



Math

Spring Operational 2016

Grade 7

Released Items

Which expressions are equivalent to  $6 - 4.5 + (-8)$  ?

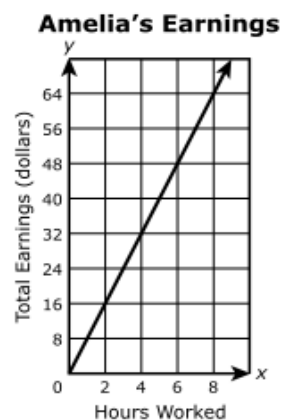
Select **each** correct answer.

- ☐ A.  $6 + 4.5 + 8$
- ☐ B.  $6 + 4.5 - 8$
- ☐ C.  $6 - 4.5 + 8$
- ☐ D.  $6 - 4.5 - 8$
- ☐ E.  $6 + (-4.5) - 8$
- ☐ F.  $6 + (-4.5) + (-8)$
- ☐ G.  $6 + (-4.5) - (-8)$

On Monday, the temperature at 10 a.m. at Sam's house was  $-6^{\circ}$  Fahrenheit. The temperature at 2 p.m. at Sam's house was  $2^{\circ}$  Fahrenheit. Which statement about the change in temperature from 10 a.m. to 2 p.m. at Sam's house is true?

- ☐ A. The temperature decreased by  $12^{\circ}$  Fahrenheit.
- ☐ B. The temperature decreased by  $4^{\circ}$  Fahrenheit.
- ☐ C. The temperature increased by  $3^{\circ}$  Fahrenheit.
- ☐ D. The temperature increased by  $8^{\circ}$  Fahrenheit.

Amelia works for 6 hours and earns \$48. The graph shows the relationship between the number of hours Amelia works,  $x$ , and the total amount she earns,  $y$ .



Which point represents the number of dollars Amelia makes per hour?

- ☐ A. (1,6)
- ☐ B. (1,8)
- ☐ C. (2,16)
- ☐ D. (6,48)

An expression is given.

$$-2y + \frac{3}{2}x + \frac{7}{4}$$

Which are equivalent to the given expression?

Select **each** correct answer.

- ☐ A.  $-\frac{1}{2}xy + \frac{7}{4}$
- ☐ B.  $\frac{3}{2}x - 2\left(y + \frac{7}{2}\right)$
- ☐ C.  $-\frac{1}{4}y + \frac{3}{2}(y + x)$
- ☐ D.  $-2y + \frac{1}{2}\left(3x + \frac{7}{2}\right)$
- ☐ E.  $\frac{1}{4}(-8y + 6x + 7)$

5

M25637

Create an expression equivalent to this expression.

$$\frac{-50}{8}$$

Drag and drop the correct number into each box.

$$-\left(\frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}\right)$$

8

-8

50

-50

6

M20137

Rodney decides to pay a \$200 fee in 3 payments. The first payment is 10% of the original fee. The second payment is 25% of the original fee. Which expressions represent the amount of money for the third payment?

Select **each** correct answer.

$$200 - 0.25(200)$$

$$200 - 0.35(200)$$

$$200 - 0.65(200)$$

$$200 - 0.75(200)$$

$$0.25(200)$$

$$0.35(200)$$

$$0.65(200)$$

$$0.75(200)$$

Select the company that has the **greatest** hourly pay rate.

☐ A.

**Company N**

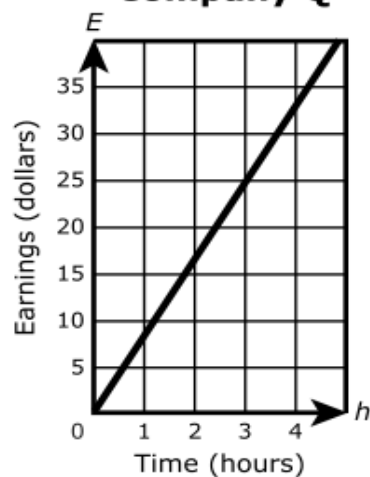
Time, $h$ (hours)	Earnings, $E$ (dollars)
0	0
3	24
5	40

☐ B. **Company P** calculates the earnings of an employee,  $E$ , for working  $h$  hours using the equation  $E = 8.25h$ .

☐ C. **Company M** pays an employee \$59.50 for working 7 hours.

☐ D.

**Company Q**

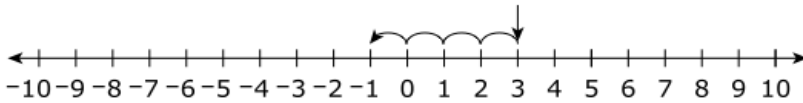
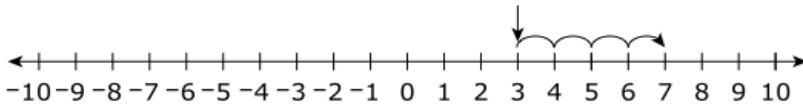
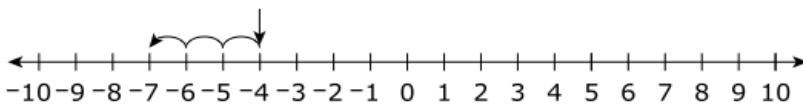
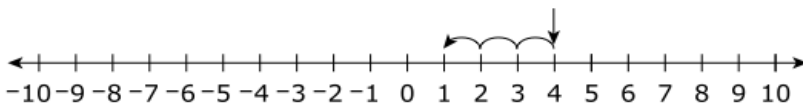


Over a period of 3 hours, the outside temperature changed an average of  $-2.25^{\circ}$  Fahrenheit per hour.

Which statement correctly describes the change in the temperature from the beginning to the end of the 3-hour period?

- ☐ A. The temperature decreased by 0.75 degrees Fahrenheit.
- ☐ B. The temperature increased by 0.75 degrees Fahrenheit.
- ☐ C. The temperature decreased by 6.75 degrees Fahrenheit.
- ☐ D. The temperature increased by 6.75 degrees Fahrenheit.

Which number line demonstrates how to find the sum of 3 and  $-4$ ?

- ☐ A. 
- ☐ B. 
- ☐ C. 
- ☐ D. 



A duck's mass at birth was 0.05 kilogram. The duck gained approximately 0.042 kilogram each week. After how many weeks is the duck's mass 0.890 kilogram?

- ☐ A. 10
- ☐ B. 17
- ☐ C. 20
- ☐ D. 21

The values in the table show the relationship between times measured in seconds and distances measured in meters.

Seconds	Meters
5	20
10	40
15	60
20	80

What is the unit rate, in meters per second, of the relationship shown in the table?

Enter your answer in the box.

meters per second

Here is an expression.

$$1\frac{1}{2} \div \frac{2}{3}$$

Which situation could the expression model?

- ☐ A. A bag of almonds weighs  $1\frac{1}{2}$  pounds. When  $\frac{2}{3}$  of the bag of almonds remain, how many pounds do the almonds weigh?
- ☐ B. How many  $\frac{2}{3}$  cup servings of yogurt are in  $1\frac{1}{2}$  cups of yogurt?
- ☐ C. A student made 6 bows from  $1\frac{1}{2}$  yards of ribbon. How many bows can be made from  $\frac{2}{3}$  yard of ribbon?
- ☐ D. A girl has  $1\frac{1}{2}$  cups of soup. She eats  $\frac{2}{3}$  of the soup. How many cups of soup remain?

Here are two equations.

















$$7n + 14 = -21$$
$$-3(x - 2) = 6$$

Solve each equation.

Enter your solutions in the space provided. Enter **only** your solutions.

$n =$

$x =$

An earthquake wave travels through 55 km of rock in 25 seconds.

Which equation represents the relationship between  $t$ , the number of seconds, and  $d$ , the total distance the wave travels?

- ☐ A.  $d = \frac{5}{11}t$
- ☐ B.  $d = 1\frac{4}{7}t$
- ☐ C.  $d = 2.2t$
- ☐ D.  $d = 80t$

Which expression(s) are equivalent to  $-4.12 - (3.25 - 1.11)$  ?

Select **each** correct answer.

- ☐ A.  $-(4.12 - 3.25) - 1.11$
- ☐ B.  $-4.12 + (-3.25 - 1.11)$
- ☐ C.  $(-4.12 - 3.25) - 1.11$
- ☐ D.  $-(4.12 + 3.25) + 1.11$
- ☐ E.  $-4.12 + (-3.25 + 1.11)$

Which expression is equivalent to  $\frac{1}{2}x - 1$ ?

- ☐ A.  $\frac{1}{3} \left( \frac{3}{2}x - 1 \right)$
- ☐ B.  $\left( \frac{3}{2}x + 1 \right) - (x - 2)$
- ☐ C.  $\frac{2}{3} \left( \frac{3}{4}x - \frac{3}{2} \right)$
- ☐ D.  $\left( \frac{3}{4}x - 2 \right) + \left( \frac{1}{4}x + 1 \right)$

A large company has offices in cities across the country. The facilities director of the company was asked to survey employees about their office furniture. Rather than survey all employees in the company, the director decided to take a sample of employees. Which groups would be **most** representative of the opinions of all employees in the company?

Select **each** correct answer.

- ☐ A. employees with office phone numbers ending in 3 and 7
- ☐ B. randomly selected employees in the cafeteria of one of the offices
- ☐ C. employees who have worked for the company for more than 10 years
- ☐ D. 5% of randomly selected employees from each office location
- ☐ E. employees answering phone calls in the company's customer service department
- ☐ F. employees who are randomly selected by a computer from a list of all company employees

A worker at the zoo calculates the amount of fish, in pounds, needed in the weekly diet of an eagle and a bear.

- The eagle eats 6 pounds of food each week, and 60% of that weight must be fish.
- The bear eats 105 pounds of food each week, and 25% of that weight must be fish.

**Part A**

What is the total amount of fish, in pounds, that the eagle and bear should eat each week? Round your answer to the nearest hundredth of a pound.

Enter your answer in the box.

**Part B**

The zoo increases the amount of food that the bear eats each week to 115 pounds. What is the percent increase in the amount of food that the bear eats each week? Round your answer to the nearest tenth of a percent.

Enter your answer in the box.

A family purchased tickets to a museum and spent a total of \$38.00. The family purchased 4 tickets. There was a \$1.50 processing fee for each ticket. Write and solve an equation that can be used to find  $x$ , the cost of one ticket to the museum. Show your work or explain your answer.

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

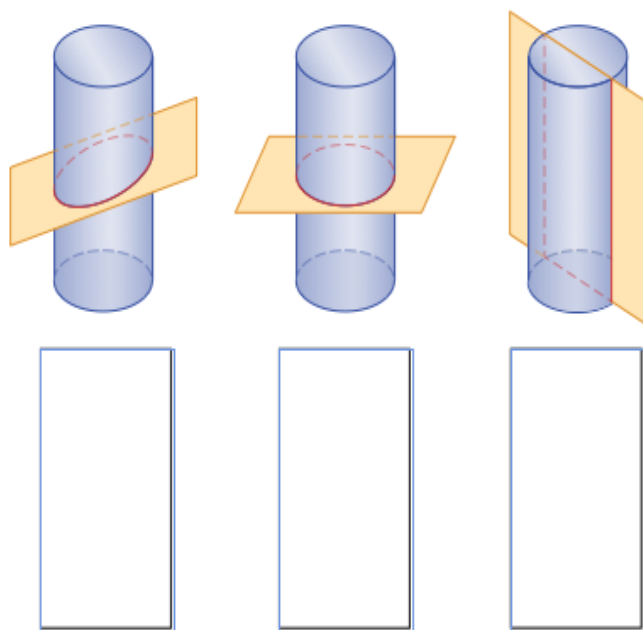
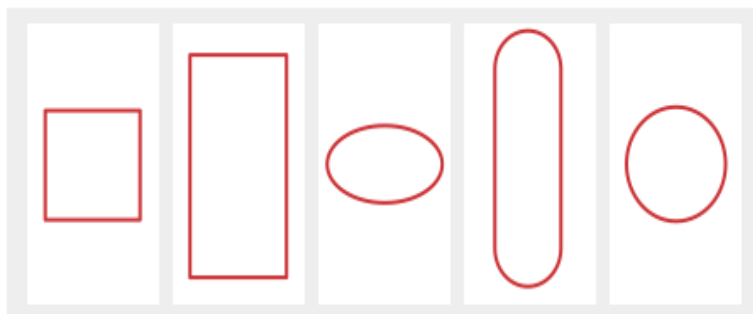


	▼ Math symbols
	$+$ $-$ $\times$ $\div$
	$\pm$ $-$ $\cdot$ $/$
	$=$ $\neq$ $\frac{\Box}{\Box}$ $\frac{\Box}{\Box}$
	$y^x$ $\sqrt{\Box}$ $\sqrt[3]{\Box}$ $\pi$
	$(\cdot)$ $^\circ$ $  $
	► Relations
	► Geometry







The right cylinders shown are each intersected by a geometric plane. The height of each cylinder is twice its diameter. Which two-dimensional figures will result from slicing a right cylinder by a geometric plane?

Drag and drop the appropriate figure into each box.

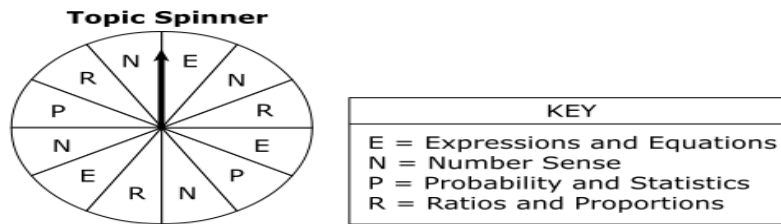


A standard number cube, numbered 1 through 6 on each side, is rolled 3 times. What is the probability of rolling a 2 on all three rolls? Express your answer as a fraction.

Enter your answer as a fraction in the space provided. Enter **only** your answer.

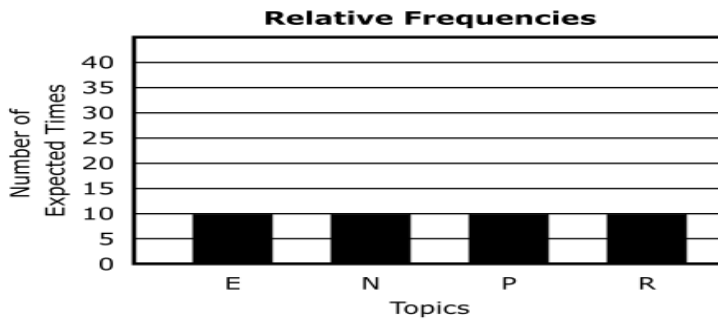
	+	-	×	÷	$\frac{\Box}{\Box}$	$\frac{\Box}{\Box}$
	$y^x$	$\sqrt{\Box}$	$\sqrt[3]{\Box}$	=	(.)	%
						

Mr. Norton uses a fair spinner with 12 equal regions to determine the topic for each day's warm-up lesson in math class.

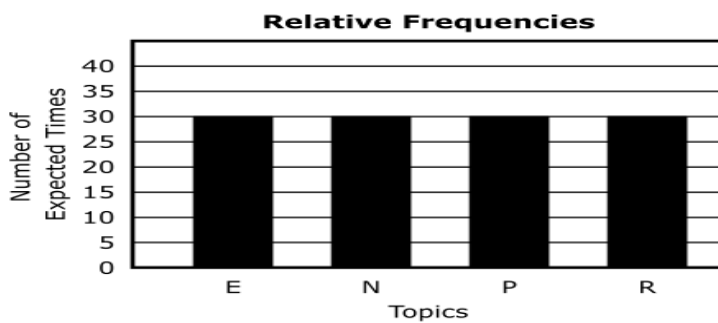


Mr. Norton plans to spin the spinner 120 times during the school year. Which bar graph shows the **best** prediction for the number of times each topic will be selected?

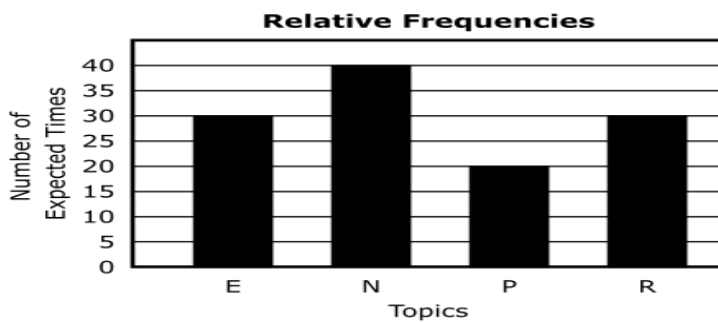
☐ A.



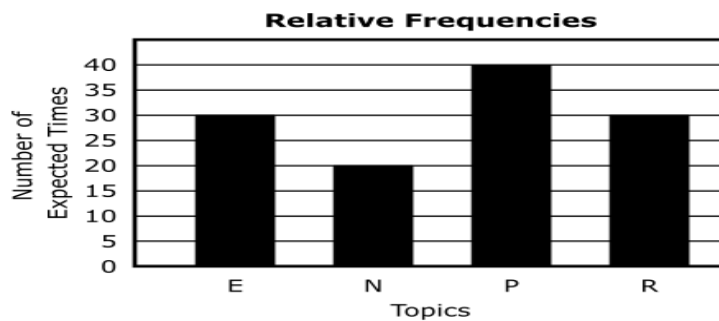
☐ B.



☐ C.



☐ D.



A store pays two fees when a customer uses a credit card to make a purchase. These fees include

- a flat fee of \$0.15 and
- a processing fee equal to 1.75% of the dollar amount of the purchase.

There is no sales tax on the purchase.

### Part A

What is the amount, in dollars and cents, the store pays in fees for a \$60.00 purchase by a customer using a credit card?

Enter your answer in the box.

### Part B

The store gives a discount to customers who use cash instead of a credit card for a purchase. The discount is equal to  $\frac{4}{5}$  of the 1.75% processing fee the store would be charged if a credit card was used.

A customer will make a \$150 purchase using cash. What will be the discount, in dollars and cents, for using cash instead of a credit card on this purchase?

Enter your answer in the box.

A painter plans to paint a room with an area of 515 square feet. He mixes paint to create a specific shade of green. The ratio of each color in his mixture is shown.

- 1 part blue paint
- 3 parts yellow paint
- 2 parts white paint

**Part A**

The painter estimates that he will need 1 gallon of green paint for every 175 square feet of the room. He estimates the smallest number of whole gallons of green paint needed to paint the room. How much blue paint will the painter need to make this batch of green paint?

- ☐ A.  $\frac{1}{3}$  gallon
- ☐ B.  $\frac{1}{2}$  gallon
- ☐ C. 1 gallon
- ☐ D. 3 gallons

**Part B**

The painter makes a second batch of green paint using the same ratio of blue, yellow, and white paint. He uses 3 gallons of white paint to make the second batch of green paint. How many total gallons is the second batch of green paint?

Enter your answer in the space provided. Enter **only** your answer.

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$y^x$

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$\sqrt[3]{\phantom{x}}$

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%

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**Part C**

The painter purchases 6 gallons of paint on sale for \$153.50. The regular price for the paint was \$139.92 for 4 gallons. How many dollars per gallon did the painter save purchasing the paint on sale? Round your answer to the nearest cent.

- ☐ A. \$9.40
- ☐ B. \$15.05
- ☐ C. \$25.58
- ☐ D. \$34.98

**Part D**

The painter mixes some extra green paint with red paint to make a batch of brown paint.

- The painter uses 3 parts of green paint for every 2 parts of red paint.
- He mixes a total of 2 gallons of brown paint.

How many gallons of yellow paint are in this batch of brown paint?

- ☐ A.  $\frac{1}{2}$  gallon
- ☐ B.  $\frac{3}{5}$  gallon
- ☐ C.  $1\frac{1}{5}$  gallons
- ☐ D.  $2\frac{2}{5}$  gallons

The table shows the relationship between the depth, in meters, of a submarine and the time, in minutes, since it started a dive.

Submarine Depth

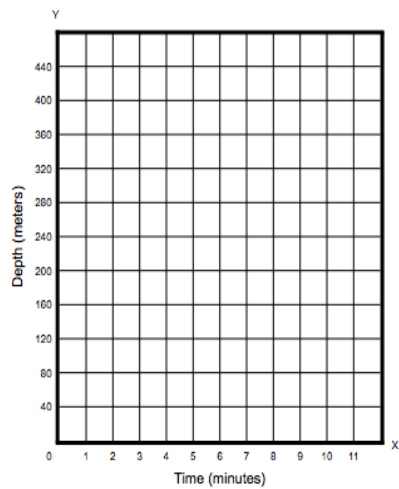
Time (minutes)	Depth (meters)
2	100
4	180
6	260
8	340

Part A

Plot the values in the table on the coordinate plane shown.

Select the places on the coordinate plane to plot the points.

Submarine Depth



Part B

Determine whether the relationship is proportional or not. Explain how the relationship shown in the table supports your answer. Explain how your graph supports your answer.

Enter your answer and your explanations in the space provided.



▼ Math symbols

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$\frac{\Box}{\Box}$

$\frac{\Box}{\Box}$

$y^x$

$\sqrt{\Box}$

$\sqrt[3]{\Box}$

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(.)

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► Relations

► Geometry

A box contains  $12\frac{1}{2}$  square feet of tiles and costs \$40.21. What is the approximate price per square foot?

Enter your answer in the box.

\$  per square feet

A school cafeteria has a juice dispenser that holds 640 fluid ounces of juice when completely filled. Juice is offered in two serving sizes: 4 ounces or 8 ounces. Each day, approximately 7 out of 10 students choose the 4-ounce serving size, and the other students choose the 8-ounce serving size.

Based on this information, estimate the number of servings that can be dispensed from the juice dispenser before it needs to be refilled. Show or explain each step you used when finding your estimate.

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



▼ Math symbols

+	−	×	÷
±	−	·	/
=	≠	$\frac{\Box}{\Box}$	$\frac{\Box}{\Box}$
$y^x$	$\sqrt{\Box}$	$\sqrt[3]{\Box}$	$\pi$
(.)	°	·	

► Relations

► Geometry



A teacher writes the expression shown on the board.

$$12.2x + 50.6y + 3(1.4x - 2.6y)$$

### Part A

A student writes the two expressions shown.

$$\text{Expression 1: } 4(4.1x + 10.7y)$$

$$\text{Expression 2: } 2(6.1x + 25.3y + 2.1x - 3.9y)$$

The student claims that both of the expressions are equivalent to the expression written on the board. Explain why the student's claim is true. Show your work for both expressions.

Enter your work and explanation in the space provided.



▼ Math symbols

+	−	×	÷
±	−	·	/
=	≠	$\frac{\Box}{\Box}$	$\frac{\Box}{\Box}$
$y^x$	$\sqrt{\Box}$	$\sqrt[3]{\Box}$	$\pi$
(·)	°	·	

► Relations

► Geometry

### Part B

A different student claims that the expression  $59.2xy$  is equivalent to the teacher's expression. The student's reasoning is shown.

The expression  $59.2xy$  is equivalent to the teacher's expression because both expressions have the same value when  $x = 1$  and  $y = 1$ . This means that the two expressions are equivalent.

- Explain which part of the student's reasoning is correct.
- Explain which part of the student's reasoning is incorrect.
- Give an example using different values for  $x$  and  $y$  to support your answer.

Enter your answer and explanations in the space provided.



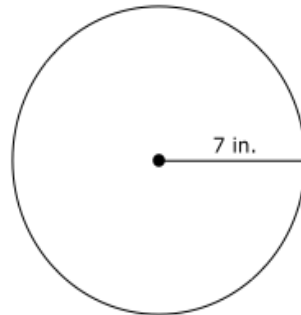
▼ Math symbols

+	−	×	÷
±	−	·	/
=	≠	$\frac{\Box}{\Box}$	$\frac{\Box}{\Box}$
$y^x$	$\sqrt{\Box}$	$\sqrt[3]{\Box}$	$\pi$
(·)	°	·	

► Relations

► Geometry

Ben draws a circle with a radius of 7 inches.

**Part A**

What is the circumference of Ben's circle, in inches? If needed, round your answer to the nearest hundredth.

Enter your answer in the box.

**Part B**

Kristin draws a different circle. The radius of Kristin's circle is  $\frac{1}{2}$  the radius of Ben's circle. Which statement is true about Kristin's circle?

- ☐ A. The area of Kristin's circle is  $\frac{1}{4}$  the area of Ben's circle.
- ☐ B. The area of Kristin's circle is  $\frac{1}{2}$  the area of Ben's circle.
- ☐ C. The area of Kristin's circle is 2 times the area of Ben's circle.
- ☐ D. The area of Kristin's circle is 4 times the area of Ben's circle.
-

A teapot is  $\frac{1}{3}$  full of tea. When all of the tea is poured into an empty container, the container is  $\frac{2}{3}$  full.

What fraction of the tea from a full teapot is needed to fill 1 entire container?

Enter your answer in the boxes.

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Gabrielle surveyed a random sample of 40 students in her school's cafeteria about whether they ate the cafeteria's tomato soup.

- Fourteen of the sampled students said they ate the tomato soup.
- A total of 840 students eat in the cafeteria each day.

**Part A**

Based on the results of Gabrielle's survey, how many of the 840 students who eat in the cafeteria can be expected to eat the tomato soup?

Enter your answer in the box.

**Part B**

Isaiah and Kaylee also surveyed random samples of 40 students in the school's cafeteria about the tomato soup. The results of all three surveys are shown in the table.

**Survey Results**

Student Who Gave Survey	Students Who Ate Tomato Soup
Gabrielle	14
Isaiah	10
Kaylee	11

Based on the results of the three surveys, what percentage of the 840 students who eat in the cafeteria each day can be expected to eat the tomato soup?

- ☐ A. 4% to 10%
- ☐ B. 10% to 14%
- ☐ C. 25% to 35%
- ☐ D. 35% to 59%

Two students determined the value of this expression.

$$-2.5(1.4 + 3.1) + 6.9(-4.3)$$

These are the steps each student used.

Student P	Student Q
Step 1: $-3.5 + 7.75 + 6.9(-4.3)$	Step 1: $-3.5 - 7.75 + 6.9(-4.3)$
Step 2: $-3.5 + 7.75 - 29.67$	Step 2: $-3.5 - 7.75 - 29.67$
Step 3: $7.75 - 3.5 - 29.67$	Step 3: $-(3.5 - 7.75 - 29.67)$
Step 4: $-25.42$	Step 4: $-(-33.92)$
	Step 5: $33.92$

- Describe any errors made by Student P.
- Describe any errors made by Student Q.
- Show a complete set of correct steps to determine the value of the expression.

Enter your answers and your work in the space provided.



▼ Math symbols

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=	≠	$\frac{\Box}{\Box}$	$\frac{\Box}{\Box}$
$y^x$	$\sqrt{\Box}$	$\sqrt[3]{\Box}$	$\pi$
(-)	°	·	

► Relations

► Geometry

The table shows the number of miles Liz and Sara rode their bikes during the week.

**Number of Miles Each Day**

	Monday	Tuesday	Wednesday	Thursday	Friday
Distance Liz rode	13	9	8	9	11
Distance Sara rode	5	5	15	9	6

Select from the drop-down menus to correctly complete each sentence.

During that week, 

Liz  
Sara

 typically rode further each day because the 

mean  
median  
range

 of her data is greater. During that week, 

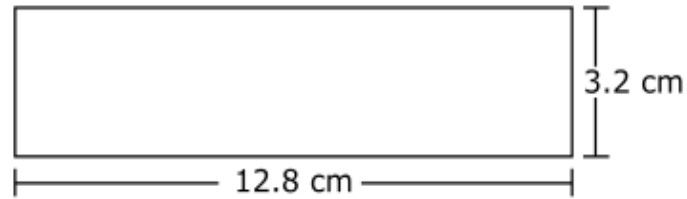
Liz  
Sara

 typically rode about the same number of miles each day because the 

mean  
median  
range

 of her data is smaller.

A scale drawing of a rectangular parking lot is shown. The width of the parking lot is shorter than the length. The width of the actual parking lot is 48 feet.

**Part A**

How many feet of the parking lot are represented by 1 centimeter on the scale drawing?

Enter your answer in the box.

**Part B**

Based on the scale drawing, what is the length, in feet, of the actual parking lot?

Enter your answer in the box.

A company sells small and large photo books.

Each page of a small photo book costs the same.

The table shows the relationship between the number of pages in a small photo book and the total cost of the photo book.

Small Photo Book	
Number of Pages	Total Cost (\$)
20	30
32	48
	57

Part A

What is the cost per page for a small photo book?

Enter your answer in the box.

\$

Part B

How many pages are in a small photo book that costs \$57? Show or explain how you determined your answer.

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



▼ Math symbols

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$y^x$

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▸ Relations

▸ Geometry

Part C

Each page of a large photo book costs 30% more than each page of a small photo book.

What is the cost for a large photo book with 35 pages? Show or explain how you determined your answer.

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



▼ Math symbols

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$y^x$

$\sqrt{\phantom{x}}$

$\sqrt[3]{\phantom{x}}$

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▸ Relations

▸ Geometry



The table shows a proportional relationship between the number of pounds of grapes purchased and the total cost of the grapes.

**Grapes**

Number of Pounds	Total Cost (dollars)
4	2.76
7	4.83
9	6.21

A row of values is missing in the table.

Which number of pounds of grapes and total cost of the grapes could be used as the missing values in the table?

Select **each** correct response.

- ☐ A. Pounds of grapes: 2  
Total cost: \$1.38
- ☐ B. Pounds of grapes: 3  
Total cost: \$2.53
- ☐ C. Pounds of grapes: 6  
Total cost: \$3.68
- ☐ D. Pounds of grapes: 8  
Total cost: \$5.52
- ☐ E. Pounds of grapes: 11  
Total cost: \$8.97

Tides are measured by the heights of the tide above or below sea level. The difference between the two heights represents how much greater the high tide is than the low tide. The table shows the high and low tides and the difference between their heights at each of three locations. Some of the data in the table are missing.

**Tide Heights and Differences in Feet**

Location	High Tide	Low Tide	Difference Between High and Low Tides
P	8.53	0.63	?
Q	6.98	-0.94	7.92
R	?	-1.02	6.75

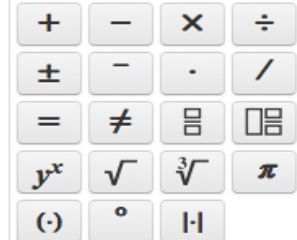
### Part A

- Find the difference between high and low tides for location P. Show your work or explain your answer.
- Find high tide for location R. Show your work or explain your answer.

Enter your answers and your work or explanations in the space provided.



#### Math symbols



#### Relations

#### Geometry

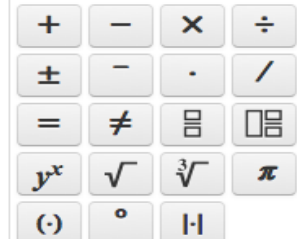
### Part B

The tides are measured at a fourth location, T. The mean of the low tide values at locations P, Q, R, and T is  $-0.27$  foot. What is the value of the low tide at location T? Show your work or explain how you found your answer.

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



#### Math symbols



#### Relations

#### Geometry

A business owner purchases supplies for a laundromat and a car wash.

**Part A**

The owner purchases 6 cases of laundry soap, 8 cases of fabric softener, and 3 cases of bleach for the laundromat. Each case of laundry soap costs \$68.45, each case of fabric softener costs \$39.71, and each case of bleach costs \$52.25.

Which is the **best** estimate of the total cost, in dollars, of the laundry items?

- ☐ A. 750.00
- ☐ B. 830.00
- ☐ C. 890.00
- ☐ D. 920.00

**Part B**

The owner purchases 5 buckets, 10 brushes, 48 towels, and 1 case of air fresheners for the car wash. The total cost of the purchases is \$144.08. Each bucket costs \$2.89, each brush costs \$7.91, and each towel costs \$0.36.

What is the cost, in dollars, of the case of air fresheners?

Enter your answer in the box.