

Colorado Measures of Academic Success



Grade 8 Mathematics



Paper Practice Resource for Students

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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.

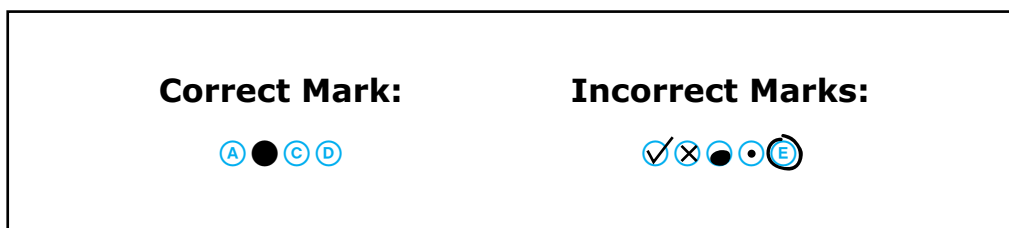
While the use of the sample items is not required, it is strongly encouraged to help ensure students are familiar with the types of items they may encounter while taking the paper-based test.

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.

-	3				
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0
<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1
<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2
<input checked="" type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3
<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4
<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5
<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6
<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7
<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8
<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9

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

.	7	5			
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0
<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1
<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2
<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3
<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4
<input type="radio"/> 5	<input type="radio"/> 5	<input checked="" type="radio"/>	<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5
<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6
<input type="radio"/> 7	<input checked="" type="radio"/>	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7
<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8
<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9

OR

0	.	7	5		
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> 0
<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1
<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2
<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3
<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4
<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5	<input checked="" type="radio"/>	<input type="radio"/> 5	<input type="radio"/> 5
<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6
<input type="radio"/> 7	<input type="radio"/> 7	<input checked="" type="radio"/>	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7
<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8	<input type="radio"/> 8
<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9

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 input-output table represents a nonlinear function?

Select **each** nonlinear function.

(A)

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

(B)

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

(C)

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

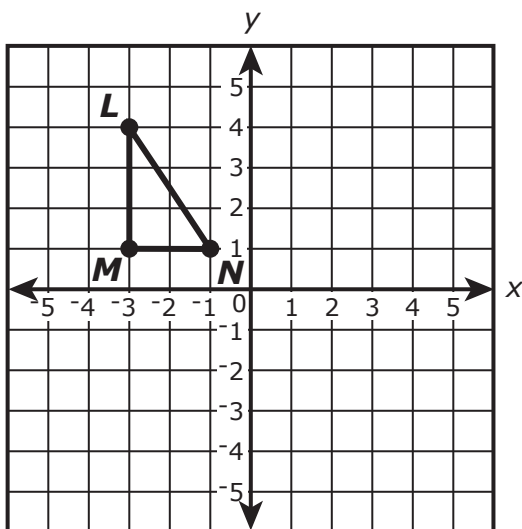
(D)

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

(E)

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

2. Triangle LMN is shown on the coordinate plane.



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

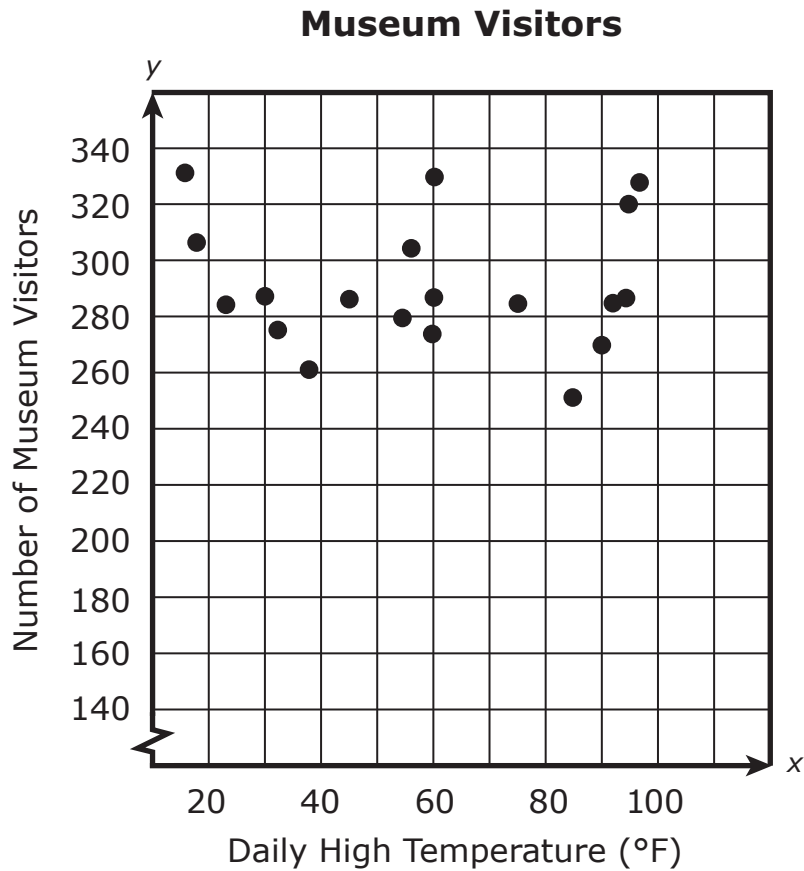
Which statement is true about the line segments in the two triangles?

- (A) \overline{NL} is the same length as $\overline{M'N'}$.
- (B) \overline{NL} is the same length as $\overline{N'L'}$.
- (C) \overline{LM} is shorter than $\overline{L'M'}$.
- (D) \overline{MN} is longer than $\overline{L'M'}$.

3. 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.

⊖					
•	•	•	•	•	•
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

4. The scatter plot shows the number of museum visitors compared to the daily high temperature, in degrees Fahrenheit. The number of museum visitors is represented by y , and the daily high temperature is represented by x .



Which phrase **best** describes the association between the number of museum visitors and the daily high temperature?

- (A) negative linear association
- (B) positive linear association
- (C) nonlinear association
- (D) no association

5. Solve the system of equations.

$$4x + 5y = 20$$

$$3x + 10y = 20$$

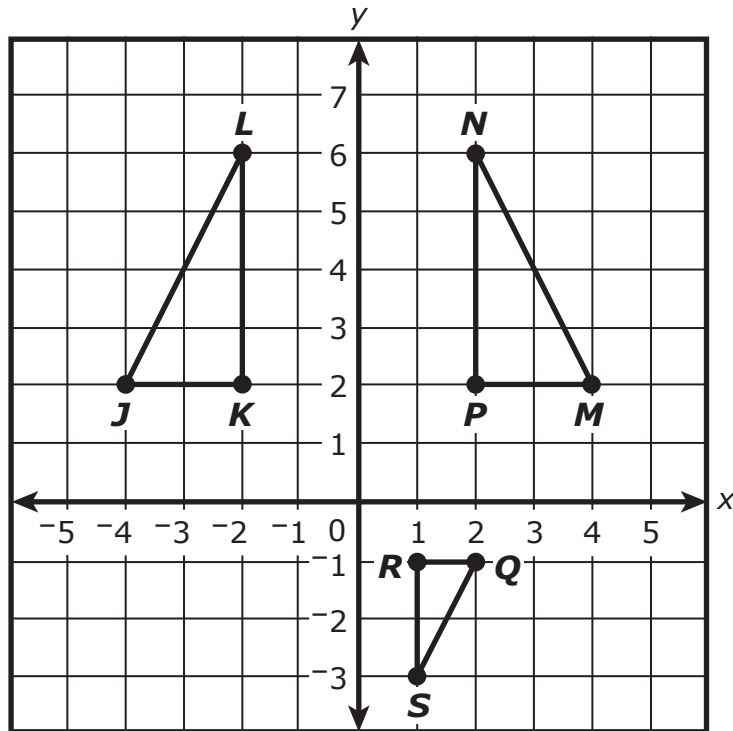
Enter your answer in the space provided. Enter **only** your answer.

(_____, _____)

**TURN THE PAGE AND
CONTINUE WORKING**

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

Triangles JKL , MPN , and QRS are shown on the coordinate plane.



6. Part A

Triangle JKL and triangle MPN are similar.

Which single transformation maps $\triangle JKL$ to $\triangle MPN$?

- (A) translation
- (B) reflection
- (C) rotation
- (D) dilation

Part B

Which statement **best** describes the relationship between $\triangle JKL$ and $\triangle QRS$?

- (A) The triangles are not similar because $\triangle QRS$ cannot be mapped onto $\triangle JKL$ by a sequence of transformations.
- (B) The triangles are similar because $\triangle QRS$ can be mapped onto $\triangle JKL$ by a sequence of transformations.
- (C) The triangles are similar because they have different perimeters.
- (D) The triangles are not similar because they have different areas.

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

- (A) $0.\overline{733}$
- (B) 0.73
- (C) $0.7\overline{3}$
- (D) 0.733

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

- (A) 4^8
- (B) 4^2
- (C) 4^{-2}
- (D) 4^{-8}

9. 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.

(A)

Input	Output
1	2

(B)

Input	Output
2	3

(C)

Input	Output
3	2

(D)

Input	Output
-3	3

(E)

Input	Output
-4.5	6

10. 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.



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.



- 11.** A randomly selected sample of middle school students were asked whether they have been on a field trip to a museum and whether they have participated in an after-school camp. The table shows the results of the survey.

Survey Results for Middle School Students

	Have Been on a Field Trip to a Museum	Have Not Been on a Field Trip to a Museum	Total
Have Participated in an After-School Camp	44	28	72
Have Not Participated in an After-School Camp	45	43	88
Total	89	71	160

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

- Ⓐ There are 28 students who have participated in an after-school camp but have not been on a field trip to a museum.
- Ⓑ There are 45 students who have participated in an after-school camp and have been on a field trip to a museum.
- Ⓒ A total of 43 students have not been on a field trip to a museum.
- Ⓓ A total of 89 students have participated in an after-school camp.

This is the end of Item Set 1 Section 2.



ITEM SET 2 (Calculator)

You may use a calculator for Item Set 2.

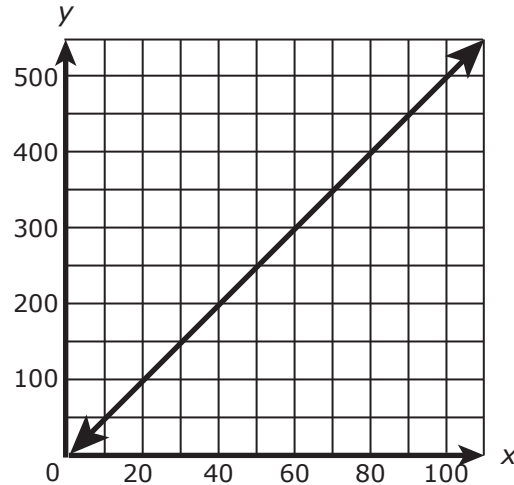


1. Two relationships are shown. The table shows the relationship between x and y in Relationship A. The graph shows a different relationship between x and y in Relationship B. The units for x and y are the same in each relationship.

Relationship A

x	y
3	18
6	36
9	54
12	72

Relationship B



Circle the answer options to correctly complete the sentence.

The slope of the graph of Relationship A is _____

less steep than
more steep than
the same as

the slope of the graph of Relationship B because the unit rate of Relationship A is _____ the unit rate of Relationship B.

less than
greater than
equal to



- 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.

−					
•	•	•	•	•	•
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Part B

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

- (A) the change in the number of scoops of ice cream sold per ounce of ice cream remaining in the container
- (B) the change in the number of ounces of ice cream remaining in the container per scoop of ice cream sold
- (C) the number of ounces of ice cream remaining in the container
- (D) 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.

-					
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Part D

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

What does this intersection point represent in this situation?

- A There are 0 ounces of ice cream remaining in the container after selling 55 scoops.
- B There are 55 ounces of ice cream remaining in the container after selling 0 scoops.
- C There are 55 scoops of ice cream remaining in the container.
- D 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: $x =$ _____

Use the information provided to answer Part A and Part B for question 5.

Student A and Student B started collecting cans for recycling on the same day. Each student started with a certain number of cans, which is included in the total. The tables show the total number of cans each student had up to a certain day.

Student A

Day	Total Number of Cans
10	116
40	207
70	295

Student B

Day	Total Number of Cans
15	205
32	240
57	289



5. Part A

Based on the tables, which student most likely collected the most cans by the 110th day?

Circle the answer options to correctly complete the sentences.

_____ most likely collected the most cans by the 110th day,

Student A

Student B

which includes the cans the student started with. The best estimate of the total number of cans this student collected is _____.

300

315

415

550



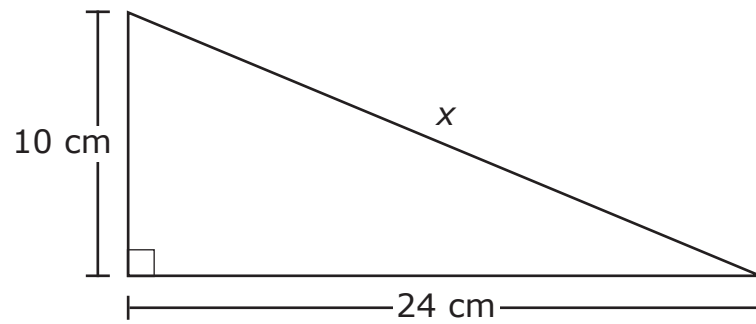
Part B

- Using the table about Student B, create a model that can be used to estimate the number of cans, n , Student B will have on day d .
- Using your model, estimate how many cans Student B will have on the 80th day.

Enter your model and your answer in the space provided.



6. A right triangle is shown.



What is the value of x , in centimeters?

- (A) 17
- (B) 22
- (C) 26
- (D) 34



7. 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.

$$\text{Company A: } c = 15h + 20$$

$$\text{Company B: } c = 20h$$

- 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.



8. 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?

- A It is 3 times the rate of change of Function R.
- B It is 2 times the rate of change of Function R.
- C It is $\frac{1}{2}$ the rate of change of Function R.
- D It is $\frac{1}{3}$ the rate of change of Function R.



9. Two snails climbed up a tree at a constant rate. A person measured and recorded their respective distances above the ground.

- Snail A was 12.5 inches above the ground at 10 minutes and 16 inches above the ground at 24 minutes.
- Snail B started at 3 inches above the ground and climbed 0.3 inch per minute.

The snails continued at the same speeds.

- Determine the amount of time, in minutes, it took for the two snails to be the same distance above the ground.
- Include an equation to represent each snail's distance above the ground, y , in terms of x , the minutes elapsed since the measurement started. Show your work or explain your answer.

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

This is the end of Item Set 2.

