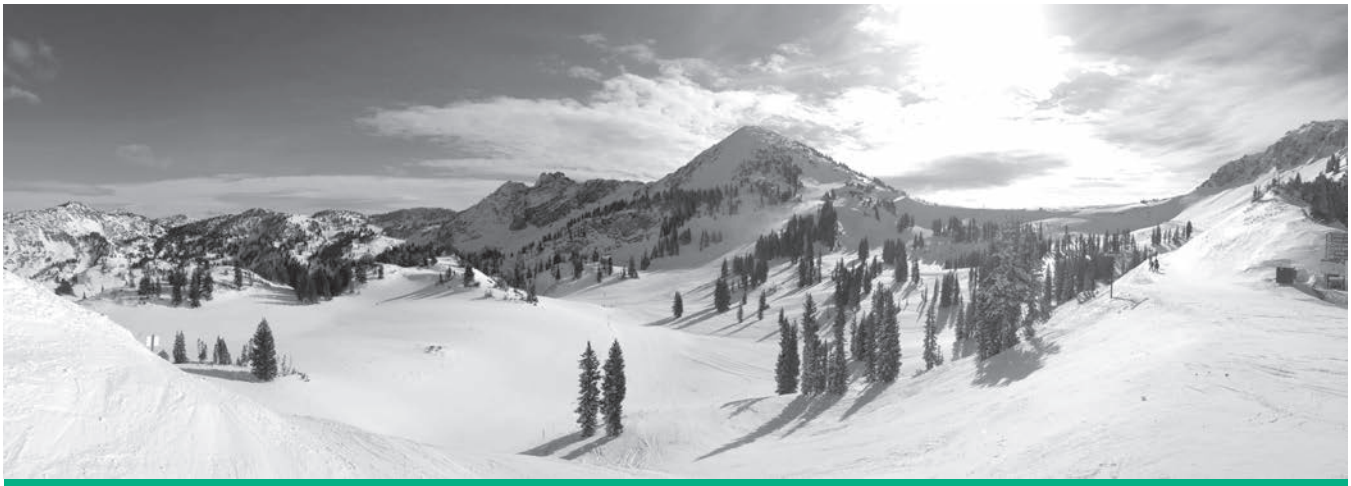
Colorado Measures of Academic Success



Grade 8

Mathematics

Paper Practice Resource for Students

Paper Practice Resource for Students

The Colorado Measures of Academic Success (CMAS) is Colorado's standards-based assessment program designed to measure the Colorado Academic Standards (CAS) in the content areas of science, social studies, English language arts, and mathematics. The sample items included in this resource provide students with an opportunity to become familiar with the format of test items that appear in the paper-based test books.

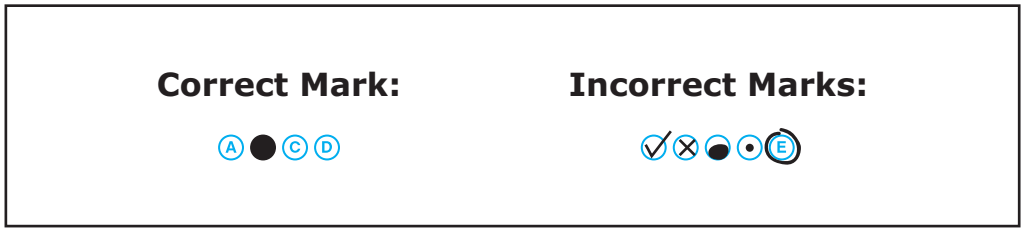
While the use of the sample items is not required, it is strongly encouraged to help ensure students are familiar with the types of items they may encounter while taking the paper-based test.

The sample item sets in the CMAS Practice Resources are not intended to be representative of a complete unit or test, nor are they intended to cover all assessed content or item types. To view assessment frameworks, high level blueprints, scoring rubrics, evidence statements and standards for the CMAS assessments, visit: https://www.cde.state.co.us/assessment/cmas_testdesign.

Item Types:

Selected Response Items

Selected response items are multiple choice questions. To respond, the student indicates their response in an answer grid or by filling in the circle(s) next to their answer choice.



Constructed Response Items

Constructed response items are questions or prompts that require an independent, written response. To respond, the student writes his or her answer in the response box in the test book.

Converted Online Technology-Enhanced Item Types

Online technology-enhanced items converted to the paper testing format may ask students to:

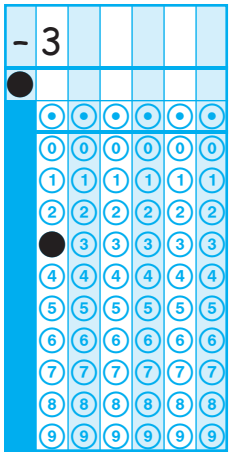
- Circle the correct answer
- Complete a table with checkmarks, Xs, or letters from a list of answer choices
- Fill in the blank
- Draw lines from boxes to correct answers
- Complete a bar graph or histogram
- Interact with a number line
- Graph points and lines on a coordinate grid
- Divide and shade shapes to indicate fractions

Directions for Completing the Answer Grids

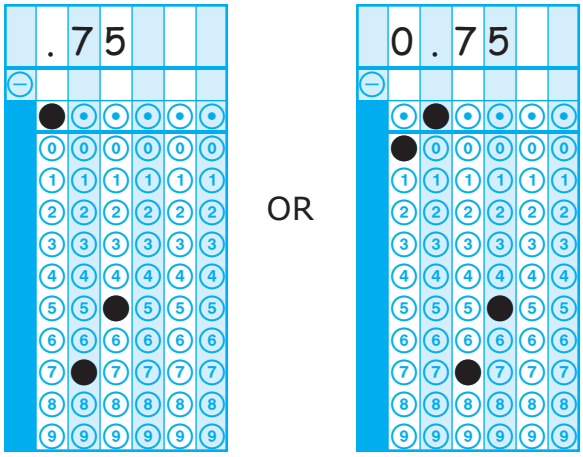
1. Work the problem and find an answer.
2. Write your answer in the boxes at the top of the grid.
3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
4. Under each box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.
5. Do not fill in a circle under an unused box.
6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.
7. See below for examples on how to correctly complete an answer grid.

EXAMPLES

To answer –3 in a question, fill in the answer grid as shown below.



To answer .75 in a question, fill in the answer grid as shown below.



ITEM SET 1 - SECTION 1 (Non-Calculator)

Directions:

This Item Set has two sections: a non-calculator section and a calculator section. You will now take the non-calculator section. You may not use a calculator.

1. Which decimal is equivalent to $\frac{11}{15}$?

Ⓐ $0.\overline{733}$

Ⓑ 0.73

Ⓒ $0.7\overline{3}$

Ⓓ 0.733

2. Which input-output table represents a nonlinear function?

Select **each** nonlinear function.

Ⓐ

Input (x)	Output (y)
2	3
3	7
4	11

Ⓑ

Input (x)	Output (y)
2	4
4	8
6	12

Ⓒ

Input (x)	Output (y)
2	2
4	14
6	34

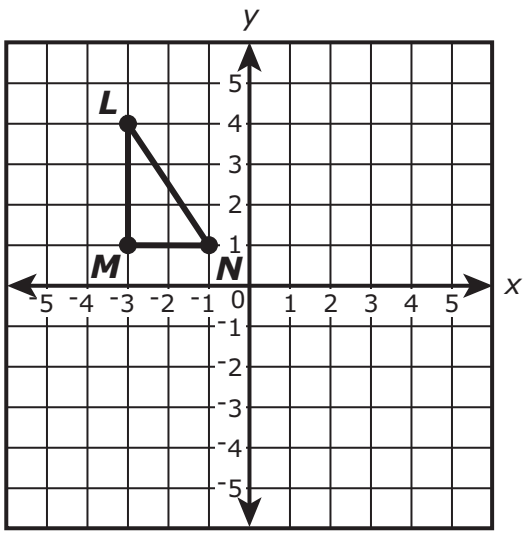
Ⓓ

Input (x)	Output (y)
2	5
3	10
4	17

Ⓔ

Input (x)	Output (y)
2	2
4	3
6	4

3. Triangle *LMN* is shown on the coordinate plane.



Triangle $L'M'N'$ is the image of triangle *LMN* after a reflection.

Which statement is true about the line segments in the two triangles?

Ⓐ $\overline{NL}$ is the same length as $\overline{M'N'}$.

Ⓑ $\overline{NL}$ is the same length as $\overline{N'L'}$.

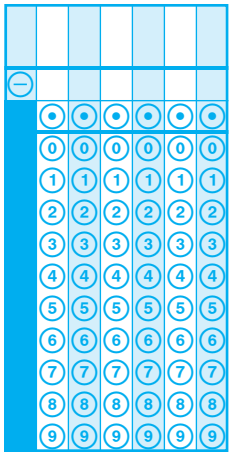
Ⓒ $\overline{LM}$ is shorter than $\overline{L'M'}$.

Ⓓ $\overline{MN}$ is longer than $\overline{L'M'}$.

4. An ant's mass is 5×10^{-3} grams. A bee's mass is 1×10^{-1} grams.

Based on this information, how many ants equal the mass of one bee?

Enter your answer in the box.



5. Solve the system of equations.

$$4x + 5y = 20$$
$$3x + 10y = 20$$

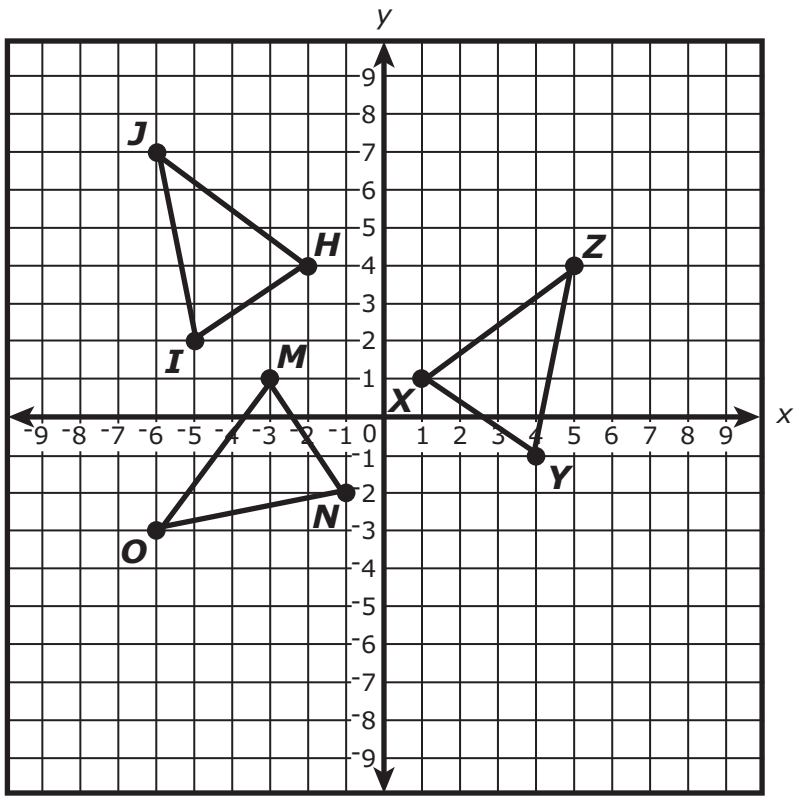
Enter your answer in the space provided. Enter **only** your answer.

(_____, _____)

TURN THE PAGE AND CONTINUE WORKING

Use the information provided to answer Part A and Part B for question 6.

Consider $\triangle HIJ$, $\triangle MNO$, and $\triangle XYZ$ on the coordinate plane. All three triangles are congruent.



6. Part A

Which sequence of transformations can be applied to $\triangle HIJ$ to prove that $\triangle HIJ \cong \triangle MNO$?

Ⓐ a rotation 90° counterclockwise about the origin and then a translation up 3 units and right 1 unit

Ⓑ a rotation 90° clockwise about the origin and then a translation up 3 units and right 1 unit

Ⓒ a reflection across the *x*-axis and then a translation up 5 units and left 1 unit

Ⓓ a reflection across the *x*-axis and then a translation right 4 units

Part B

Which sequence of transformations can be applied to $\triangle HIJ$ to prove that $\triangle HIJ \cong \triangle XYZ$?

Ⓐ a rotation 180° about the origin and then a translation down 1 unit and left 1 unit

Ⓑ a rotation 180° about the origin and then a translation up 5 units and left 1 unit

Ⓒ a reflection across the *y*-axis and then a translation down 3 units and left 1 unit

Ⓓ a reflection across the *y*-axis and then a translation up 3 units and left 1 unit

7. Which expression is equivalent to $4^5 \times 4^{-3}$?

Ⓐ 4^8

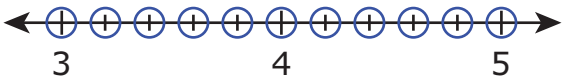
Ⓑ 4^2

Ⓒ 4^{-2}

Ⓓ 4^{-8}

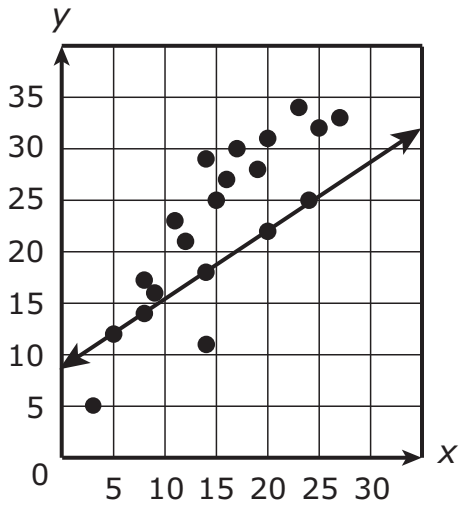
8. Select a point on the number line that **best** approximates the location of $\sqrt{10}$.

Fill in **one** circle on the number line to plot the point.

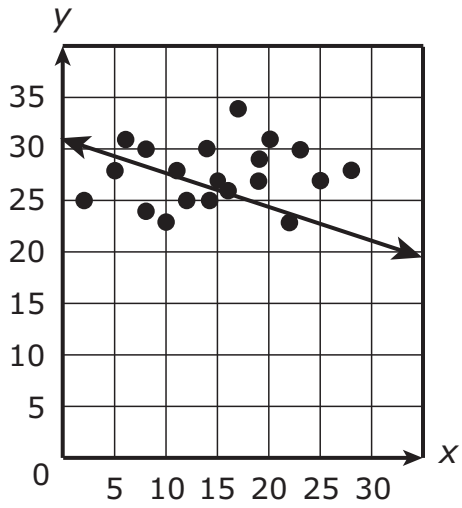


9. Which scatter plot illustrates a line of best fit for the data?

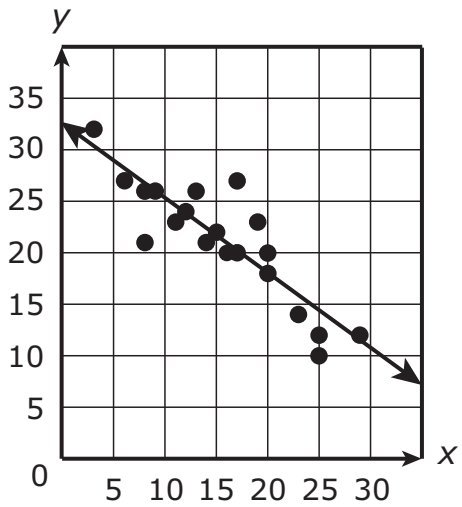
Ⓐ



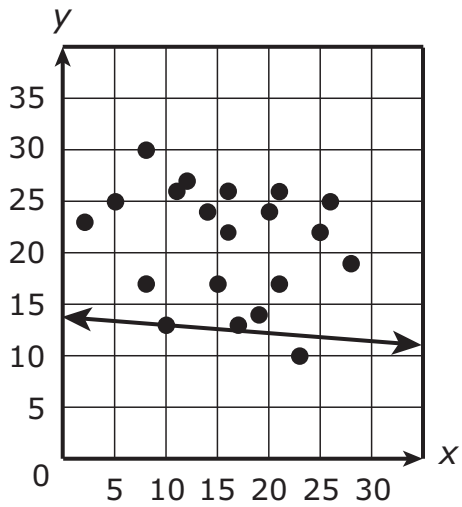
Ⓑ



Ⓒ



Ⓓ



10. The $\sqrt{55}$ is between which two values?

Ⓐ 6.5 and 7

Ⓑ 7 and 7.5

Ⓒ 7.5 and 8

Ⓓ 8 and 8.5

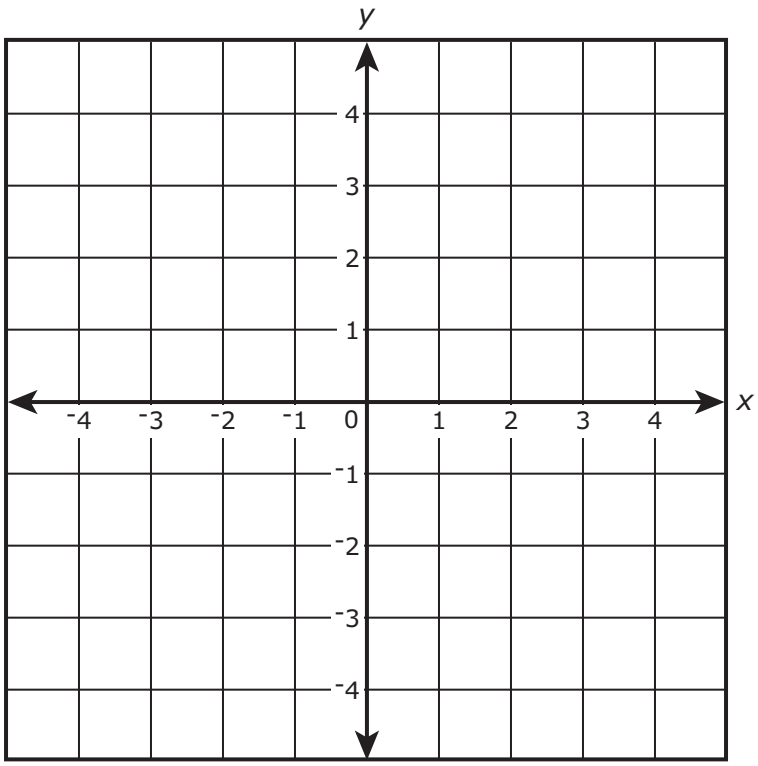
TURN THE PAGE AND CONTINUE WORKING

11. Use graphing to determine the solution to the system of equations shown.

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

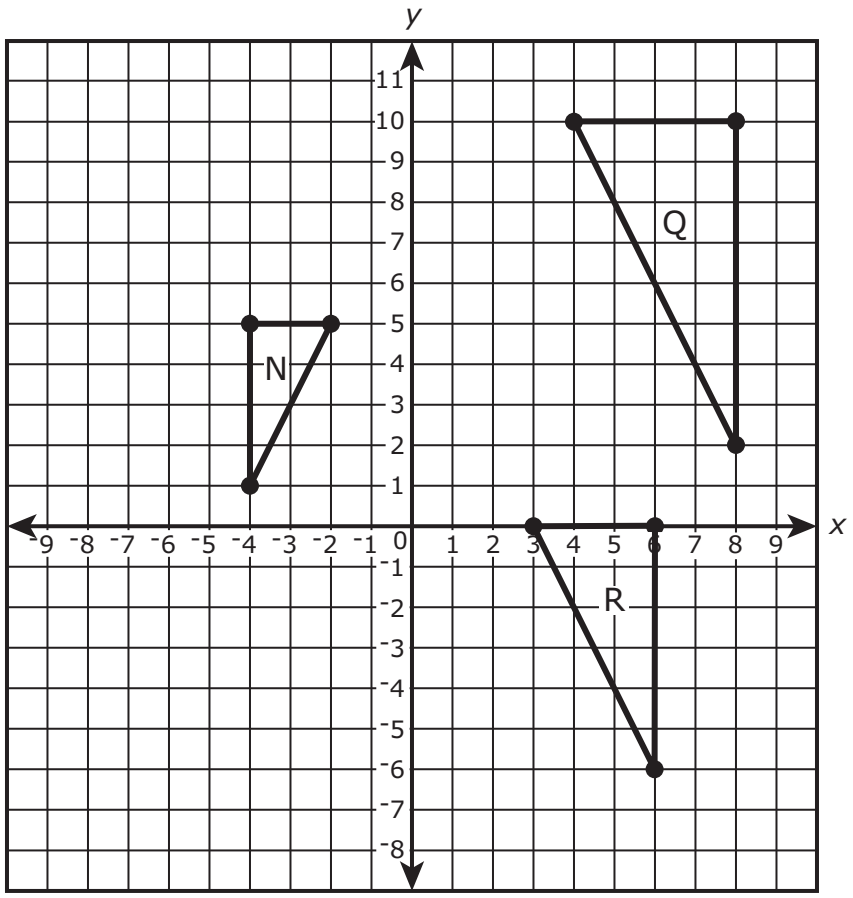
Graph the solution to the system of linear equations on the coordinate plane.

- Graph $y = -\frac{2}{3}x + 1$ by plotting two points on the coordinate grid and drawing a line through the points.
- Graph $y = \frac{1}{2}x - \frac{5}{2}$ by plotting two points on the coordinate grid and drawing a line through the points.
- Graph the solution. Label the point "Solution."



Use the information provided to answer Part A and Part B for question 12.

The coordinate plane shows three similar right triangles.



12. Part A

Which two transformations on triangle N result in triangle Q?

Select the **two** correct transformations.

Ⓐ a rotation 180° clockwise about the origin

Ⓑ a rotation 90° clockwise about the origin

Ⓒ a dilation with the center at the origin

Ⓓ a reflection across the *y*-axis

Ⓔ a reflection across the *x*-axis

Ⓕ a translation to the right

Part B

A sequence of two transformations on triangle Q results in triangle R.

The second transformation is a dilation centered at the origin.

What is the first transformation?

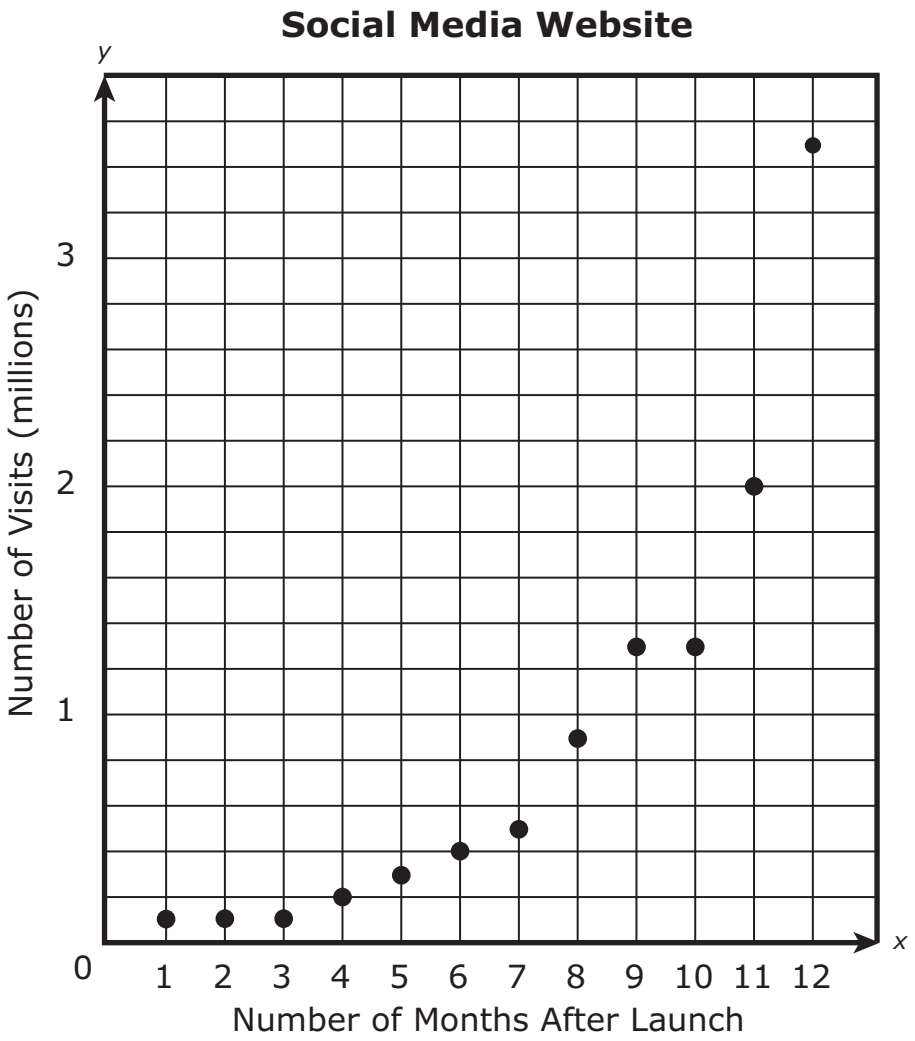
Ⓐ a translation down 10 units

Ⓑ a translation up 10 units

Ⓒ a translation right 1 unit

Ⓓ a translation left 1 unit

13. The graph shows the number of visits to a social media website.



Which phrase is true about the graph?

Ⓐ increases quickly during the first few months and increases slowly during the later months

Ⓑ increases slowly during the first few months and increases quickly during the later months

Ⓒ increases at a constant rate

Ⓓ remains constant

14. The table shows a function composed of the given input and output values.

Function

Input	Output
2	1
3	3
4.5	6
?	?

Which sets of values could be included in the function?

Select **all** possible sets of values.

Ⓐ

Input	Output
1	2

Ⓑ

Input	Output
2	3

Ⓒ

Input	Output
3	2

Ⓓ

Input	Output
−3	3

Ⓔ

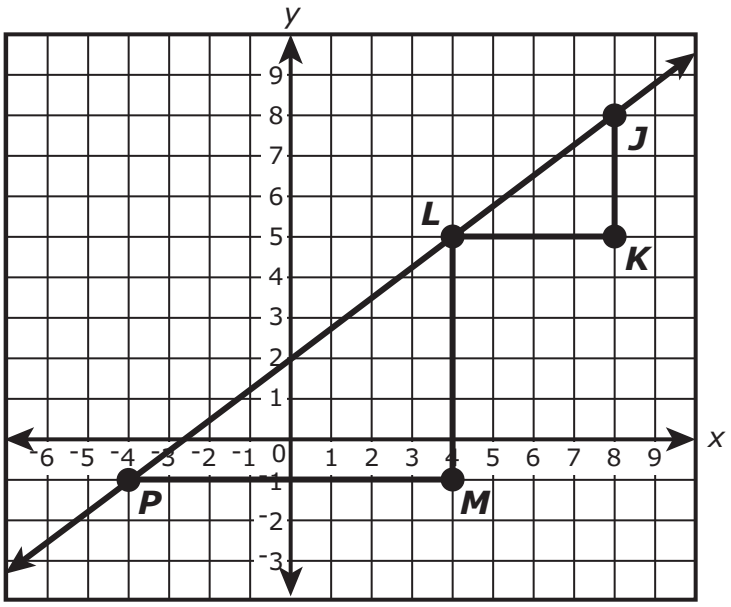
Input	Output
−4.5	6

This is the end of Item Set 1 Section 1.

ITEM SET 1 - SECTION 2 (Calculator)

You may use a calculator for Item Set 1 - Section 2.

15. The coordinate plane shows two similar triangles located on the same line.



Which statement explains why the slope of $\overline{PL}$ is the same as the slope of $\overline{LJ}$?

Ⓐ The ratio of $\overline{JK}$ to $\overline{PM}$ is equal to the ratio of $\overline{LK}$ to $\overline{LM}$.

Ⓑ The ratio of $\overline{JK}$ to $\overline{LK}$ is equal to the ratio of $\overline{LM}$ to $\overline{PM}$.

Ⓒ The ratio of $\overline{LM}$ to $\overline{JK}$ is equal to the ratio of $\overline{PM}$ to $\overline{LJ}$.

Ⓓ The ratio of $\overline{LM}$ to $\overline{LK}$ is equal to the ratio of $\overline{PL}$ to $\overline{LK}$.

16. A survey was given to a sample of 3,000 randomly chosen college students. The survey asked about their participation in online classes and whether they have a job. The results of the survey are shown in the table.

Survey Results for College Students

	Has a Job	**Does Not Have a Job**
Takes At Least One Class Online	562	708
Does Not Take Any Classes Online	128	1,602

Based on the data in the table, which statement is true about the college students?

Select **all** correct statements.

Ⓐ It is likely that a student who does not take any classes online also does not have a job.

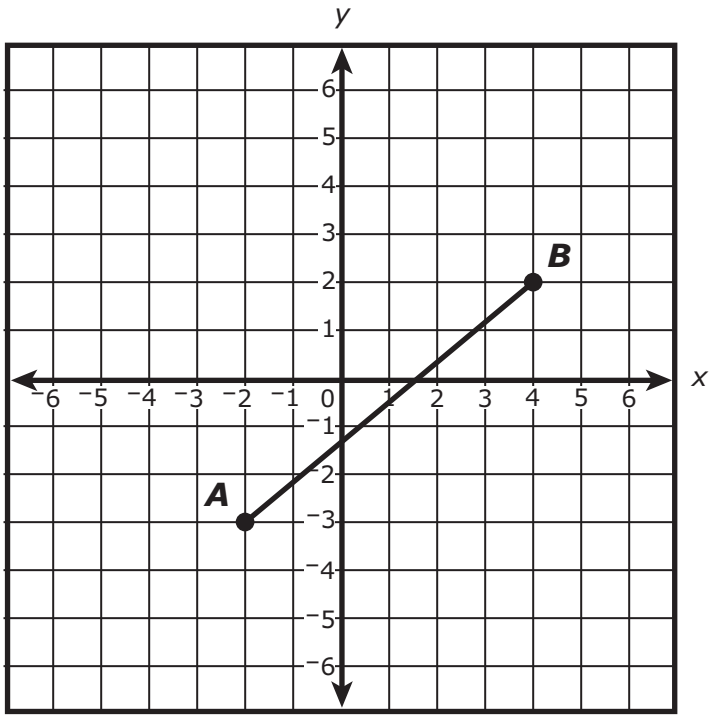
Ⓑ More than 50% of the students who have a job take at least one class online.

Ⓒ There are about 500 more students who have a job than do not have a job.

Ⓓ More than 50% of the students surveyed take at least one class online.

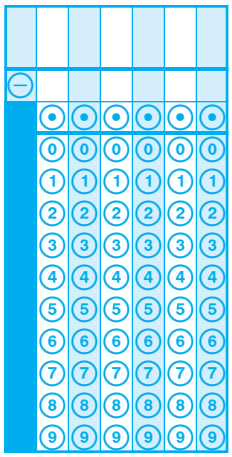
Ⓔ It is likely that a college student has a job.

17. The coordinate plane shows $\overline{AB}$.



What is the length of $\overline{AB}$? Round your answer to three decimal places.

Enter your answer in the box.



This is the end of Item Set 1 Section 2.

ITEM SET 2 (Calculator)

You may use a calculator for Item Set 2.

1. Two linear functions are described.

Function Q

$y = 2x + 7$

Function R

x	0	1
y	0	6

Which statement is true about the rate of change of Function Q?

Ⓐ It is 3 times the rate of change of Function R.

Ⓑ It is 2 times the rate of change of Function R.

Ⓒ It is $\frac{1}{2}$ the rate of change of Function R.

Ⓓ It is $\frac{1}{3}$ the rate of change of Function R.

2. A customer spends $21.50 on cupcakes and muffins. The number of muffins purchased is 1 fewer than the number of cupcakes.

Each cupcake costs $2, and each muffin costs $1.25.

- Create a system of equations that relates *c*, the number of cupcakes, and *m*, the number of muffins, the customer purchased.
- Determine the total cost of the muffins the customer purchased. Show or explain your work.

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

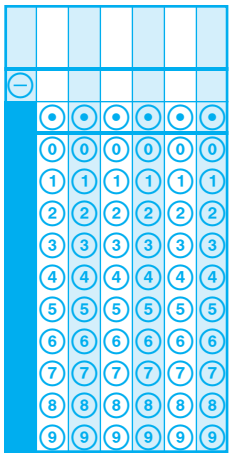
Use the information provided to answer Part A through Part D for question 3.

An ice cream shop sells scoops of ice cream from a container. The equation for the linear model representing the amount of ice cream in the container is $y = -4x + 220$, where y represents the number of ounces that remain in the container after x scoops are sold.

3. Part A

According to the model, how many ounces of ice cream are in the container before any scoops are sold?

Enter your answer in the box.



Part B

What does the slope of the equation for the linear model represent?

Ⓐ the change in the number of scoops of ice cream sold per ounce of ice cream remaining in the container

Ⓑ the change in the number of ounces of ice cream remaining in the container per scoop of ice cream sold

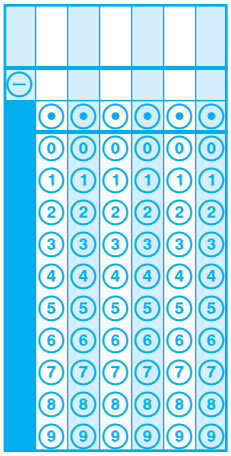
Ⓒ the number of ounces of ice cream remaining in the container

Ⓓ the number of ice cream scoops sold

Part C

According to the model, how many ounces of ice cream remain after selling 43 scoops?

Enter your answer in the box.



Part D

The graph of the linear model intersects the x-axis at (55, 0).

What does this intersection point represent in this situation?

Ⓐ There are 0 ounces of ice cream remaining in the container after selling 55 scoops.

Ⓑ There are 55 ounces of ice cream remaining in the container after selling 0 scoops.

Ⓒ There are 55 scoops of ice cream remaining in the container.

Ⓓ There are 55 ounces in each scoop of ice cream sold.

4. Half of the sum of x and 6.2 is the same as 19.6 less than x.

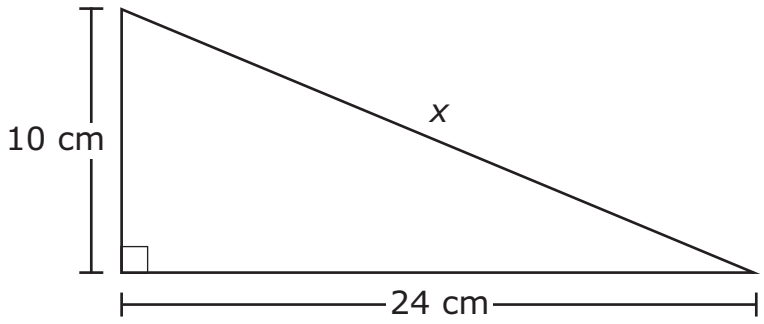
Create and solve an equation to find the value of x.

Enter your equation and your solution in the space provided. Enter **only** your equation and your solution.

Equation: _____

Solution: x = _____

5. A right triangle is shown.



What is the value of x, in centimeters?

Ⓐ 17

Ⓑ 22

Ⓒ 26

Ⓓ 34

6. Two companies rent boats by the hour. The total cost, in dollars, c, depends on the number of hours, h. The equations that represent the rental rates of both companies are shown.

Company A: $c = 15h + 20$

Company B: $c = 20h$

- A person rents a boat from Company A for h hours and realizes they would have paid the same amount if they had rented the boat from Company B. How many hours, h, did the person rent the boat? Explain or show each step of your work.
- Verify that your solution for h hours of renting the boat is the same cost, c, for each company.

Enter your answer and your explanations or steps in the space provided.

This is the end of Item Set 2.

ITEM SET 3 (Calculator)

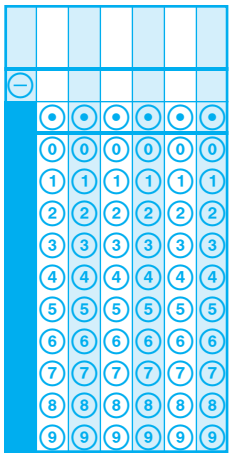
You may use a calculator for Item Set 3.

1. Two different factories are building engine parts for a car company. Both factories are open 8 hours a day, 260 days a year.

- Factory A makes 1,900 engine parts per hour.
- Factory B makes p parts in d days, which can be modeled by the equation $p = 13{,}500d$.

How many more engine components does Factory A make per year than Factory B?

Enter your answer in the box.



2. Line Q passes through the origin and $\left(\frac{3}{4}, 1\right)$.

A student claims that $\left(\frac{3}{4},1\right)$ shows that the constant of proportionality of line Q is $\frac{3}{4}$ and therefore the equation of line Q is $y = \frac{3}{4}x$.

- Explain the student's error in reasoning.
- Explain why line Q represents a proportional relationship.
- Write a correct equation for line Q in the form $y = mx$, where m is the constant of proportionality.
- Explain how you found the number you used for m.

Enter your explanations and your equation in the space provided.

Use the information provided to answer Part A and Part B for question 3.

Shopper A paid $108.34 for 3 shirts and 1 pair of pants. Shopper B paid $201.86 for 2 shirts and 4 pairs of pants. The price of each shirt is the same, and the price of each pair of pants is the same.

The system of equations that represents this situation is shown.

$$\begin{cases} 3x + y = 108.34 \\ 2x + 4y = 201.86 \end{cases}$$

3. Part A

What does $4y$ represent in the context of the problem?

Ⓐ the number of pants and shirts Shopper B bought

Ⓑ the number of pants Shopper B bought

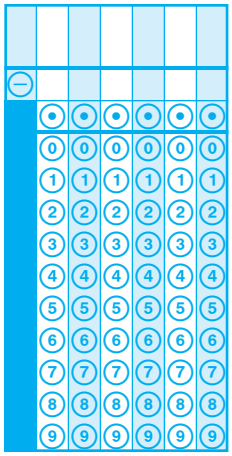
Ⓒ the price of 4 pairs of pants

Ⓓ the price of 1 pair of pants

Part B

What is the price, in dollars, of 1 shirt?

Enter your answer in the box.



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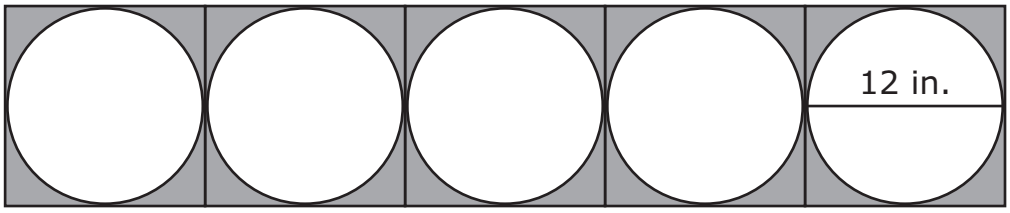
4. Part A

Students are making decorations to display on a classroom wall. Each student begins with a square-shaped piece of cardboard with a circle drawn on it.

Each student will draw a design inside one of the circles. The diameter of each circle is 12 inches. A total of 25 decorations will be displayed on a classroom wall in a square arrangement, with 5 rows of 5 decorations. The figure shows a row of 5 decorations, with the sides of the circles touching but not overlapping.



- Create an equation to find A, the total area of the wall, to the nearest square inch, covered by the circular areas of 25 decorations displayed on the wall.
- What is the total area, to the nearest square inch, of the circular areas of 25 decorations?
- What is the total area, to the nearest square inch, of the shaded area that will surround the 25 circular decorations? Show your work or explain your answer.

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

Part B

The students give individual presentations about their design. The first 2 presentations take a total of 5 minutes.

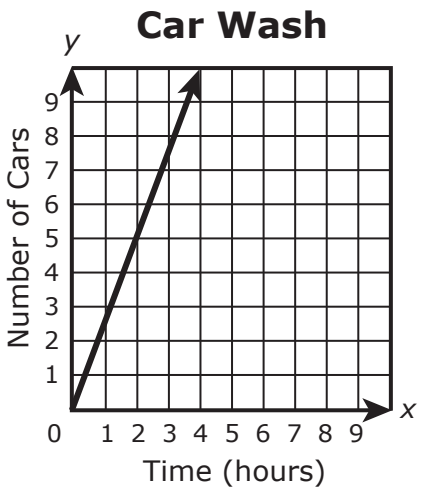
- At this rate, approximately how long, to the nearest **hour**, will 25 presentations take?
- Show your work or explain your answer.

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

5. At a car wash, an average of 5 cars can be washed in 2 hours.

Which graph shows the relationship between the amount of time, in hours, and the number of cars washed?

Ⓐ



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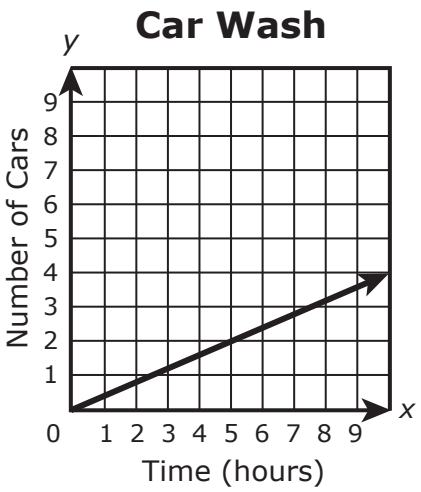
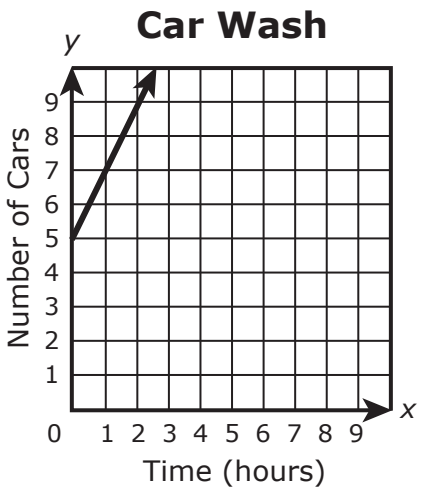
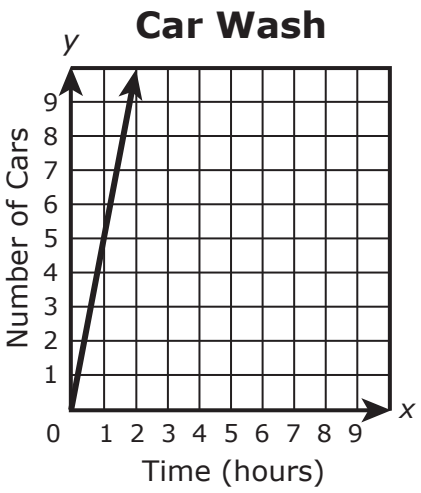


Ⓒ



Ⓓ



6. An equation is shown.

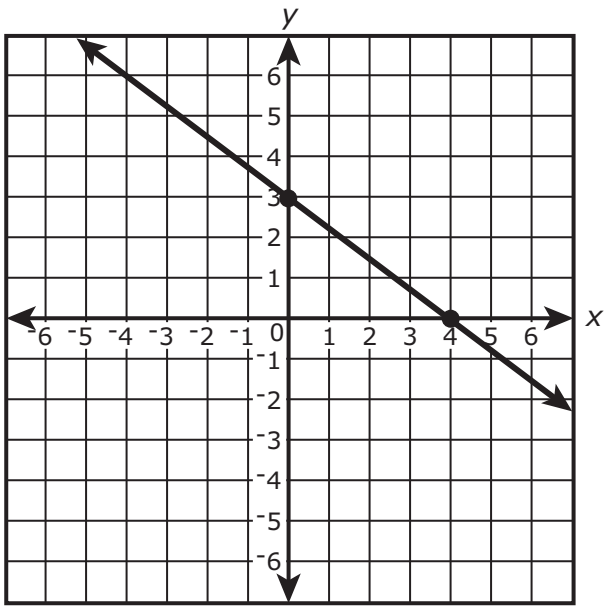
$$\frac{1}{2}n + 5 = \frac{3}{4}n + 3$$

- Solve the equation for *n.* Show your work or explain your steps.
- Verify that your solution for *n* is true for $\frac{1}{2}n + 5 = \frac{3}{4}n + 3$.

Enter your answer and your explanations in the space provided.

7. Consider the two linear functions.

Function A



Function B

$$y = 4 - \frac{3}{4}x$$

Circle the correct answer options to complete each sentence.

The rate of change for Function A is _____ the rate of change for Function B.

greater than
less than
equal to

The *y*-intercept for Function A is _____ the *y*-intercept for Function B.

greater than
less than
equal to

This is the end of Item Set 3.

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