a. Will the image of $\overline{AB}$ also be a segment? Is it possible to reflect $\overline{AB}$ in a way that results in a figure that is not a segment?

   b. How will the lengths of $\overline{AB}$ and its image compare?

4. Suppose that $\overline{AB}$ is a line instead of a segment. Will the image of $\overleftrightarrow{AB}$ also be a line? Is it possible to translate, reflect, or rotate $\overleftrightarrow{AB}$ in a way that results in a figure that is not a line? Explain.

2.



1. Suppose $\angle A$ is translated in some way.

   a. Will the image of $\angle A$ also be an angle? Is it possible to translate $\angle A$ in a way that results in a figure that is not an angle?

   b. How will the measures of $\angle A$ and its image compare?

2. Suppose $\angle A$ is rotated in some way.

   a. Will the image of $\angle A$ also be an angle? Is it possible to rotate $\angle A$ in a way that results in a figure that is not an angle?

   b. How will the measures of $\angle A$ and its image compare?

3. Suppose $\angle A$ is reflected in some way.

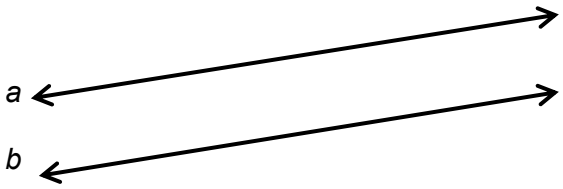
   a. Will the image of $\angle A$ also be an angle? Is it possible to reflect $\angle A$ in a way that results in a figure that is not an angle?

   b. How will the measures of $\angle A$ and its image compare?

3. Lines m and n are parallel on a coordinate plane. Lines m and n are transformed by the same rotation, resulting in image lines s and t. Which statement describes the relationship between lines s and t?

   Ⓐ Lines s and t are parallel
   Ⓑ Lines s and t are perpendicular.
   Ⓒ Lines s and t are intersecting but not perpendicular.
   Ⓓ The relationship between lines s and t cannot be determined without knowing the angle of the rotation.

4.



1. Suppose lines *a* and *b* are translated in some way.

   a. Will the images of lines *a* and *b* also be parallel lines? Is it possible to translate lines *a* and *b* in a way that does not result in a pair of parallel lines?

   b. How will the distance between lines *a* and *b* compare to the distance between their images?

2. Suppose lines *a* and *b* are rotated in some way.

   a. Will the images of lines *a* and *b* also be parallel lines? Is it possible to rotate lines *a* and *b* in a way that does not result in a pair of parallel lines?

   b. How will the distance between lines *a* and *b* compare to the distance between their images?

3. Suppose lines *a* and *b* are reflected in some way.

   a. Will the images of lines *a* and *b* also be parallel lines? Is it possible to reflect lines *a* and *b* in a way that does not result in a pair of parallel lines?

   b. How will the distance between lines *a* and *b* compare to the distance between their images?

MAFS.8.G.1.1 FSA PRACTICE

Neutral – Items Appear on Calculator and No Calculator Session

1. Line symmetry exists as the result of which kind of a transformation?

   Ⓐ Translation
   Ⓑ Transformation
   Ⓒ Reflection
   Ⓓ Rotation

2. A horizontal line is translated seven units to the right. Which of the following is true?

   Ⓐ The new line and the original line are the same
   Ⓑ The new line has a different *y*-intercept than the original line
   Ⓒ The new line has a different slope than the original line
   Ⓓ The new line is a line a segment

3. When an angle is reflected across a line, what happens to its measure?

   Ⓐ It remains the same
   Ⓑ It doubles
   Ⓒ It halves
   Ⓓ Not enough information

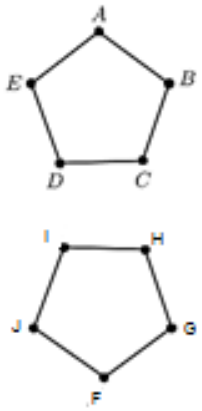
4. Two parallel lines are separated by a distance of 5 units. If one is translated 3 units to the right, will the lines remain parallel?

   Ⓐ It depends on the *y*-intercepts of the lines
   Ⓑ Yes, they will remain parallel
   Ⓒ It depends on the slopes of the lines
   Ⓓ No, they will not remain parallel

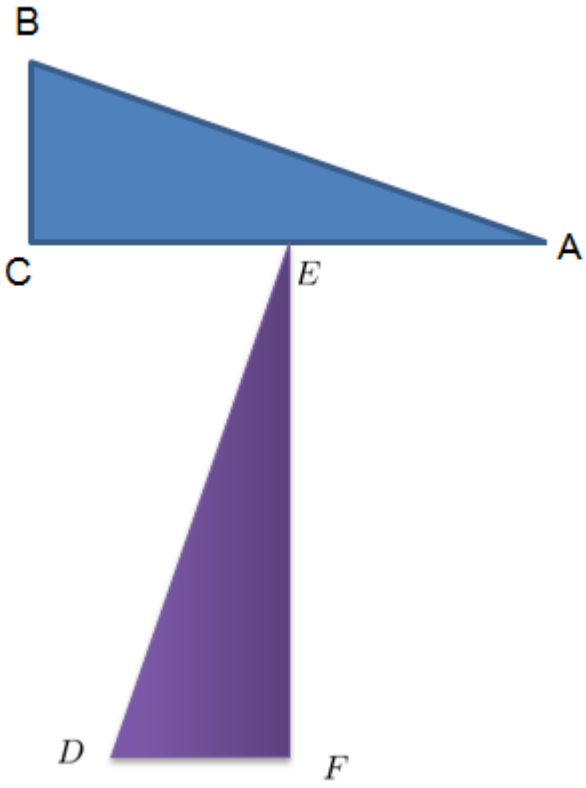
MAFS.8.G.1.2

Neutral – Items Appear on Calculator and No Calculator Session

1. Pentagon *ABCDE* and its transformation Pentagon *FGHIJ* are shown. What transformation produced Pentagon *FGHIJ*? Justify your answer.

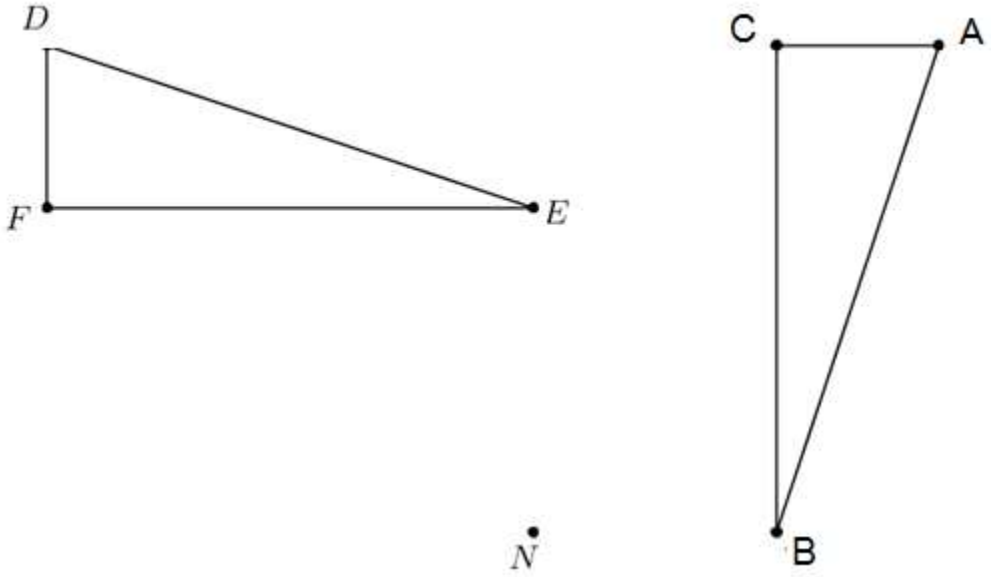


2. Triangle ABC and its transformation Triangle DEF are shown. What transformation produced Triangle DEF? Justify your answer.



3.

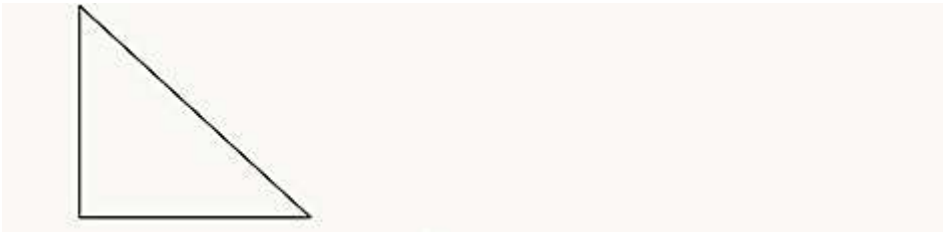
Triangle ABC and its transformation Triangle DEF are shown. What transformation produced Triangle DEF? Justify your answer.

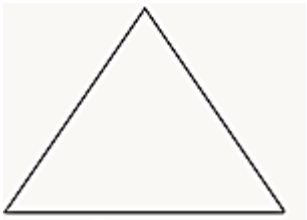


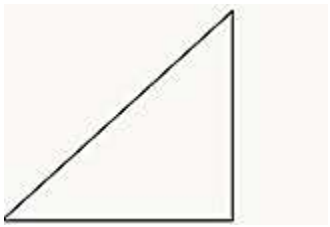
MAFS.8.G.1.2 FSA PRACTICE

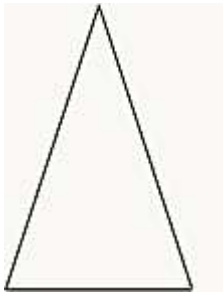
Neutral – Items Appear on Calculator and No Calculator Session

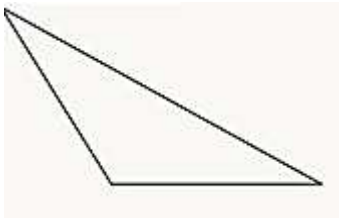
1. What choice is a possible transformation of the triangle shown below:



Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

2. Figure 1 and Figure 2 are shown. What transformation produced Figure 2? Justify your answer.

Figure 1

Figure 2

_____

3. Figure 1 and Figure 2 are shown. What transformation produced Figure 2? Justify your answer.

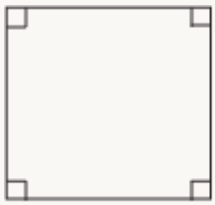


Figure 1

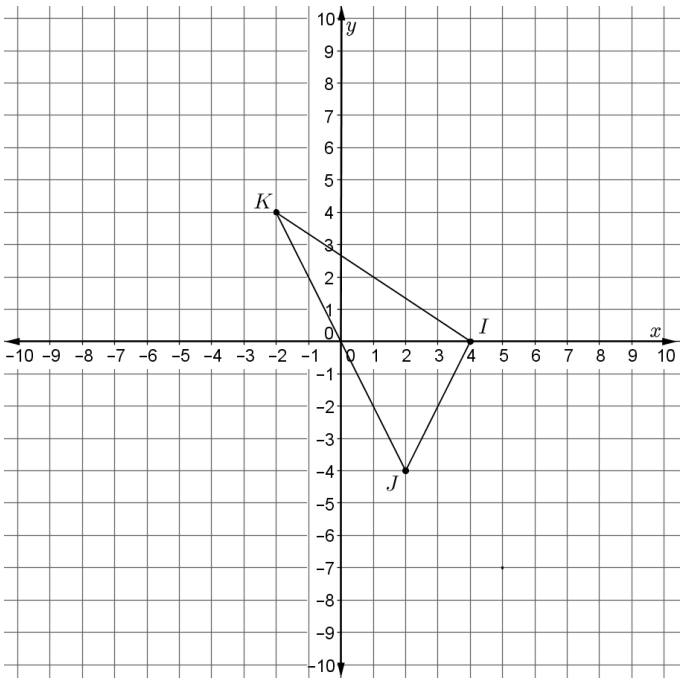
Figure 2

Ⓐ Translation
Ⓑ Dilation
Ⓒ Reflection
Ⓓ None of these

MAFS.8.G.1.3

Neutral – Items Appear on Calculator and No Calculator Session

1. Find the coordinates of the vertices of the image of triangle *IJK* after it is dilated by a scale factor of $\frac{1}{4}$ using the origin as the center of dilation. Graph the dilated image on the graph below.

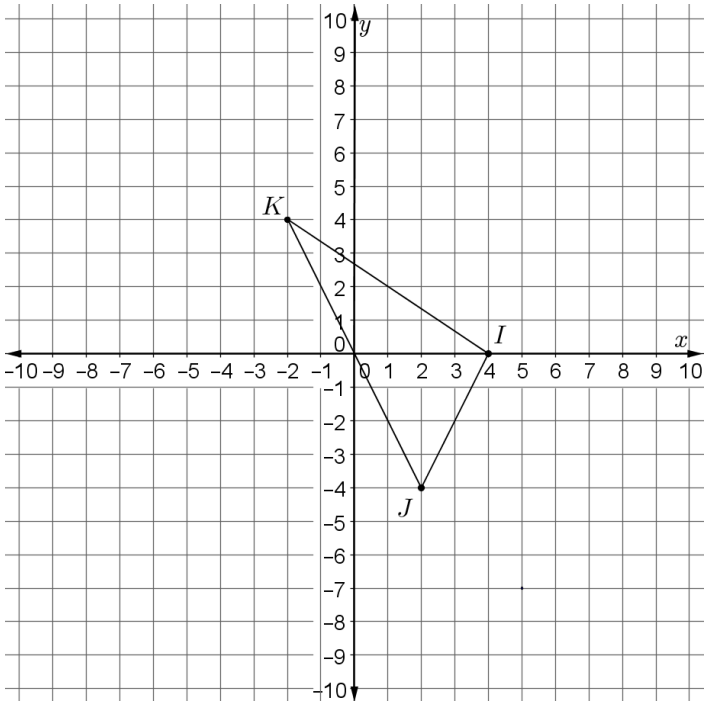


I' _____

J' _____

K' _____

2. Find the coordinates of the vertices of the image of triangle *IJK* after the translation $T(x,y) \rightarrow T(x-3, y+5)$. Graph the translated image on the graph below.

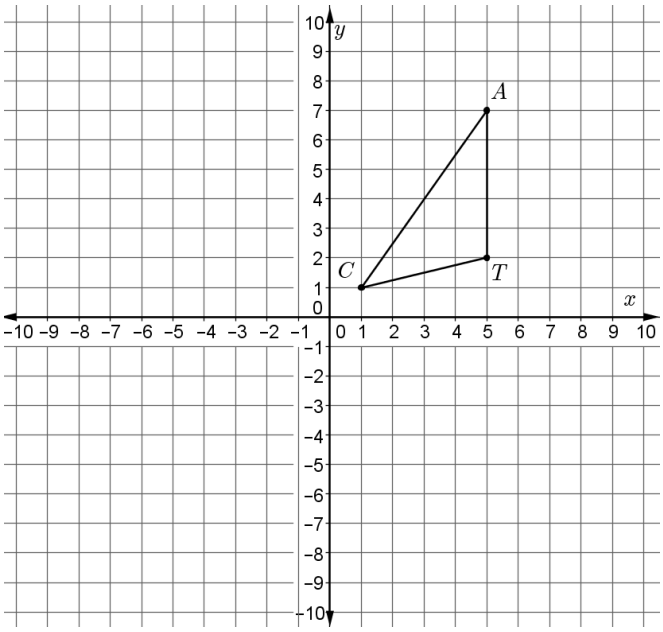


I' _____

J' _____

K' _____

3. Find the coordinates of the vertices of the image of triangle *CAT* after a 270° counterclockwise rotation about the origin. Graph the rotated image on the graph below.

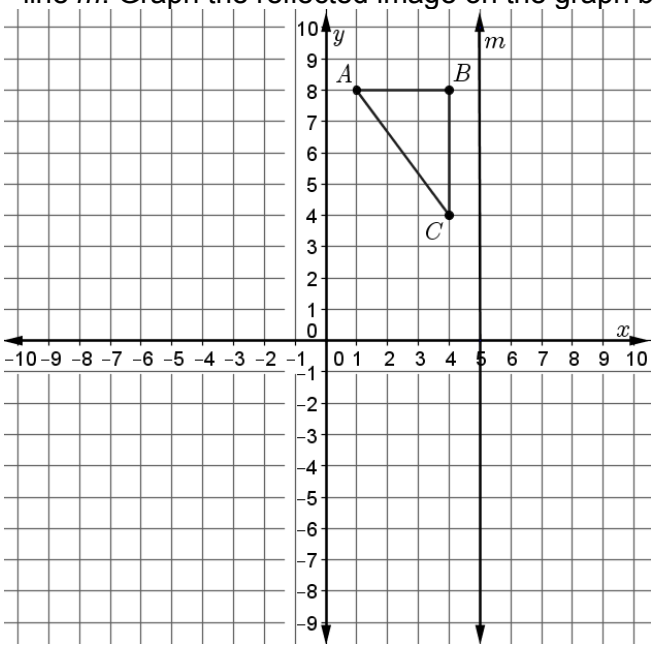


C' _____

A' _____

T' _____

4. Find the coordinates of the vertices of the image of Δ*ABC* after a reflection across line *m*. Graph the reflected image on the graph below.



A´ _____

B´ _____

C´ _____

5. Δ*ABC* has the points *A* (4, 3), *B* (9, 4), and *C* (7, 9). If it's reflected across the line *x* = 1, which of the following is a point on the new triangle?

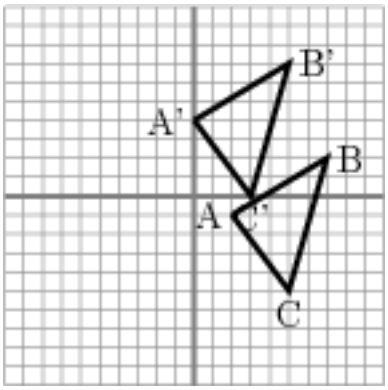
Ⓐ (9, -2)
Ⓑ (4, -1)
Ⓒ (-7, 4)
Ⓓ (0,3)

MAFS.8.G.1.3 FSA PRACTICE

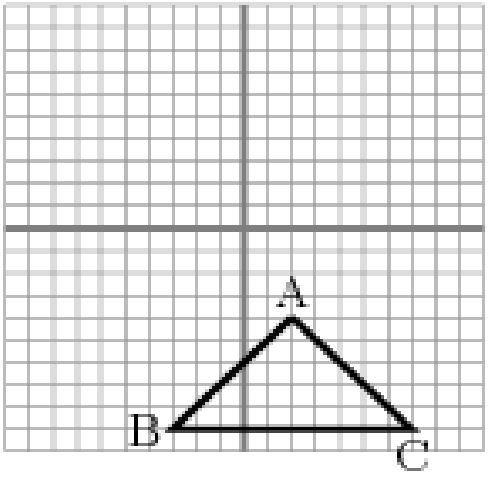
Neutral – Items Appear on Calculator and No Calculator Session

1. Triangle ABC and its transformation Triangle A'B'C' are shown. Describe the transformation.

   Describe the transformation.



2. Triangle ABC is shown. Translate Triangle ABC 5 left and 4 up and reflect it over the x-axis.

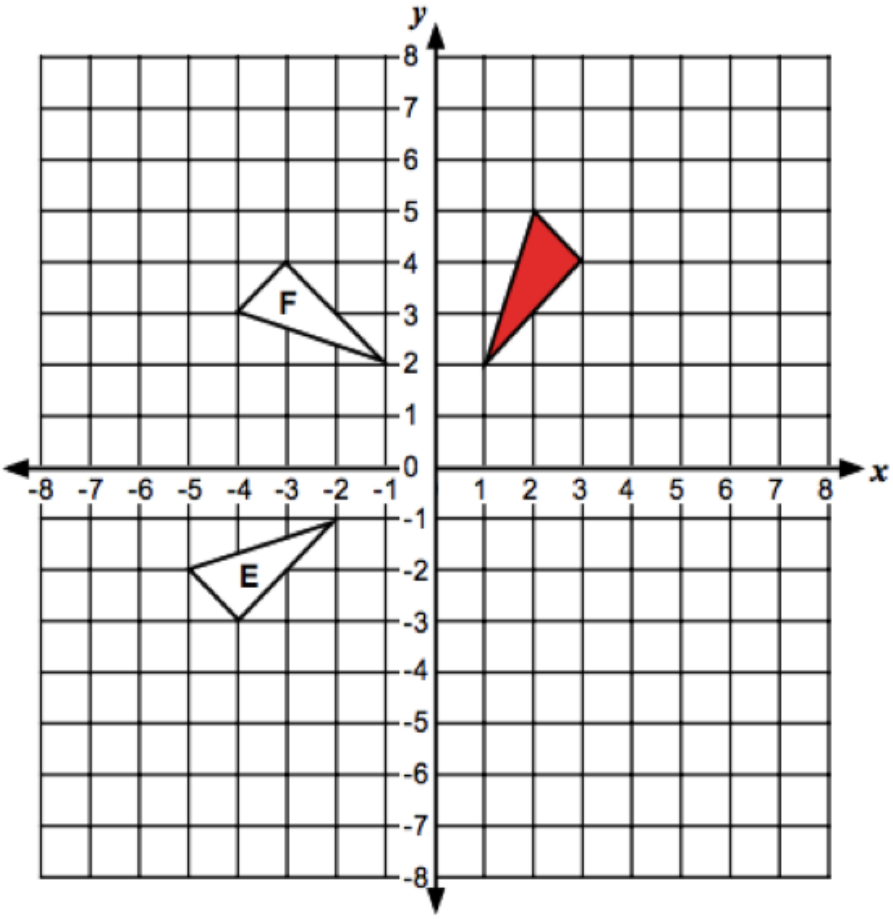


3.

Part A

Draw the shaded triangle after:

- It has been translated −7 horizontally and +1 vertically. Label your answer A
- It has been reflected over the x-axis. Label your answer B.
- It has been rotated $90°$ clockwise around the origin. Label your answer C.
- It has been reflected over the line y = x. Label your answer D.



Part B

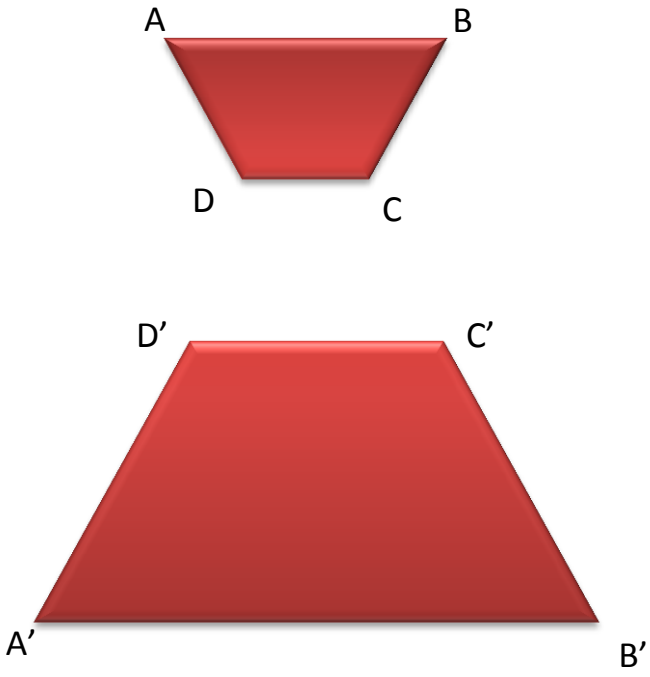
Describe fully the single transformation that:

- Takes the shaded triangle onto the triangle labeled E.
- Takes the shaded triangle onto the triangle labeled F
- It has been rotated $90°$ clockwise around the origin. Label your answer C.
- Describe a single transformation that has the same effect as rotating a shape $90°$ clockwise around the origin, then reflecting the result over the x-axis.

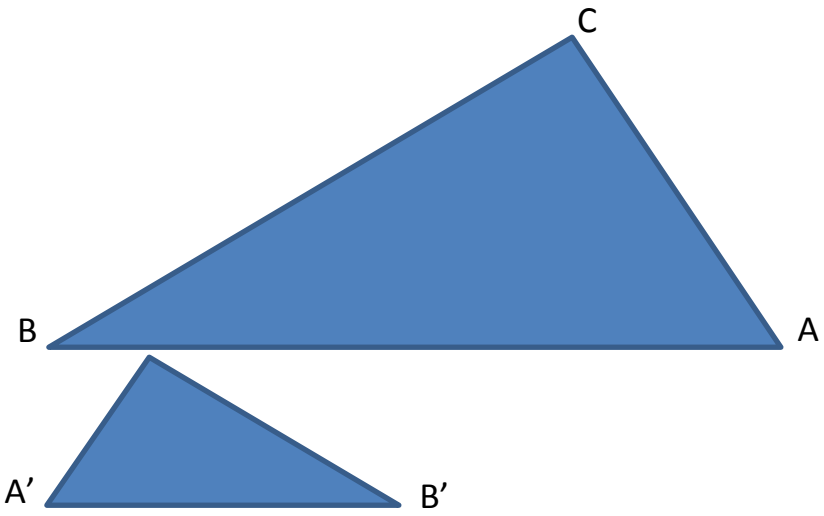
MAFS.8.G.1.4

Neutral – Items Appear on Calculator and No Calculator Session

1. Describe a sequence of transformations in detail to show that trapezoid *ABCD* is similar to trapezoid $A'B'C'D'$.



2. Describe a sequence of transformations in detail to show that triangle ABC is similar to triangle $A'B'C'$.



3. Which of the following transformations will result in a similar figure?

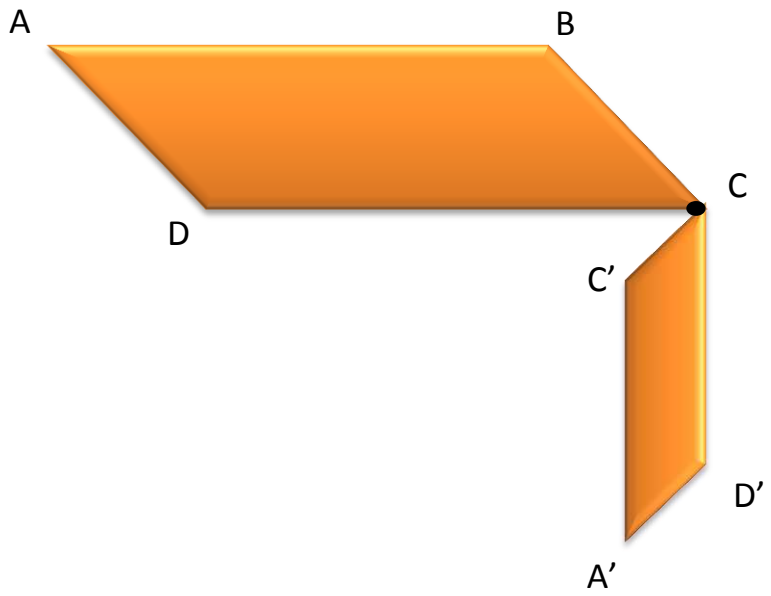
Ⓐ (3x, 2y)
Ⓑ (-x + 2, y-2)
Ⓒ (5x, y + 5)
Ⓓ (3x, x + y)

MAFS.8.G.1.4 FSA PRACTICE

Neutral – Items Appear on Calculator and No Calculator Session

1.

Describe a sequence of transformations in detail to show that parallelogram *ABCD* is similar to parallelogram $A'B'CD'$.



2.

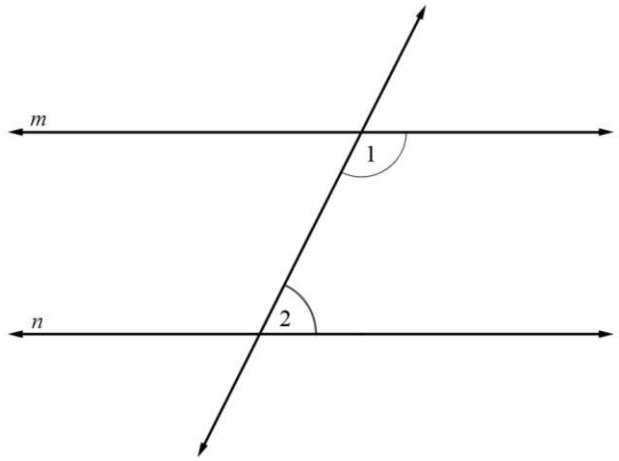
Which of the following is true about two squares of different sizes ABCD and WXYZ?

Ⓐ ABCD can be carried onto WXYZ using only translation
Ⓑ ABCD can be carried onto WXYZ using only dilation
Ⓒ ABCD can be carried onto WXYZ using only rotation
Ⓓ There is no transformation that can carry ABCD onto WXYZ

MAFS.8.G.1.5

Neutral – Items Appear on Calculator and No Calculator Session

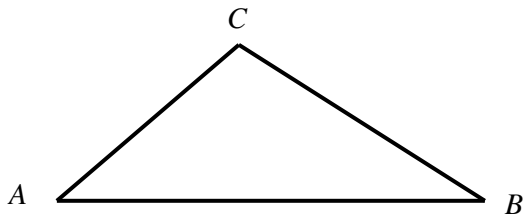
1. In the diagram below, lines *m* and *n* are parallel.



Describe the relationship between the measures of ∠1and ∠2.

Provide an informal justification for your answer to question 1.

2. The Exterior Angle of a Triangle Theorem states that the measure of an exterior angle of a triangle is equal to the sum of the measures of the nonadjacent interior angles.



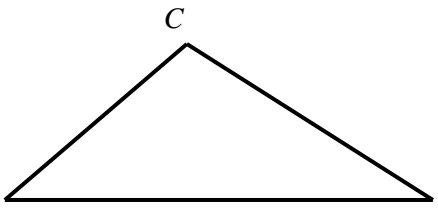
Using the triangle above:

Extend $\overline{AB}$ to show an exterior angle of ΔABC at vertex *B*. Label this angle in the diagram as $\angle 1$.

Apply the Exterior Angle of a Triangle Theorem and write an equation that describes the measure of $\angle 1$.

Provide an informal justification of this theorem.

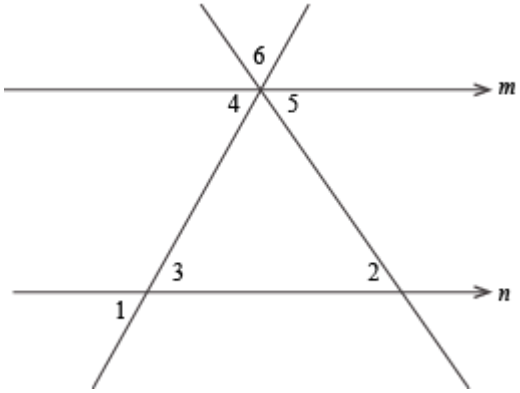
3. The Triangle Sum Theorem states that the sum of the measures of the interior angles of a triangle is 180°. Using the triangle shown below, provide an informal justification of this theorem. You may add to the diagram if you want, or use tracing paper or other supplies to support your explanation.



MAFS.8.G.1.5 FSA PRACTICE

Neutral – Items Appear on Calculator and No Calculator Session

1. Given the figure below and knowledge of parallel lines and vertical angles, which of the following can be proved to be true?

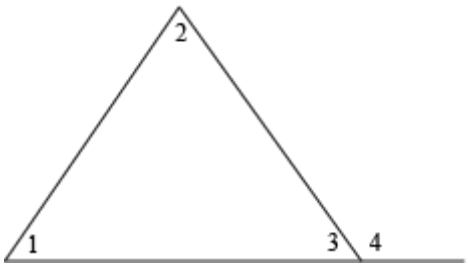


.

Ⓐ m∠1 + m∠6 + m∠2 =180°
Ⓑ m∠1 + m∠3 + m∠4 =180°
Ⓒ m∠1 + m∠2 + m∠3 =180°
Ⓓ None of the above

2. If we know that m∠1 + m∠2 + m∠3 = 180 and m∠3 + m∠4 = 180, what can we prove about the diagram below? Justify your answer.

.

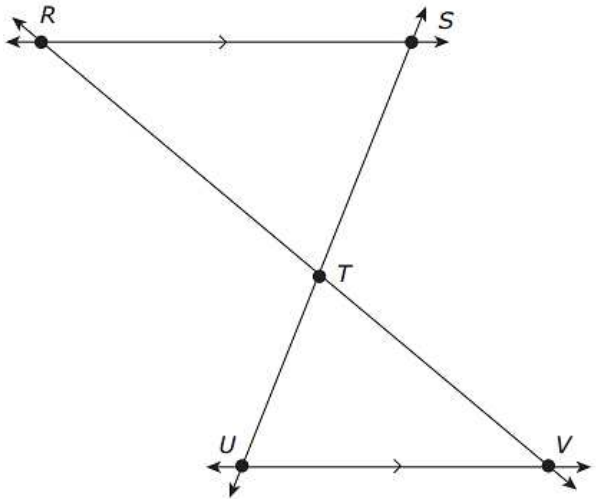


Ⓐ m∠1 = m∠2
Ⓑ m∠3 = m∠4
Ⓒ m∠1 + m∠2 = m∠4
Ⓓ m∠1 + m∠2 + m∠4 =180°

3. Which statement is illogical given the fact that the angles of a triangle add up to 180°? Justify your answer.

Ⓐ A right triangle has 2 acute angles
Ⓑ An equilateral triangle has three 60° angles
Ⓒ All pentagons have a total of 540°
Ⓓ An obtuse triangle has 3 obtuse angles

4. The figure shows line RS parallel to line UV. The lines are intersected by 2 transversals. All lines are in the same plane.



Part A

Explain why triangle RTS is similar to triangle VTU. Enter your explanation in the space provided.

Part A

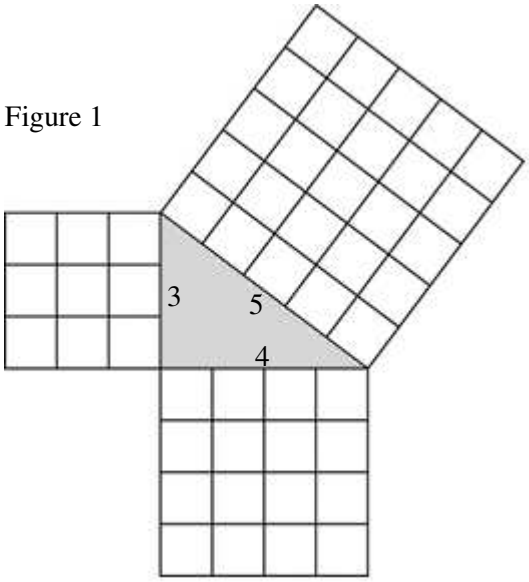
Given that m∠STU = 108°, determine m∠SRT + m∠TUV. Show your work or explain your answer. Enter your answer and your work or explanation in the space provided.

MAFS.8.G.2.6

A CALCULATOR IS ALLOWED

1. Explain how Figure 1 demonstrates the Pythagorean Theorem. The shaded triangle is a right triangle.

Figure 1



2. Which of the following three numbers are also the sides of a right triangle?

Ⓐ 1, 1, 2
Ⓑ 3, 3, 4
Ⓒ $1, 1\sqrt{2}$
Ⓓ $6, 6, 3\sqrt{3}$

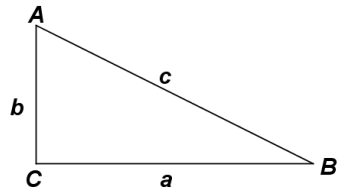
3. Why is the Converse of the Pythagorean Theorem equally as important as the Pythagorean Theorem itself?

Ⓐ It allows us to identify right triangles
Ⓑ It allows us to calculate side lengths of right triangles
Ⓒ It allows us to calculate angle measures or right triangles
Ⓓ It isn't as important as the Pythagorean Theorem itself

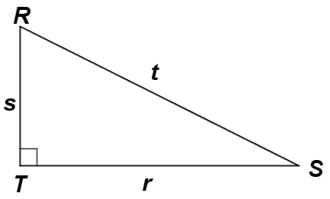
4. The converse of the Pythagorean Theorem states: If a triangle has side lengths of *a*, *b*, and *c*, and $a^2 + b^2 = c^2$, then the triangle is a right triangle. Mr. Lopez presented the following proof of the theorem to his math students and asked them to interpret the meaning.

Given: *ΔABC* where $a^2 + b^2 = c^2$

Prove: *ΔABC* is a right triangle



Construct a right triangle, *RST*, where *r* = *a*



1. The first thing Mr. Lopez did was draw a right triangle, triangle *RST*, with legs the same length as those of triangle *ABC* (see above). Why can Mr. Lopez say that $r^2 + s^2 = t^2$?

2. Since $r^2 + s^2 = t^2$, he claimed that $a^2 + b^2 = t^2$? Why can *a* and *b* be substituted for *r* and *s*?

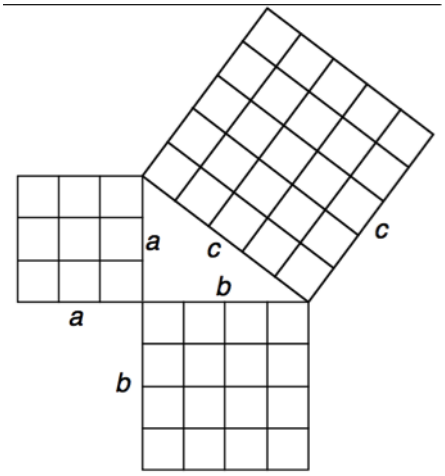
3. He then stated that $t^2 = c^2$. Explain why this must be true.

4. He finally stated that *t* = *c* and explained that if the three sides of one triangle are congruent to the three sides of another triangle, then the triangles must be congruent. What can be said now of the measure of angle *C*? What does this mean about triangle *ABC*?

5. Tammy attempted to prove Pythagorean theorem. Look carefully at her attempt. Determine if she is correct. Justify your answer.

Suppose a right triangle has sides of length a, b and c
Draw squares on the three sides as shown.
Divide these squares into smaller squares.
You can see that the number of squares on the two shorter sides add up to make the number of squares on the longest side.

So: $a^2+b^2=c^2$

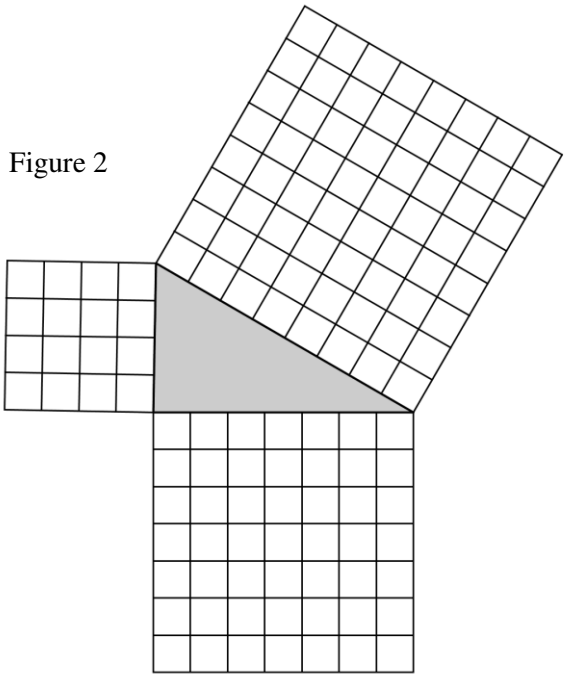


MAFS.8.G.2.6 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. Is the shaded triangle of Figure 2 a right triangle? Explain how you know.

Figure 2



2. We've found that the equation $8^2 + 15^2 = 17^2$ is true. What does this mean?

Ⓐ If the sides of a right triangle are of length 8 and 15, its hypotenuse is 17
Ⓑ The Pythagorean Theorem works only when the hypotenuse is a prime number
Ⓒ If the sides of a right triangle are 15 and 17, the hypotenuse is 8
Ⓓ The sum of the angles of a right triangle is $180°$.

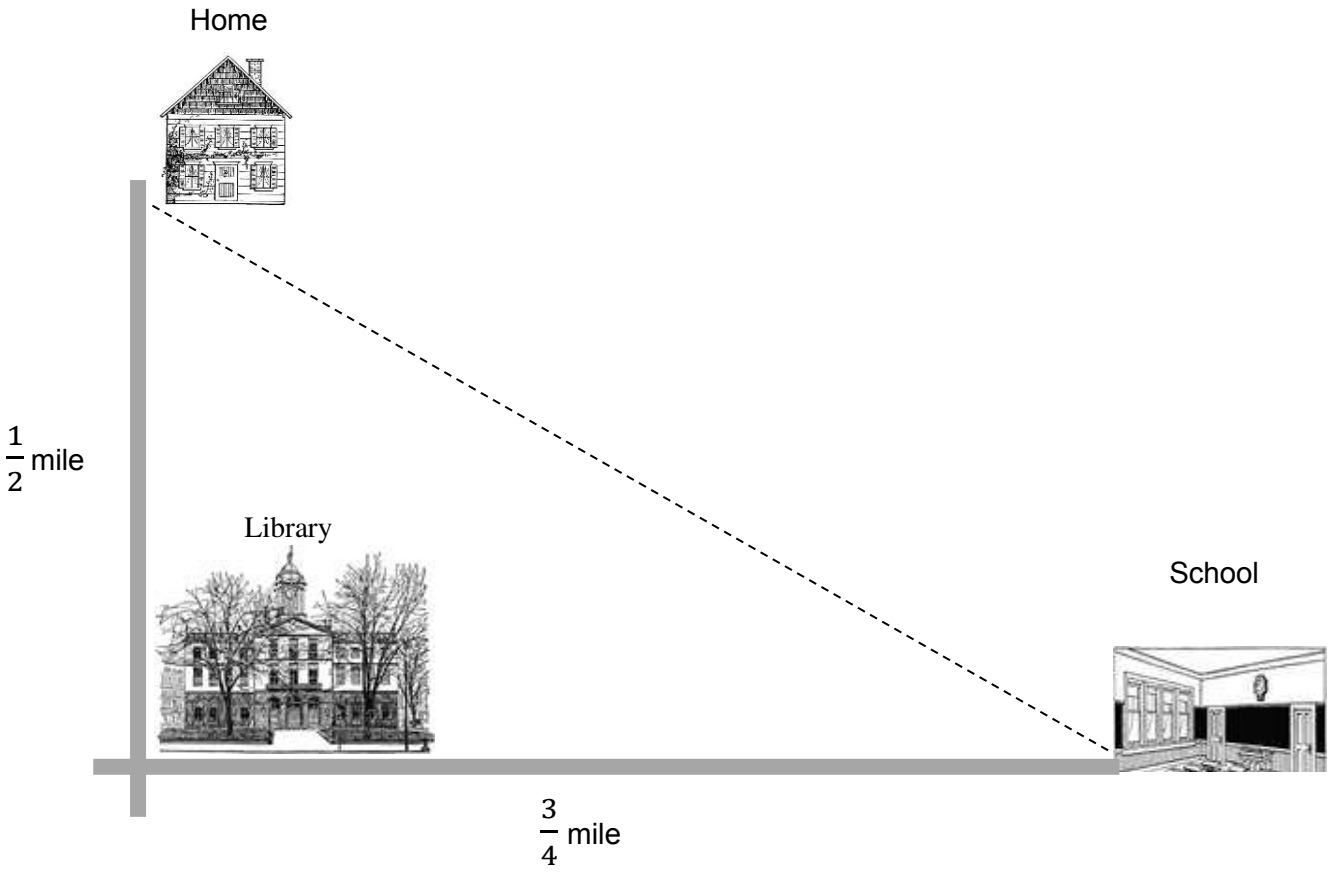
3. Which of the following are possible side lengths for a right triangle? Justify your answer.

Ⓐ 1 , 2, 3
Ⓑ 3, 5, 7
Ⓒ 6, 8, 10
Ⓓ 10, 15, 20

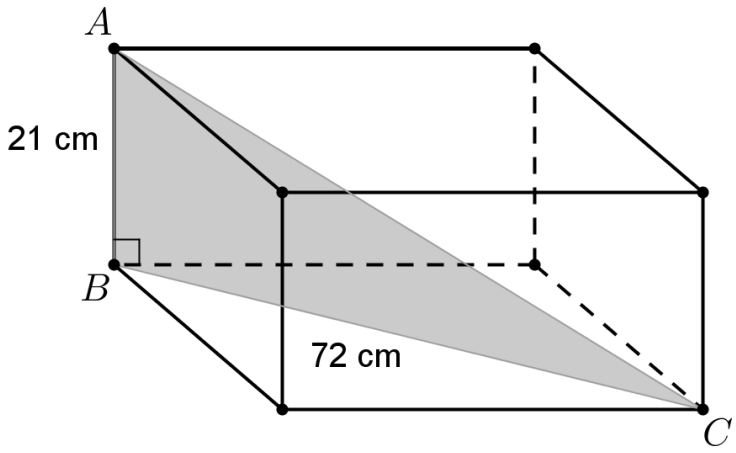
MAFS.8.G.2.7

A CALCULATOR IS ALLOWED

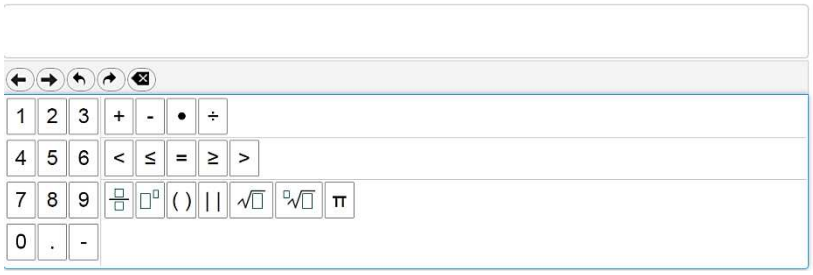
1. Lily and Matthew are walking from home to school. Matthew has to return a library book on the way and follows the sidewalk. Lily walks directly to school. Assume the path from home to the library is perpendicular to the path from the library to school. Use the lengths in the diagram to determine how far Lily walks. Show your work and explain how you determined your answer.



2. Find the length of $\overline{AC}$ given a right rectangular prism that has measurements in centimeters as shown in the diagram. Show your work and explain how you determined your answer.



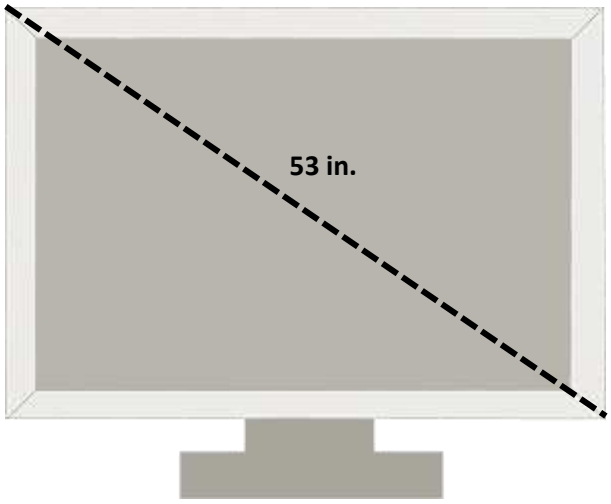
3. After deciding to remodel his house a little, Mr. Feeney bought a 15-foot handrail for his new staircase. If the second story of the house is 12 feet above the first floor, how long (horizontally) should Mr. Feeney's staircase be?



MAFS.8.G.2.7 FSA PRACTICE

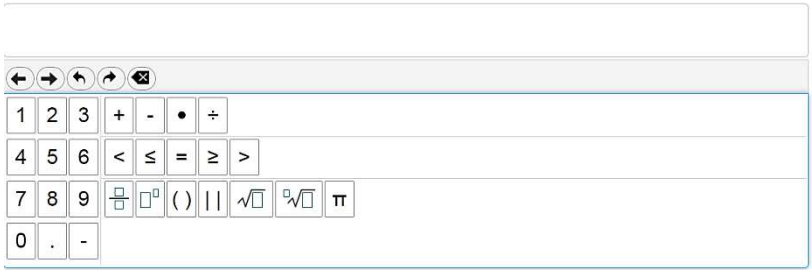
A CALCULATOR IS ALLOWED

1.

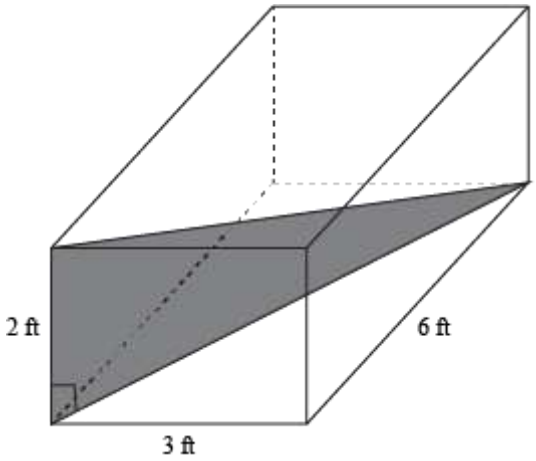


Television sizes are given by the length of the screen's diagonal. Tyrone wants a new 53 inch television for his bedroom. He plans to put the TV in a space that is 42 inches wide, but he is not sure it will fit. Tyrone knows the new television is rectangular and has a height of 28 inches. Determine whether the TV will fit in the available space. Show your work and explain how you determined your answer.

2. A right triangle has a hypotenuse of length 12 and a leg of length 8. What is the length of the other leg?



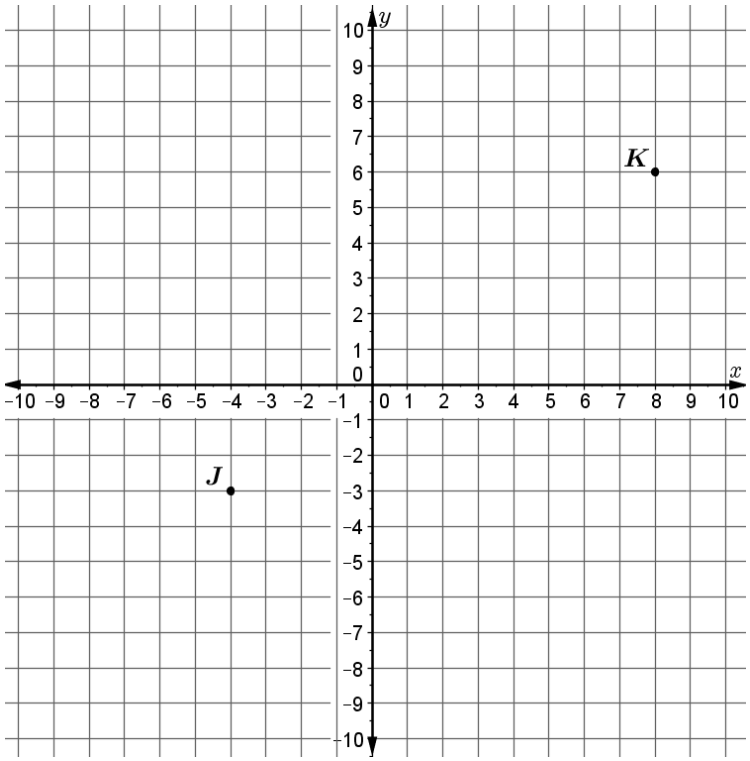
3. Twins James and Jamie, age 5, are getting bunk beds. Their parents picked up the box from Ruth and found that it has dimensions of 6 feet by 2 feet by 3 feet. Their minivan can only hold a box with a diagonal of 6.8 feet at most. Will the bunk bed fit in their trunk? Justify your answer.



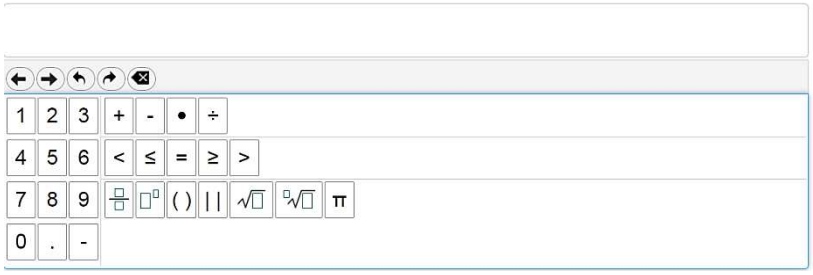
MAFS.8.G.2.8

A CALCULATOR IS ALLOWED

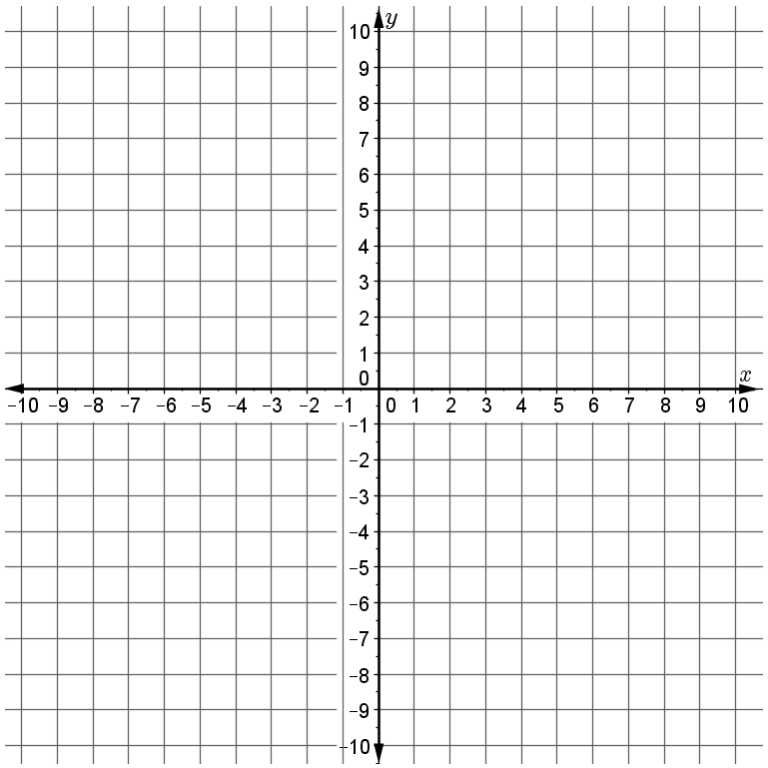
1. Find the distance between the points *J* and *K* shown on the coordinate plane. Show work to justify your answer.



2. What is the distance between (-1, 1) and (5,9)?



3. Graph and label triangle *PQR* whose vertices are located at *P*(-5, 2), *Q*(7, -3), *R*(7, 2). Determine the length of each side and show work to justify your answers.



List the length of each side of the triangle:

$\overline{PQ}$ _____

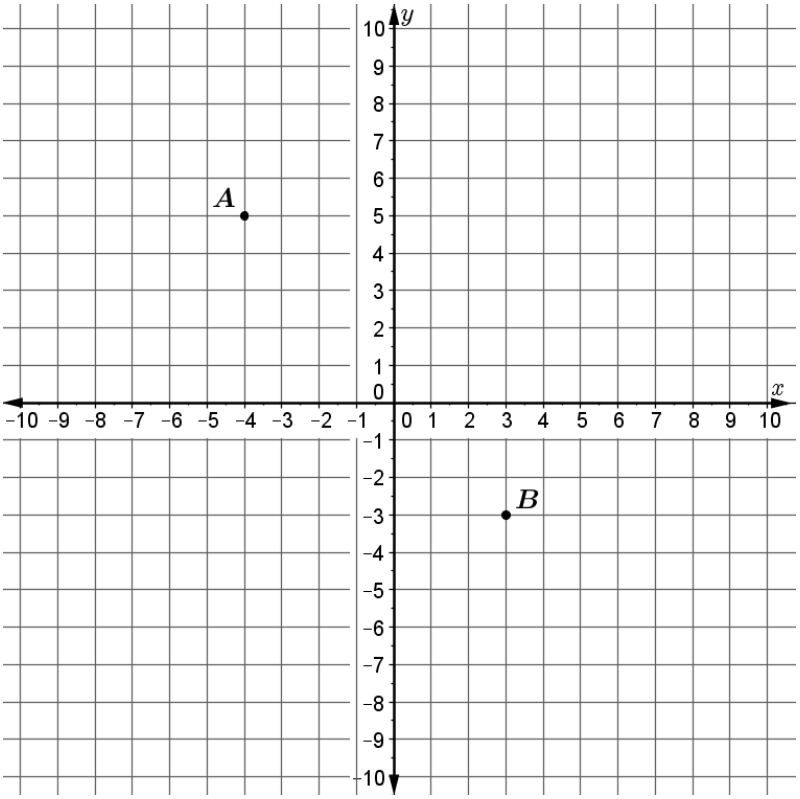
$\overline{QR}$ _____

$\overline{RP}$ _____

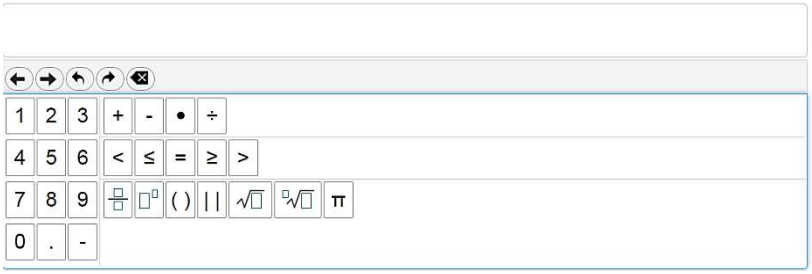
MAFS.8.G.2.8 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. Find the distance between points A and B in the coordinate plane. Show work to justify your answer.



2. What is the distance between (1,4) and (4,8)?



3. Which two points are separated by a distance of 17 units?

Ⓐ (1, -2) and (13, 14)
Ⓑ (-2, -4) and (6, 9)
Ⓒ (-3, 11) and (5, -4)
Ⓓ (2, 5) and (13, -3)

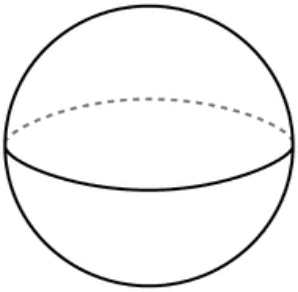
MAFS.8.G.3.9

A CALCULATOR IS ALLOWED

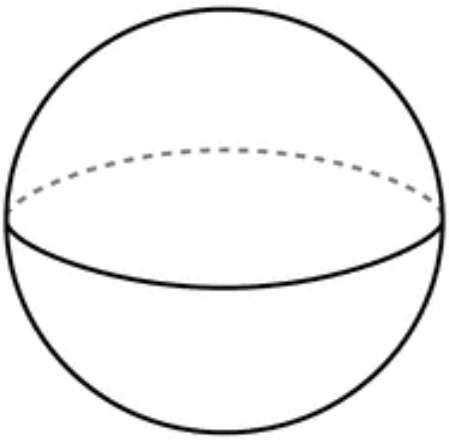
1. State the formula for finding the volume of a sphere.

Explain what each variable in the formula represents.

On the diagram, draw and label the dimensions represented by the variables in the formula.



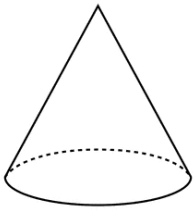
A science teacher fills a spherical bubble with hydrogen gas. The bubble has a diameter of 8 centimeters. Find the volume of hydrogen gas in terms of π, and explain or show how you found your answer.



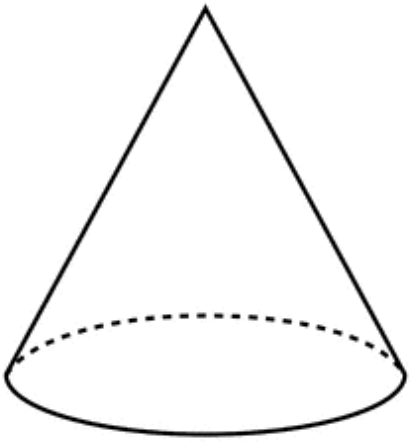
2. State the formula for finding the volume of a cone.

Explain what each variable in the formula represents.

On the diagram, draw and label the dimensions represented by the variables in the formula.



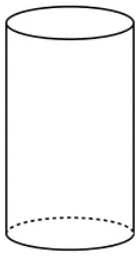
Sugar was traditionally produced and sold as sugarloaves, which are cones of sugar wrapped in paper. Find the volume of a cone-shaped sugarloaf with a base diameter of 8 centimeters and a height of 22 centimeters. Explain or carefully show how you calculated the volume.



3. State the formula for finding the volume of a cylinder.

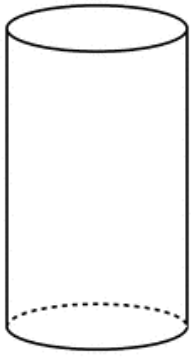
Explain what each variable in the formula represents.

On the diagram, draw and label the dimensions represented by the variables in the formula.

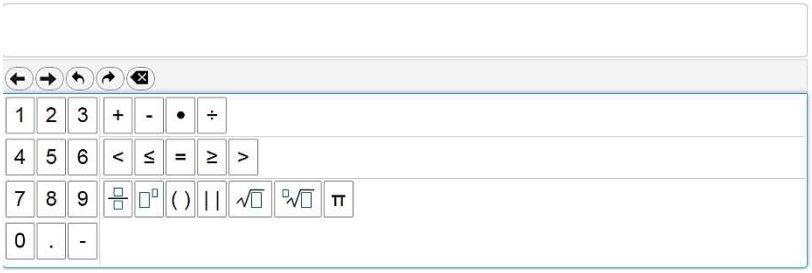


Until 2014, the mass of a kilogram was defined as exactly equal to the mass of a special platinum-iridium cylinder kept in Sèvres, France. The cylinder's diameter and height are both 39.2 millimeters.

What is the volume of this cylinder? Explain how you found your answer.



4. A basketball has a circumference of 29.5 inches. Using 3.14 as an approximation for π, what is the basketball's volume to the nearest cubic inch?



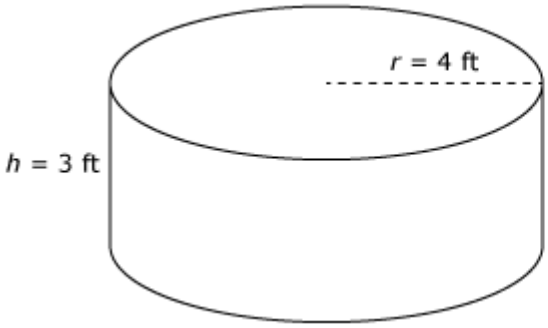
5. What is the volume of a cylinder with a radius of 4m and a height of 5m?

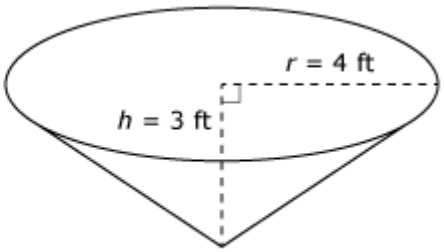
Ⓐ $40\pi\ m^3$
Ⓑ $80\pi\ m^3$
Ⓒ $100\pi\ m^3$
Ⓓ $400\pi\ m^3$

MAFS.8.G.3.9 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. The figure shows a right-circular cylinder and a right-circular cone. The cylinder and the cone have the same base and the same height.





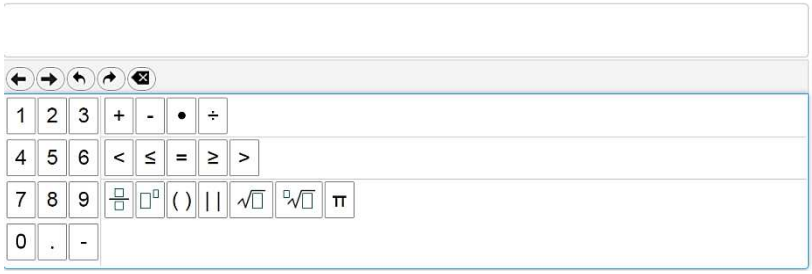
Part A

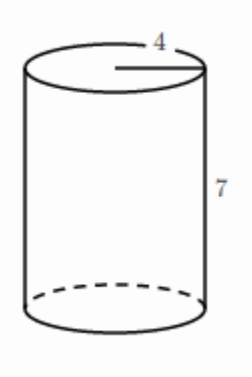
What is the volume of the cone, in cubic feet?

A. 12π B. 16π C. 36π D. 48π

Part B

What is the ratio of the cone's volume to the cylinder's volume?
Enter your answer in the space provided. Enter **only** your fraction.



2. 

What is the volume of a cylinder with base radius 4 and height 7?

Neutral – Items Appear on Calculator and No Calculator Session

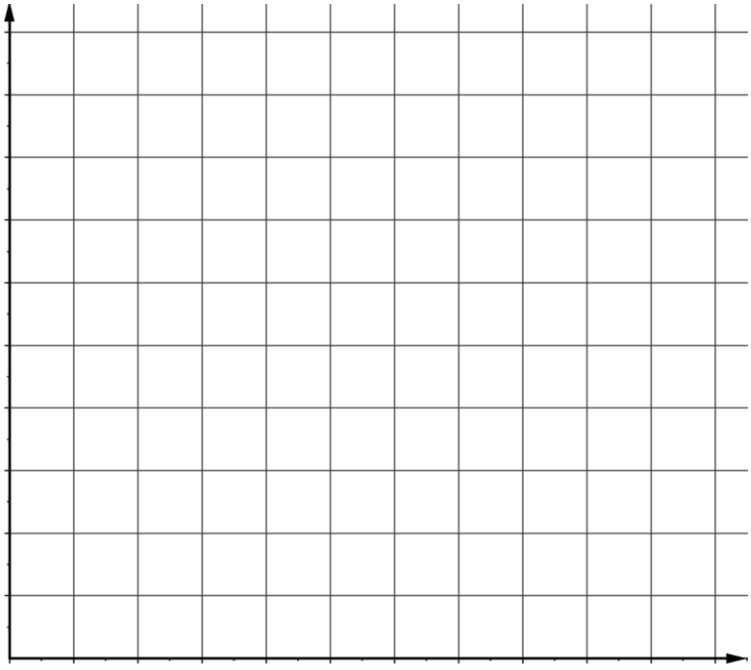
MAFS.8.SP.1.1

1. Scientists at the new company, BunG, tested their bungee cords using weights from 10 to 200 pounds. They identified a random sample of cords and measured the length that each cord stretched when different weights were applied. The table displays the average stretch length for the sample of cords for each weight.

Bungee Cord Length

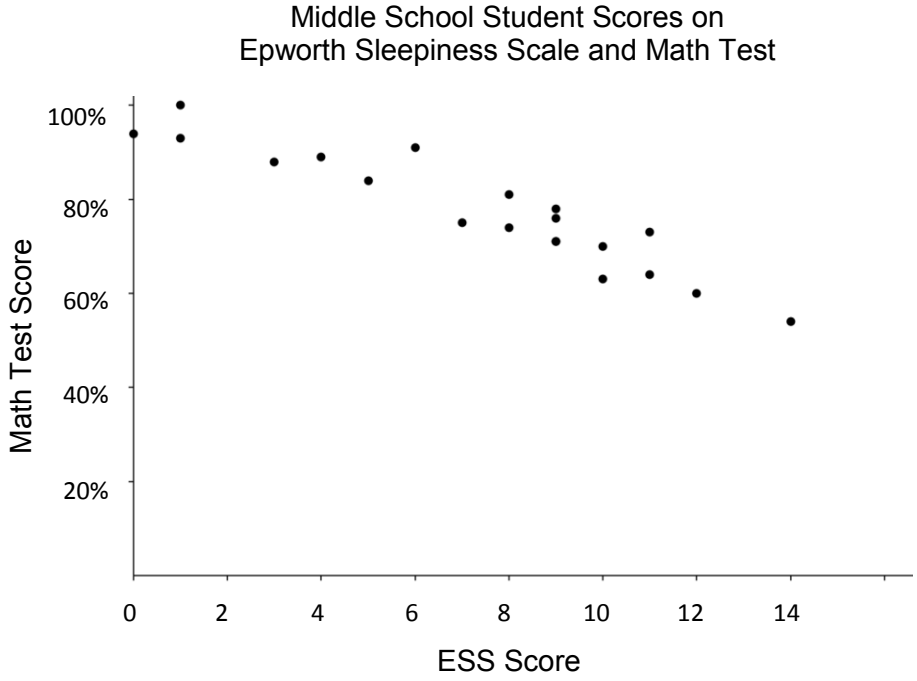
Weight (pounds)	10	30	50	70	100	125	150	175	200
Length (feet)	11	12	13	14	15	17	19	20	21

Construct a scatterplot for this set of data.



Use the scatterplot to describe the relationship between the weights applied to a bungee cord and the length the cord stretches.

2. The scatterplot below compares middle school students' scores on the Epworth Sleepiness Scale (ESS) to their scores on a recent math test. The Epworth Sleepiness Scale measures excessive daytime sleepiness with zero being least sleepy.

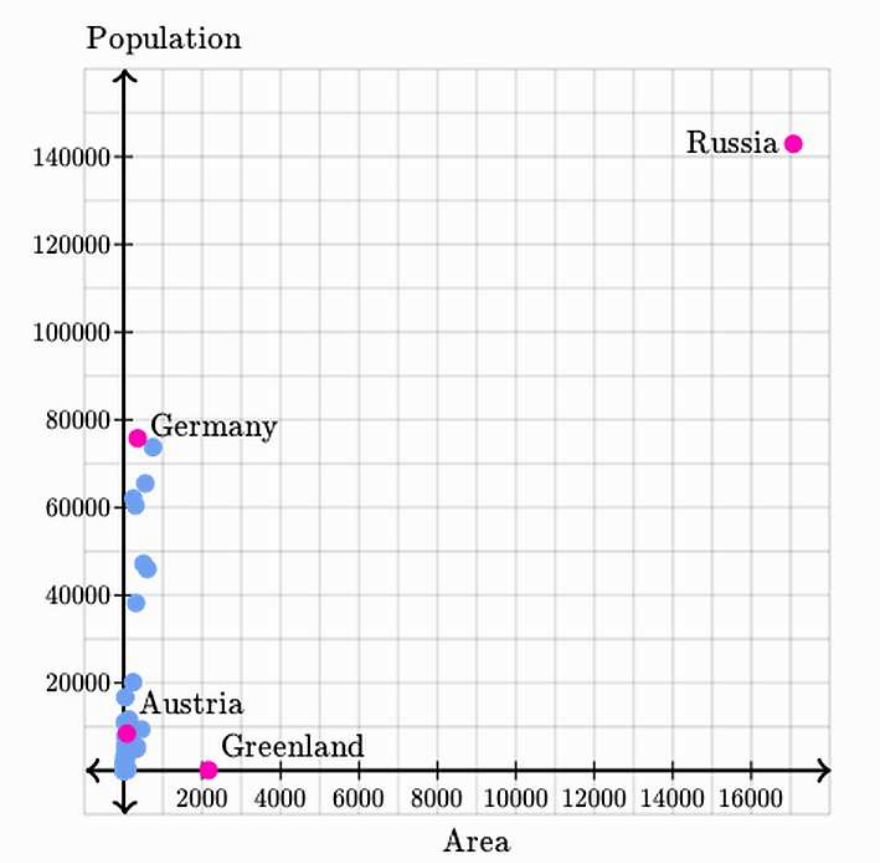


Describe the association between scores on the Epworth Sleepiness Scale and scores on the math test.

3. The plot shown describes the relationship between the area (in thousands of square kilometers) and population (in thousands of people) of all European countries.

Which of the marked points are outliers? Select all that apply.

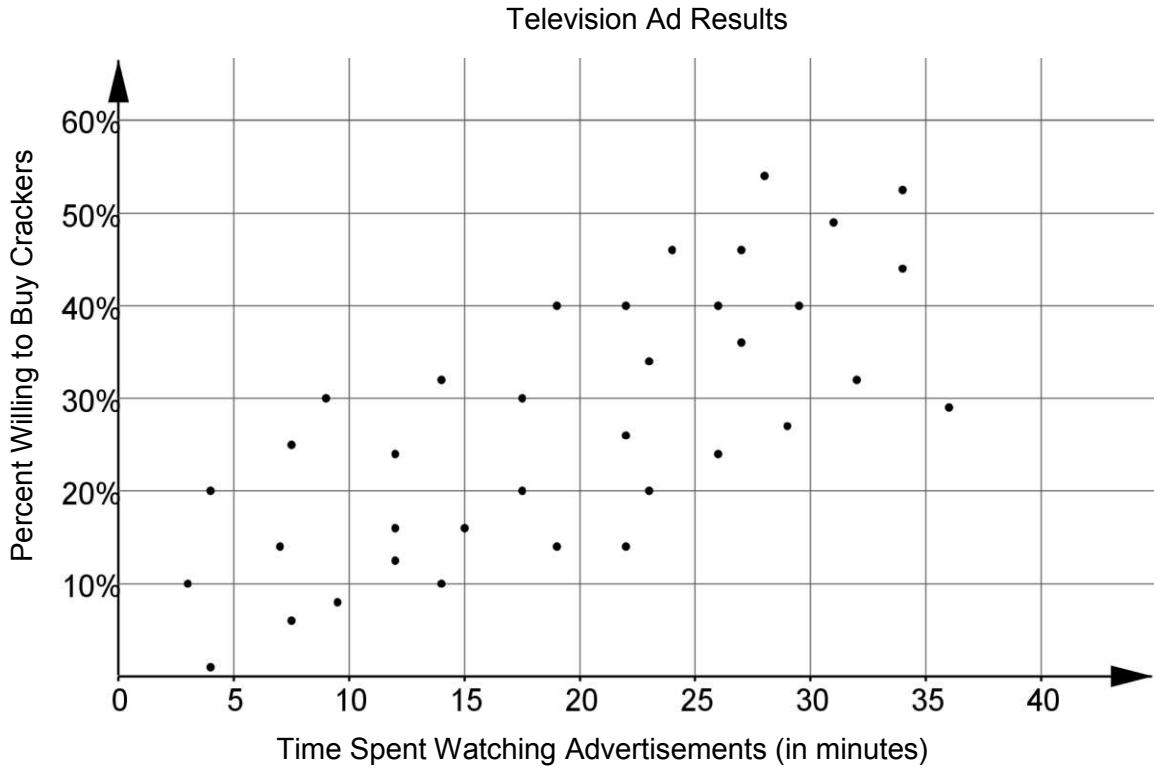
☐	Greenland
☐	Germany
☐	Austria
☐	Russia



MAFS.8.SP.1.1 FSA PRACTICE

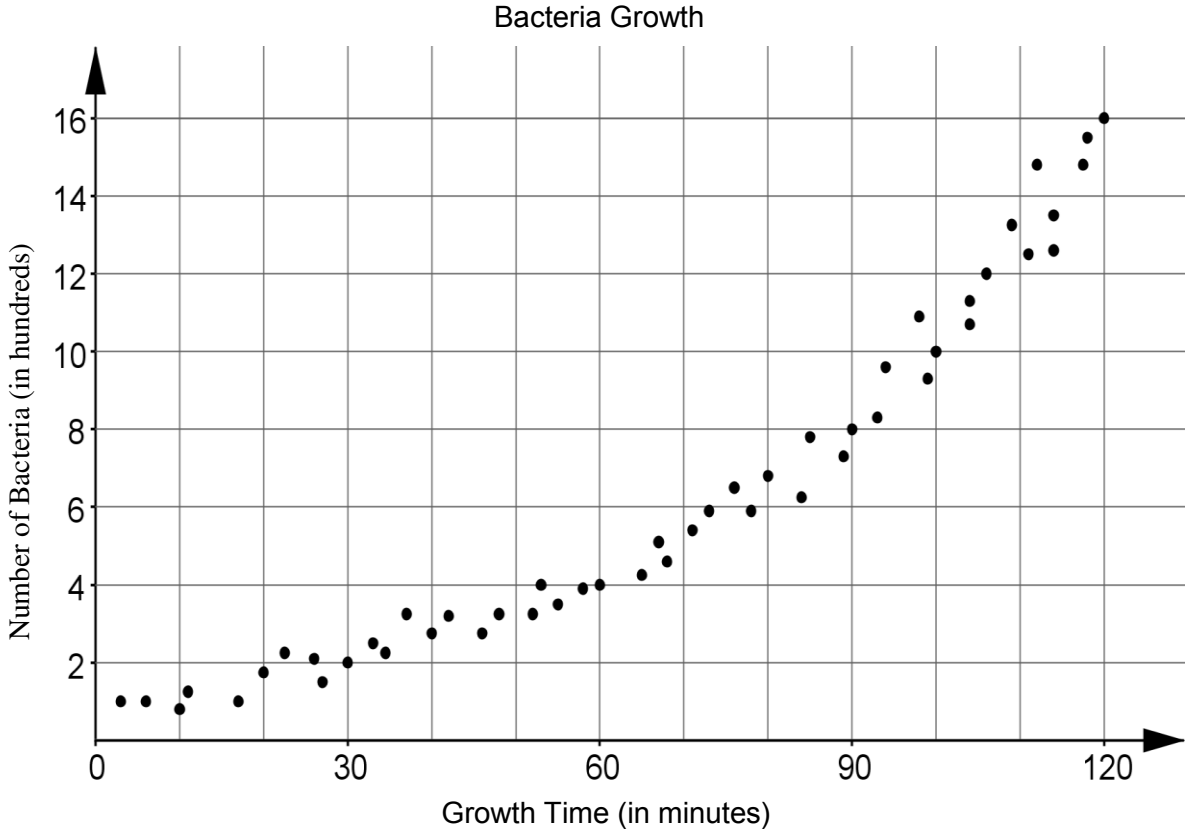
Neutral – Items Appear on Calculator and No Calculator Session

1. A company that manufactures cheese crackers decides to test their new advertising campaign on 36 groups of people before paying for their advertisements to be run nationwide. They compared the amount of time each group watched television ads to their willingness to buy the company's crackers.



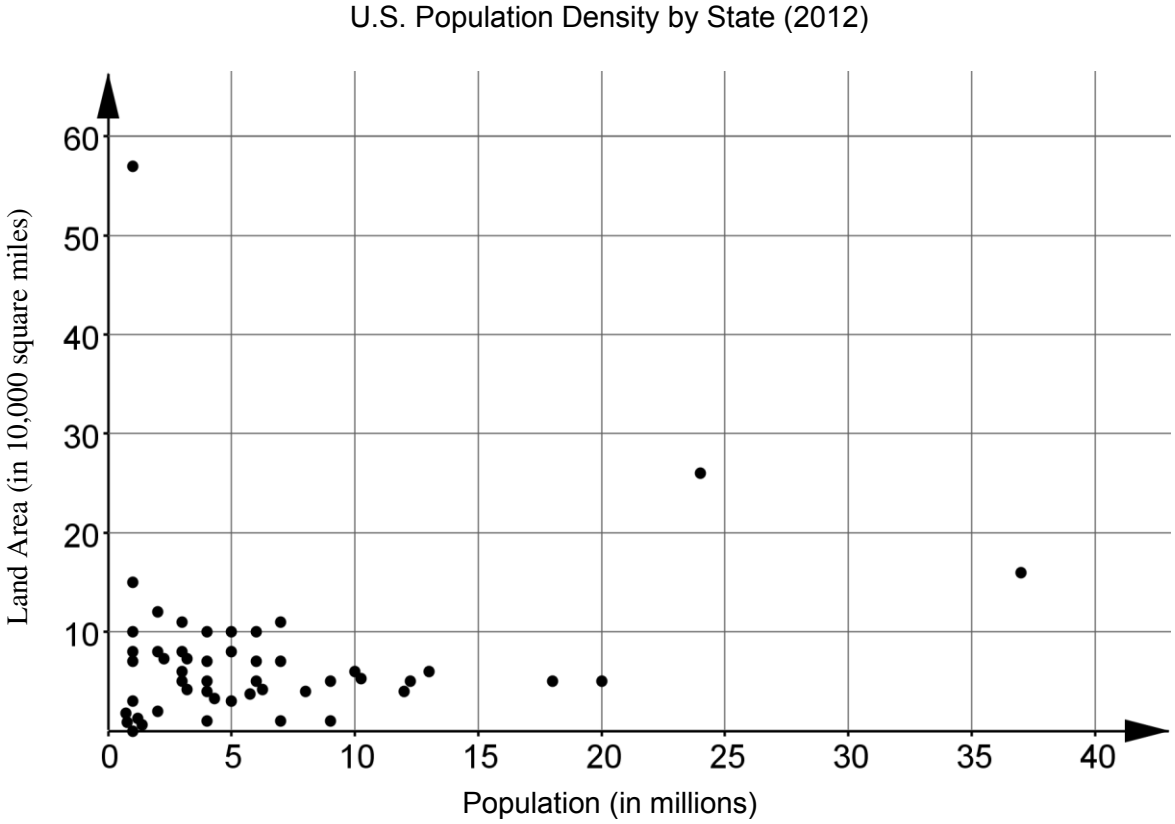
Describe the association between time spent watching advertisements and the percent of each group willing to buy the company's cheese crackers.

2. A group of scientists wanted to measure the growth pattern of a particular kind of bacteria. They started 50 colonies of 100 bacteria each and recorded the number of bacteria in each colony throughout a two-hour period. The results are shown below.



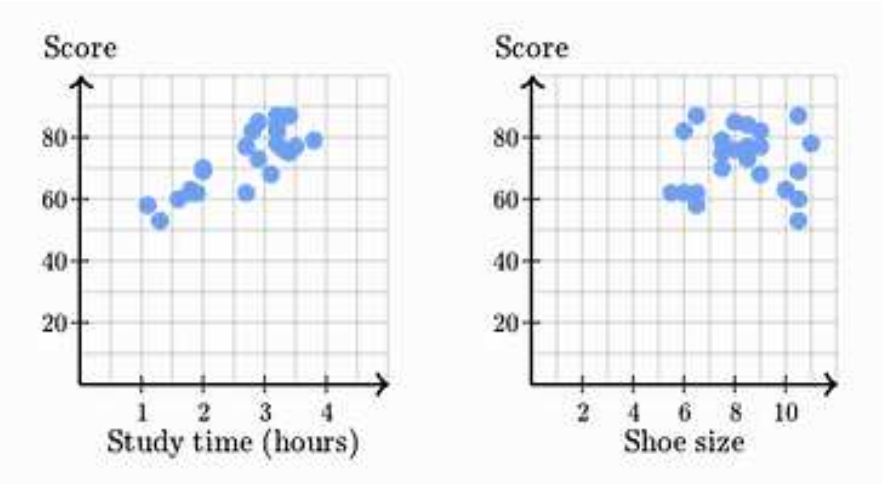
Describe the association between the passage of time and the number of bacteria.

3. Population density measures are approximations of the number of people per square unit of area. The following scatterplot represents data from each of the 50 states comparing population (in millions) to land area (in 10,000 square miles) in 2012.



Describe the relationship between population and land area. Include in your description any evidence of clustering or outliers.

4. The graphs below show the test grades of the students in Dexter's class. The first graph shows the relationship between test grades and the amount of time the students spent studying, and the second graph shows the relationship between test grades and shoe size.



Choose the best description of the relationships suggested by the graphs.

Ⓐ There is a negative linear relationship between study time and score, and a positive linear relationship between shoe size and score.

Ⓒ There is a negative linear relationship between study time and score, and a positive linear relationship between shoe size and score.

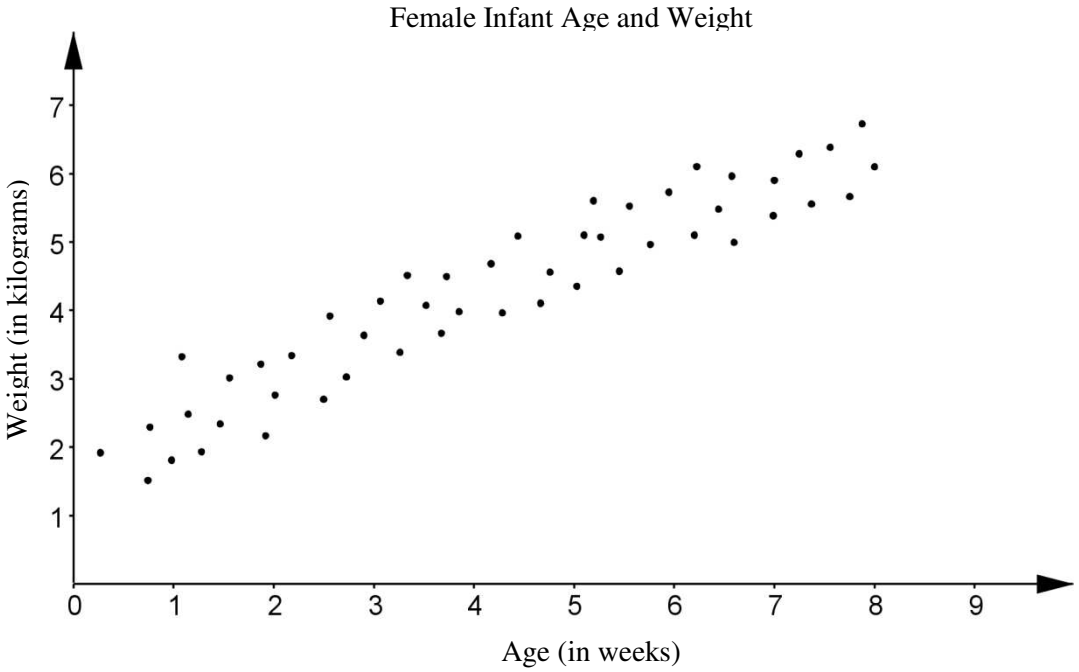
Ⓑ There is a positive linear relationship between study time and score, and no relationship between shoe size and score.

Ⓓ There is a positive linear relationship between study time and score, and no relationship between shoe size and score.

MAFS.8.SP.1.2

Neutral – Items Appear on Calculator and No Calculator Session

1. The scatterplot below shows the relationship between the ages and weights of 50 female infants.

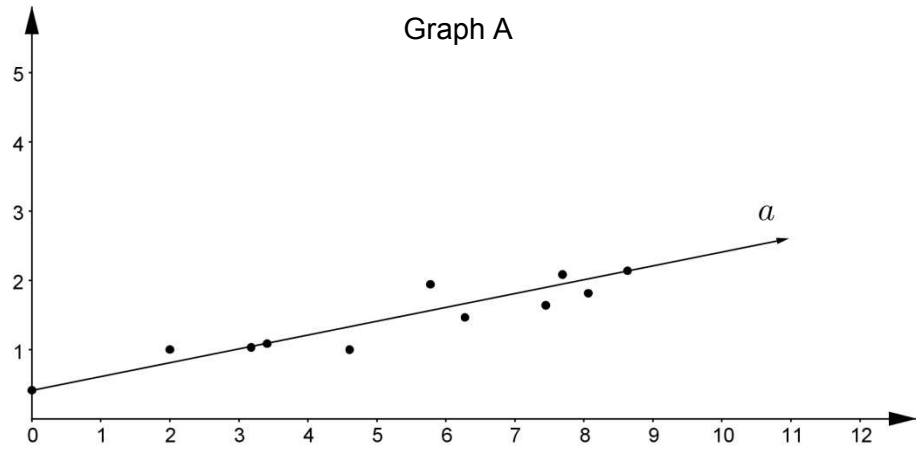


Draw a line on the scatterplot that fits the data.

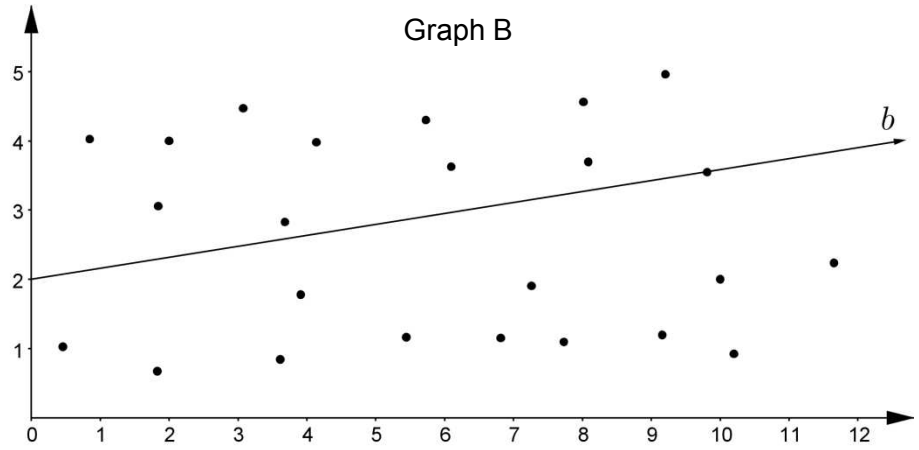
Assess how well the line you drew fits this data.

2. Each graph shows a set of data and a line that has been fitted to that data.

Graph A



Graph B



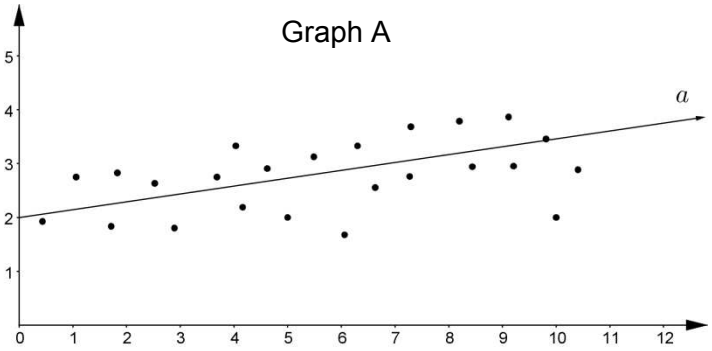
Compare how well each line fits its set of data. Explain your reasoning.

MAFS.8.SP.1.2 FSA PRACTICE

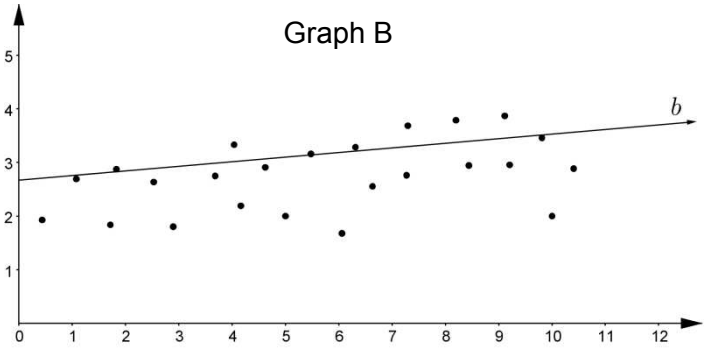
Neutral – Items Appear on Calculator and No Calculator Session

1. Each graph shows the same set of data and a line that has been fitted to the data.

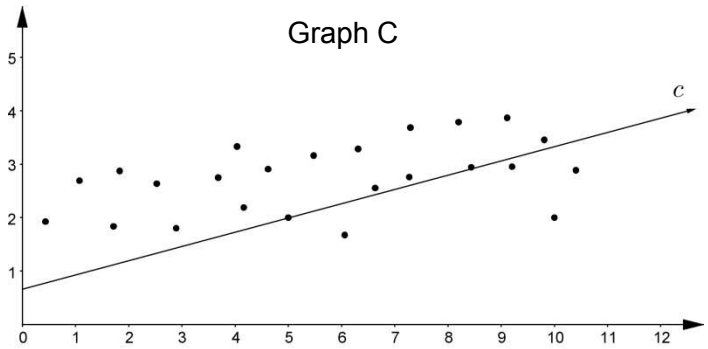
Graph A



Graph B

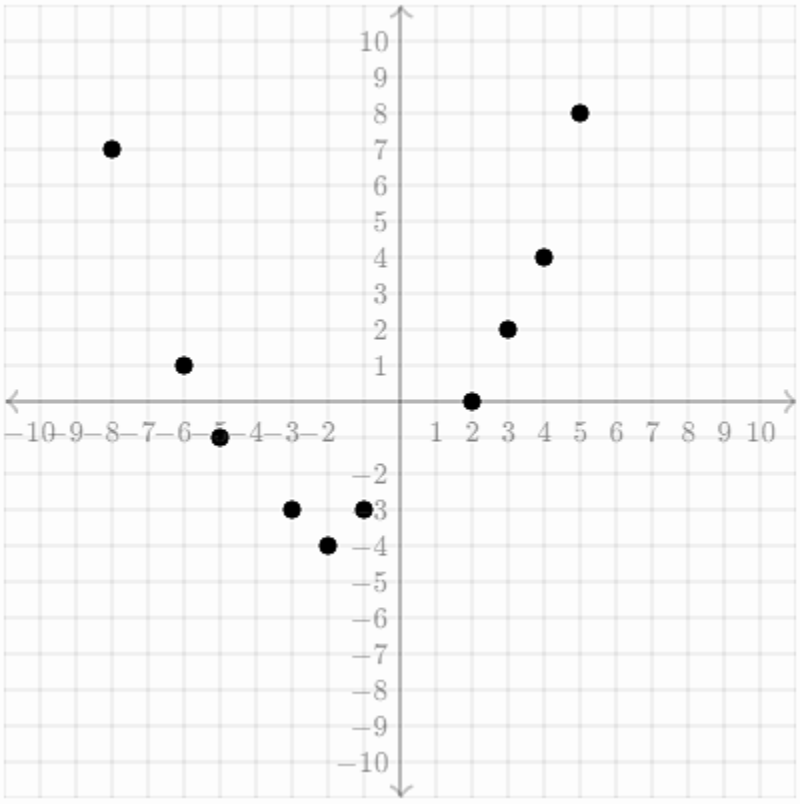


Graph C

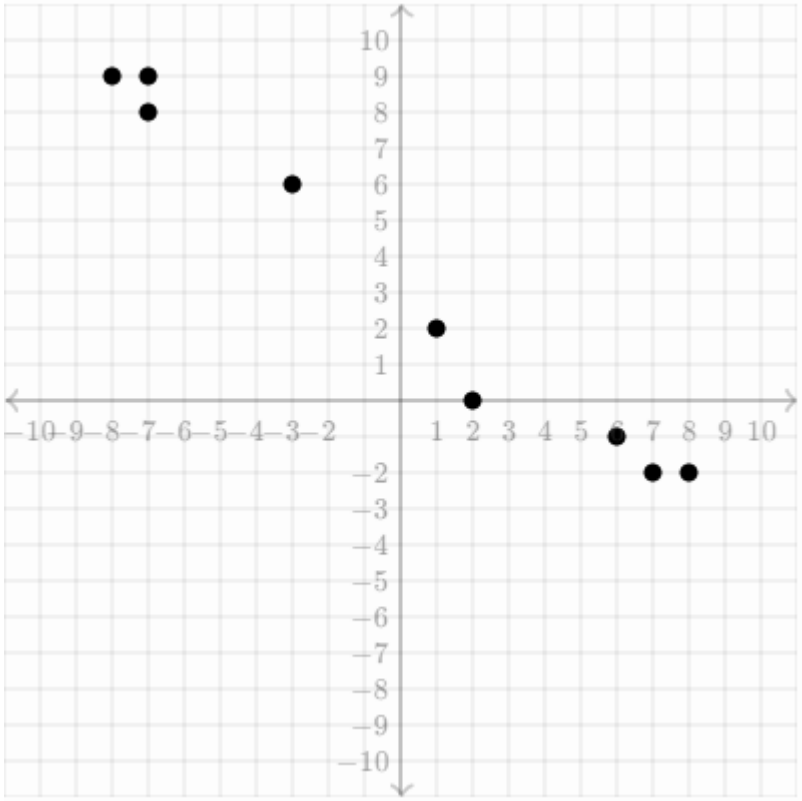


Determine which line, a, b, or c is a best fit for the data and explain why.

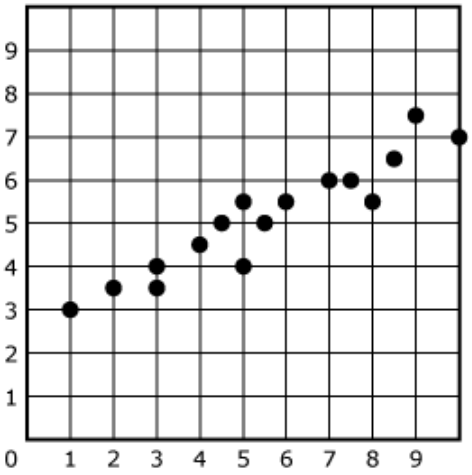
2. A scatter plot is shown. Fit a line to the data, or write that no line fits the data well.



3. A scatter plot is shown. Fit a line to the data, or write that no line fits the data well.

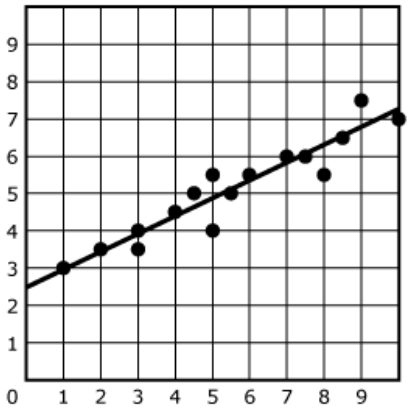


4. A scatter plot is shown in the coordinate plane.

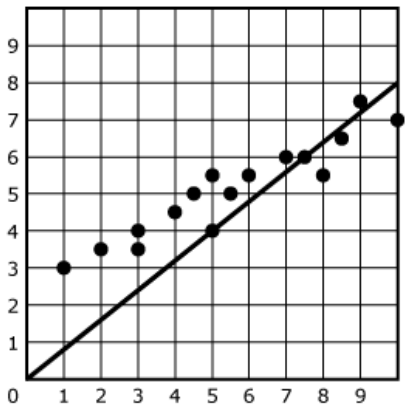


Which graph most closely approximates a line of best fit for the data in the scatter plot?

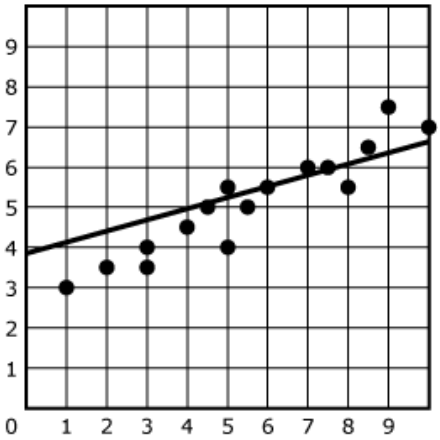
A.



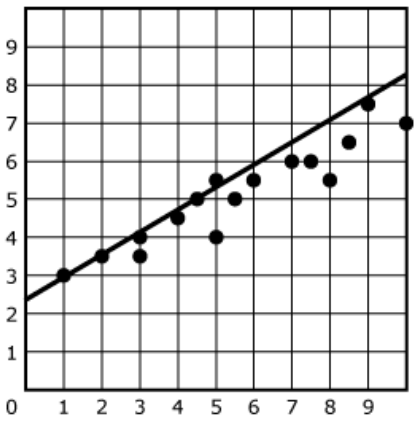
B.



C.



D.



5. Eric planted a seedling in his garden and recorded it height each week. The equation shown can be used to estimate the height, h , in inches, of the seedling after w , weeks since Eric planted the seedling.

$$h = \frac{3}{4}w + \frac{9}{4}$$

Part A

What does the slope of the graph of the equation $h = \frac{3}{4}w + \frac{9}{4}$ represent?

Ⓐ the height, in inches, of the seedling after w weeks
Ⓑ the height, in inches, of the seedling when Eric first planted it
Ⓒ the increase in the height, in inches, of the seedling each week
Ⓓ the total increase in the height, in inches, of the seedling after w weeks

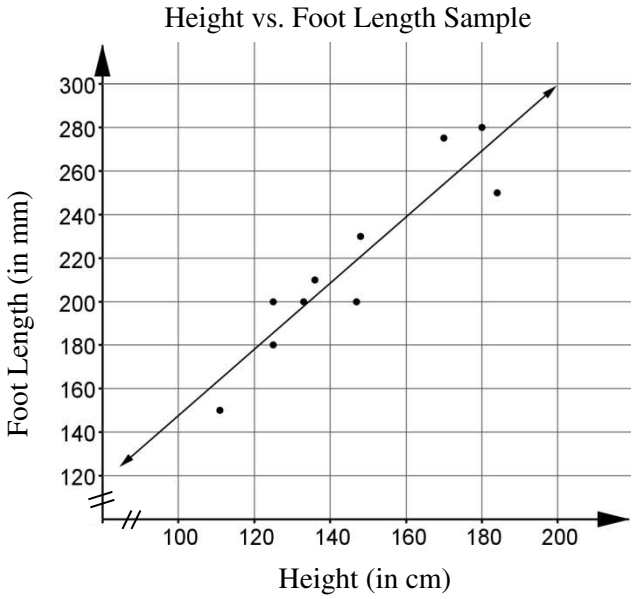
Part B

The equation $h = \frac{3}{4}w + \frac{9}{4}$ estimates the height of the seedling to be 8.25 inches after how many weeks? Enter your answer in the box.

MAFS.8.SP.1.3

Neutral – Items Appear on Calculator and No Calculator Session

1. The graph below shows a scatterplot and its line of best fit for data collected on the height and foot length of a sample of ten male students.



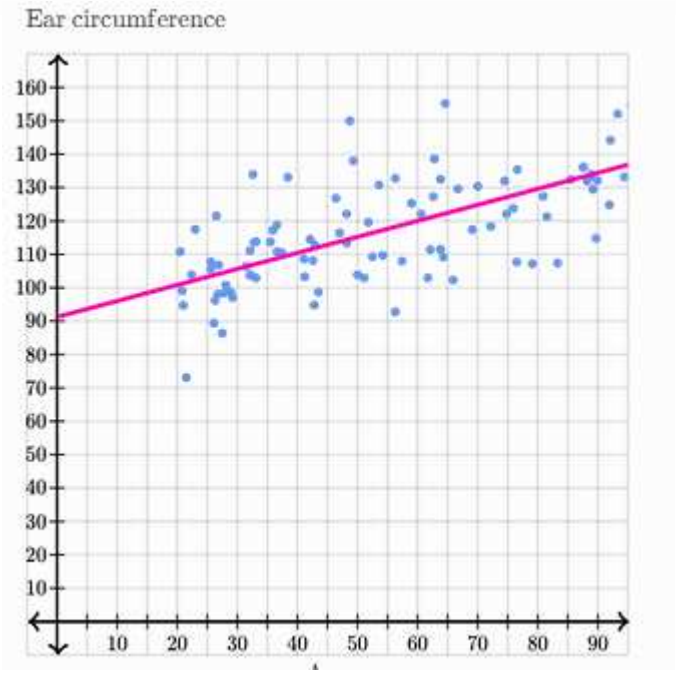
What does the graph indicate about the relationship between foot length and height?

The equation of the line of best fit is $F = (1.52)\,h - 4.35$, where F is foot length in millimeters and h is height in centimeters. Explain the meaning of the slope and the y-intercept of this equation in the context of the data.

2.

Rani went around the laboratory where she works and measured her coworkers' ear circumference(in millimeters). Then she matched her results with each coworkers' age and created the following scatter plot and trend line.

Assuming the line correctly models the trend in the data, what does this line's slope of 0.48 **mean?**



Ⓐ The average age was 48 years old
Ⓑ On average, each 1 year increase in age was associated with a 0.48 millimeter increase in ear circumference.
Ⓒ The average ear circumference was 0.48 millimeters
Ⓓ On average, each 1 millimeter increase in ear circumference was associated with a 0.48 year increase in age.

MAFS.8.SP.1.3 FSA PRACTICE

Neutral – Items Appear on Calculator and No Calculator Session

1. A developmental psychologist conducted an experiment to measure the amount of time per day infants younger than 12 months old spent sleeping. The equation that best fits the data collected is $m = -7.5a + 930$, where m is the number of minutes per day spent sleeping and a is the age of the infant in months.

   Explain the significance of the slope of the equation in terms of the problem's context.

2. Scientists at the new company, BunG, tested their bungee cords using weights from 0 to 200 pounds. They identified a random sample of cords and measured the length that each cord stretched when different weights were applied. Using the data from testing, they modeled the relationship between the weight on the bungee cord and the length of the cord with the formula $y = 0.05x + 10$, where x is the weight on the cord (in pounds) and y is the length of the cord (in feet).

   Explain the significance of the point (20, 11) in terms of the problem's context.

   Explain the significance of the y-intercept of the equation in terms of the problem's context.

MAFS.8.SP.1.4

A CALCULATOR IS ALLOWED

1. Students at Beach Middle School were surveyed regarding their preference for school start times. Responses were recorded by grade level.

Relative frequencies are shown in the two-way table below:

School Start Time Preference by Grade Level

	6th grade	7th grade	8th grade
Prefer earlier start time	55%	75%	90%
Prefer later start time	45%	25%	10%

Explain any association between grade level and preference of school start time. Use data from the table to support your answer.

What does the 25% in the second row of the table mean in the context of this problem?

2. A sample of students in middle school was randomly selected. Each student was asked whether he or she played a team sport and played a musical instrument. The following are the results:

Playing Sports and Playing Musical Instruments

Student	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Plays Team Sport	y	y	n	n	n	n	y	y	n	y	y	y	n	n	y	n	y	n	n	y
Plays Instrument	y	n	n	n	y	n	y	y	n	y	n	y	n	y	y	n	y	n	y	y

Note: y = yes; n = no

Construct a two-way table to summarize the data given in the table above.

3. Students at Westside Middle School were surveyed regarding their preference for team sports (such as basketball) versus individual sports (such as swimming) and their preference for mathematics versus science.

The results are shown in the two-way table below:

Student Preference for Sport and Subject

	Prefer Math	Prefer Science
Prefer Team Sports	80	25
Prefer Individual Sports	40	45

In the table below, record the relative frequencies by row.

Student Preference for Sport and Subject – Relative Frequency Table

	Prefer Math	Prefer Science	Total
Prefer Team Sports			
Prefer Individual Sports			

In the table below, record the relative frequencies by column.

Student Preference for Sport and Subject – Relative Frequency Table

	Prefer Math	Prefer Science
Prefer Team Sports		
Prefer Individual Sports		
Total		

MAFS.8.SP.1.4 FSA PRACTICE

A CALCULATOR IS ALLOWED

1. Students at Beach Middle School were surveyed regarding whether they have a sibling and whether they have a pet.

Relative frequencies are shown in the two-way table below:

Beach Middle School Siblings and Pets

	Have a pet	Have no pet
Have a sibling	$\frac{10}{90}$	$\frac{80}{90}$
Have no sibling	$\frac{70}{75}$	$\frac{5}{75}$

Explain any association between having a pet and having a sibling. Use data from the table to support your answer.

What does the $\frac{5}{75}$ mean in the context of this problem?

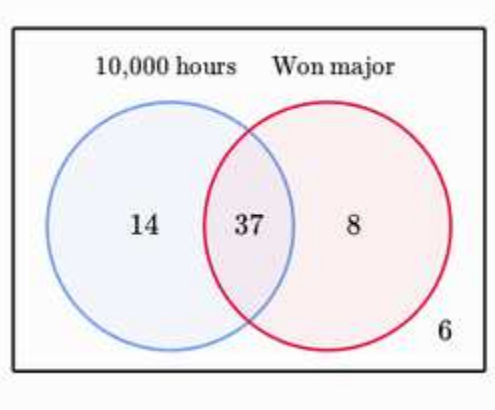
2. The table shows the results of a random survey of students in grade 7 and grade 8. Every student surveyed gave a response. Each student was asked if he or she exercised less than 5 hours last week or 5 or more hours last week.

	Less than 5 hours	5 or more hours
Grade 7 Students	49	63
Grade 8 Students	58	51

Based on the results of the survey, which statements are true?
Select **each** correct statement.

☐	More grade 8 students were surveyed than grade 7 students.
☐	A total of 221 students were surveyed.
☐	Less than 50% of the grade 8 students surveyed exercised 5 or more hours last week.
☐	More than 50% of the students surveyed exercised less than 5 hours last week.
☐	A total of 107 grade 7 students were surveyed.

3. Ikeoluwa collected data on whether 65 professional golfers have PRACTICEd for at least 10,000hours in their career and whether they have won a major championship. The Venn diagram below shows her data.



	Have PRACTICEd for a least 10,000 hours	Have not PRACTICEd for a least 10,000 hours
Have won a major		
Have not won a major		
Total		