Colorado Measures of Academic Success

Grade 6 Mathematics

Paper Practice Resource for Students

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 expression has the same value as $54 + 24$?

Ⓐ $6(9 + 24)$

Ⓑ $8(7 + 3)$

Ⓒ $6(9 + 4)$

Ⓓ $4(50 + 20)$

2. An expression is shown.

$$19 \times 19 \times 19 \times 19 \times 19 \times 19 \times 19$$

Using a base and an exponent, write an expression that is equivalent to the one shown.

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

3. The point $(-2, 6)$ is plotted on a coordinate plane.

Which statements are true?

Select the **two** statements that are true.

- Ⓐ The reflection point across the y-axis is $(2, 6)$.
- Ⓑ The reflection point across the y-axis is $(2, -6)$.
- Ⓒ The reflection point across the y-axis is $(-2, -6)$.
- Ⓓ The reflection point across the x-axis is $(2, 6)$.
- Ⓔ The reflection point across the x-axis is $(2, -6)$.
- Ⓕ The reflection point across the x-axis is $(-2, -6)$.

4. Which question is a statistical question?

- Ⓐ Which students in an elementary school class can speak another language?
- Ⓑ How many students in a middle school class like each type of food?
- Ⓒ Which elementary classes is the principal visiting this week?
- Ⓓ How many students are in a middle school?

5. What is the value of this expression?

$$1{,}224 \div 16$$

Ⓐ 76.0

Ⓑ 76.2

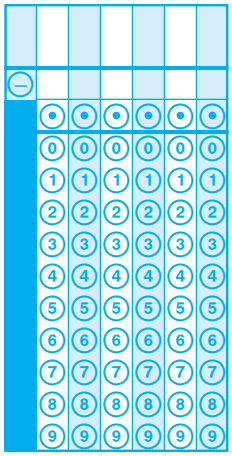
Ⓒ 76.5

Ⓓ 76.8

6. A baker mixes 42.68 grams of flour and 19.125 grams of sugar in a bowl. The baker then uses 52.76 grams of the mixture in a cake.

How many grams of the mixture does the baker still have?

Enter your answer in the box.



7. Which number is closest to zero on a number line?

Ⓐ $-\frac{3}{5}$

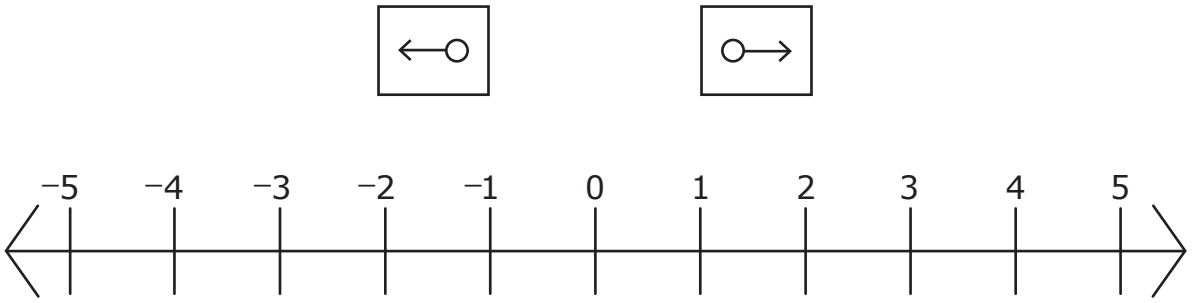
Ⓑ $-\frac{2}{5}$

Ⓒ $\frac{1}{5}$

Ⓓ $\frac{4}{5}$

8. Graph the inequality that shows all the possible values of $-1 > x$.

Select the correct ray and then graph the ray beginning at the correct place on the number line.



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.

Use the information provided to answer Part A and Part B for question 9.

A student makes two statements.

> Statement 1: $2x - 5 + 6 = 2x - 11$ because the sum of 5 and 6 is 11.
>
> Statement 2: $2x - 5 + 6 = 8x - 5$ because the sum of $2x$ and 6 is $8x$.

9. Part A

Evaluate the expressions for $x = 10$ to show that Statement 1 and Statement 2 are incorrect.

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

$2x - 5 + 6 =$ _____

$2x - 11 =$ _____

$8x - 5 =$ _____

Part B

Explain why the student's reasoning in Statement 1 is incorrect.

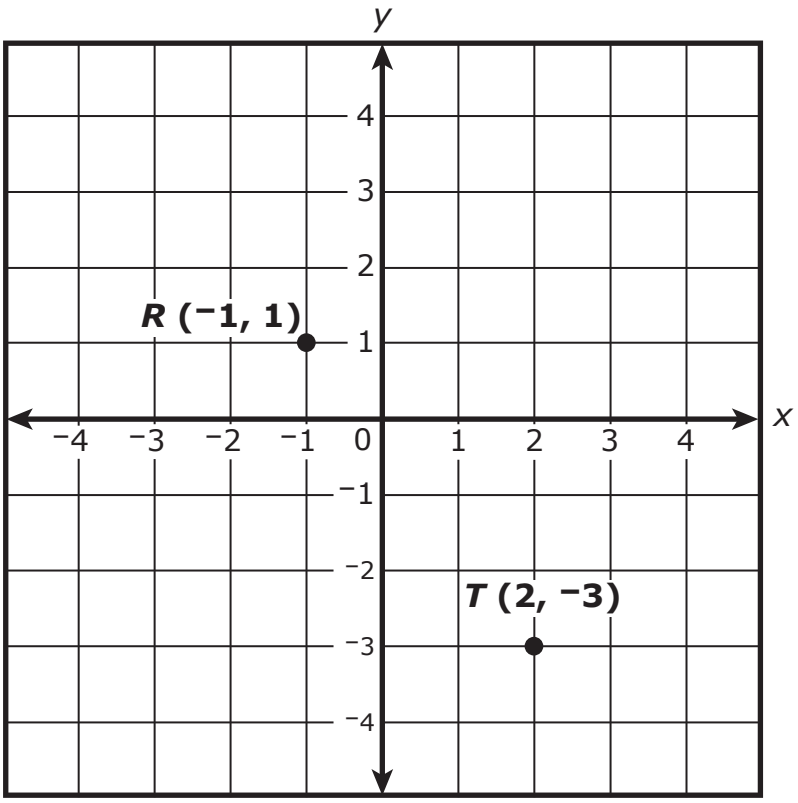
Explain why the student's reasoning in Statement 2 is incorrect.

Enter your explanation in the space provided.

This is the end of Item Set 1 Section 2.

Use the information provided to answer Part A and Part B for question 1.

Points *R* and *T* are plotted on a coordinate grid.



1. Part A

In right triangle *RST*, point *T* is graphed at (2, −3), and point *R* is graphed at (−1, 1).

Which coordinate pair describes the location of point *S*?

Ⓐ (−1, −3)

Ⓑ (−1, 3)

Ⓒ (1, 2)

Ⓓ (1, 3)

Part B

Triangle MRT is graphed with point M at $(-4, -3)$.

What is the length, in units, of side $\overline{MT}$?

Ⓐ 3

Ⓑ 4

Ⓒ 6

Ⓓ 7

Use the information provided to answer Part A through Part D for question 2.

The table shows the number of words four students can type in a given amount of time.

Typing Speeds for Students

Student	Typing Speed
W	225 words in 5 minutes
X	246 words in 6 minutes
Y	266 words in 4 minutes
Z	303 words in 6 minutes

2. Part A

Which student can type the **fewest** number of words in 60 minutes?

Ⓐ Student W

Ⓑ Student X

Ⓒ Student Y

Ⓓ Student Z

Part B

How many words could students X and Y type together in 2 hours?

Ⓐ 12,900

Ⓑ 10,750

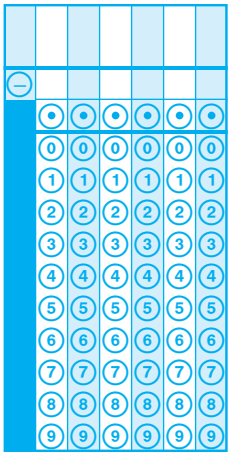
Ⓒ 9,675

Ⓓ 6,450

Part C

Student Z is typing a document with 5,454 words. How many minutes will it take this student to type this document?

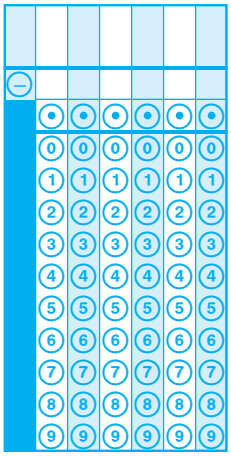
Enter your answer in the box.



Part D

How many more words can Student Y type in 20 minutes compared to Student W?

Enter your answer in the box.



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

Volunteers go to a park to plant trees and build benches. A total of 32 volunteers go to the park. The volunteers are split into groups to do the tasks.

3. Part A

There are 26 volunteers planting trees. In 1 hour, 4 volunteers can plant 8 trees. How many trees can the volunteers plant at the park in 3 hours?

Write the correct numbers from the list in the blank boxes. Each number may be used once or not at all.

1	2	4	16	24	26	48	52	144	156

Each volunteer can plant [ ] trees in 1 hour.

The volunteers can plant [ ] trees in 3 hours.

Part B

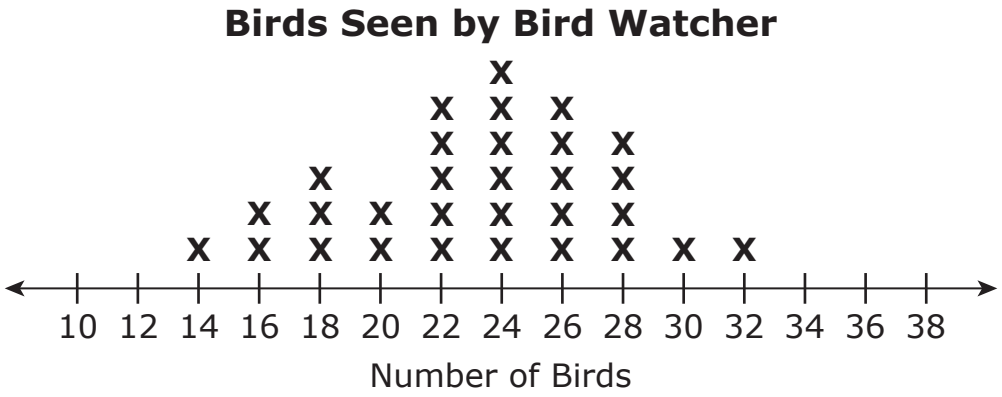
In 4 hours, 6 volunteers can build 60% of the total benches needed. The volunteers will continue to work at the same rate until all the benches are built.

- At this rate, how many more hours will the volunteers need to build the remaining benches?
- Show or explain your steps.

Enter your answer and your steps in the space provided.

Use the information provided to answer Part A and Part B for question 4.

The number of birds seen by a bird watcher each day for 30 days is recorded in a line plot.



4. Part A

What is the mean number of birds seen by the bird watcher each day?

Ⓐ 18

Ⓑ 21.81

Ⓒ 23.27

Ⓓ 24

Part B

The bird watcher describes the center of the data set as the mean.

Which statement explains a reason the bird watcher would choose the mean to describe the center of the data set?

Ⓐ More than half of the recorded number of birds seen by the bird watcher are less than the mean.

Ⓑ The line plot showing the number of birds seen by the bird watcher is equally distributed.

Ⓒ There are about the same number of data points above and below the mean.

Ⓓ The mean is lower than all the data points.

5. A serving of dog food is $\frac{5}{8}$ cup. There are $3\frac{3}{4}$ cups of dog food in a bag.

- Write an expression to determine how many servings of dog food are in the bag. Your expression must include fractions.
- Determine the number of servings of dog food in the bag. Show your work.
- Explain how to check your answer for the number of servings of dog food by using an equation with a different operation. Your equation must include fractions.

Enter your expression, your answer, your equation, and your explanations in the space provided.

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

An artist is filling jars with sand of different colors and different amounts.

- The artist divides the same amount of blue sand, the same amount of green sand, and the same amount of red sand into each of 20 jars.
- Each jar holds a total of 3.2 ounces of sand.
- The price of the sand is $0.17 per ounce.

Sand Needed

Color	Total Amount of Sand (ounces)
Blue	18
Green	24
Red	?

6. Part A

- Determine the amount of red sand, in ounces, needed for all 20 jars.
- Write an equation or set of equations that can be used to find r, the amount of red sand, in ounces, the artist needs for all 20 jars.
- Write an equation or set of equations to find p, the price of the red sand needed for all 20 jars.

Enter your answer and your equations in the space provided.

Part B

The artist sells 12 of the 20 jars. The sand from the jars the artist did not sell will be poured into large jars that each hold 10 ounces when full.

- Determine the fewest number of full large jars needed to hold the sand from the jars the artist did not sell.
- Write an equation or set of equations to model n, the total number of ounces of sand in the jars the artist did not sell.
- Write an equation or set of equations to model j, the number of large jars needed to hold the sand from the jars the artist did not sell.

Enter your answer and your equations in the space provided.

Use the information provided to answer Part A and Part B for question 7.

A store sells cherries for $3.70 per pound.

7. Part A

A person buys x pounds of cherries for $7.56.

Which equation can be used to find the number of pounds of cherries the person buys?

Ⓐ $3.70 + x = 7.56$

Ⓑ $7.56 + x = 3.70$

Ⓒ $3.70x = 7.56$

Ⓓ $7.56x = 3.70$

Part B

The store changes the price of the cherries. The equation $3.70 + p = 4.66$ represents the relationship between the old and new prices of cherries, where p is the change in the price per pound of cherries.

What is the value of p in this equation?

Ⓐ 0.81

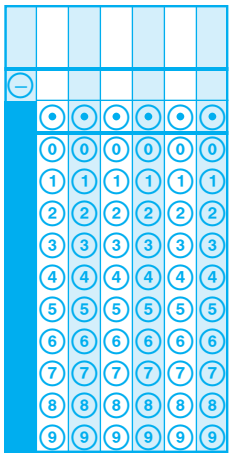
Ⓑ 0.90

Ⓒ 0.96

Ⓓ 1.23

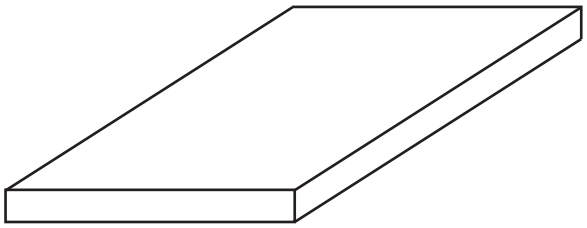
8. What is 45% of 320?

Enter your answer in the box.



9. Part A

A playground has a sandbox in the shape of a right rectangular prism. The length of the sandbox is $4\frac{1}{2}$ feet, and the width is $5\frac{1}{3}$ feet. The height of the sandbox is $\frac{1}{2}$ foot.



Playground Sandbox

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

Ⓐ $4\frac{11}{12}$

Ⓑ $10\frac{1}{3}$

Ⓒ 12

Ⓓ 24

Part B

Another area of the playground has a soft mat for safety. The area of the rectangular mat is $9\frac{1}{3}$ square feet. The mat is $\frac{1}{4}$-foot thick.

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

Ⓐ $2\frac{1}{3}$

Ⓑ $9\frac{7}{12}$

Ⓒ $21\frac{7}{9}$

Ⓓ $37\frac{1}{3}$

10. Two students are comparing the decimals 13.310, 13.28, and 13.301.

Student A makes an error. He says that $13.28 > 13.301$ because 8 is greater than 1.

Student B also makes an error. He says that $13.310 < 13.28$ because 13.310 has a 3 in the tenths place and $\frac{2}{10}$ is greater than $\frac{3}{10}$.

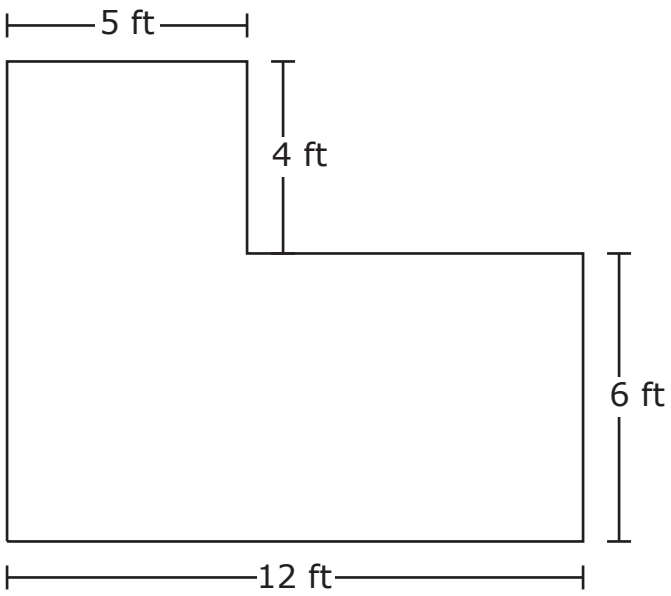
- Explain why the reasoning for Student A is incorrect.
- Explain why the reasoning for Student B is incorrect.
- Explain or show how to order the numbers from least to greatest.
- Find the sum of the three decimals rounded to the nearest tenth.

Enter your explanations and your answer in the space provided.

11. Part A

An L-shaped pool is made of two right rectangular prisms. The figure shows a top view of this pool. The pool height is the same for the entire pool.

Top View



The pool is filled with water to a height of 4 feet.

- Create an equation or set of equations that can be used to find the volume, in cubic feet, of the pool.
- Explain how you created the equation or set of equations.
- Find the volume, in cubic feet, of the pool.

Enter your equation or set of equations, your explanation, and your answer in the space provided.

Part B

A different pool is in the shape of a right rectangular prism and has a volume of 192 cubic feet. The area of the base of the pool is 32 square feet.

- Create an equation to find the height, in feet, of the water in the pool.
- Find the height, in feet, of the water in the pool. Show your work.

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

Equation: _____

Height of water: _____ **feet**

Your Work:

This is the end of Item Set 2.

Colorado Measures of Academic Success

Grade 6 Mathematics

Answer Key with Scoring Rubrics

Practice Resource for Students

1139073 1 2 3 4 5 A B C D E Printed in the USA ISD36175

ANSWER KEY: ITEM SET 1

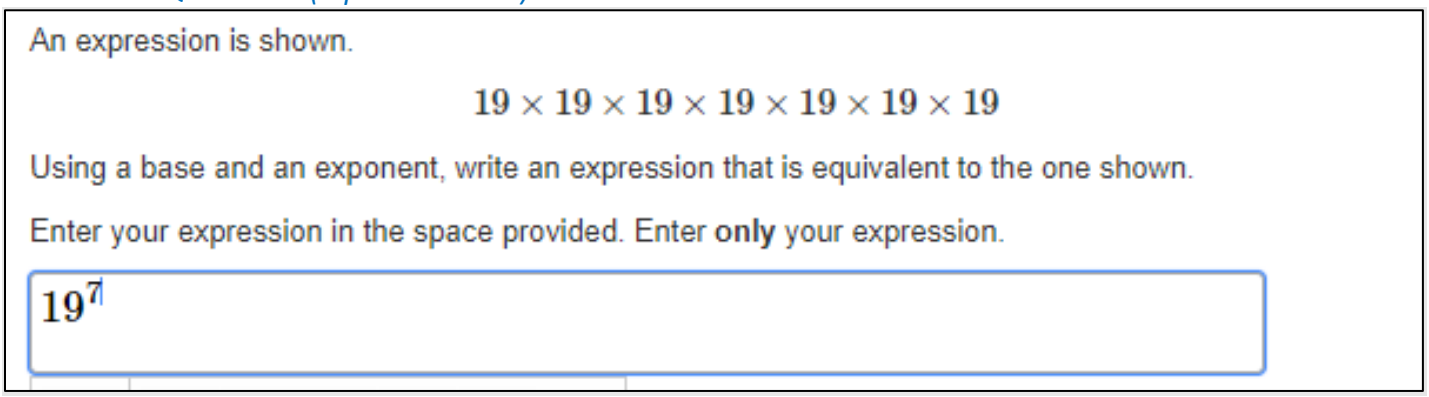
Item Set 1 – Question 1 (Selected Response)

Which expression has the same value as $54 + 24$?

- A. $6(9 + 24)$
- B. $8(7 + 3)$
- C. $6(9 + 4)$
- D. $4(50 + 20)$

Item Information		
Answer:	C	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express 36 + 8 as 4(9 + 2).
Evidence Statement:	6.NS.4-2	Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express 36 + 8 as 4 (9 + 2).
Subclaim:	B - Supporting Content	The student solves problems involving the Additional and Supporting Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.634	

Item Set 1 – Question 2 (Equation Editor)



Item Information		
Answer:	See Image	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
Evidence Statement:	6.EE.1-1	Write numerical expressions involving whole-number exponents.
Subclaim:	A - Major Content	The student solves problems involving the Major Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.655	

Item Set 1 – Question 3 (Multiple Select)

The point $(^{-}2, 6)$ is plotted on a coordinate plane.

Which statements are true?

Select the **two** statements that are true.

- [x] A. The reflection point across the *y*-axis is $(2, 6)$.
- [ ] B. The reflection point across the *y*-axis is $(2, ^{-}6)$.
- [ ] C. The reflection point across the *y*-axis is $(^{-}2, ^{-}6)$.
- [ ] D. The reflection point across the *x*-axis is $(2, 6)$.
- [ ] E. The reflection point across the *x*-axis is $(2, ^{-}6)$.
- [x] F. The reflection point across the *x*-axis is $(^{-}2, ^{-}6)$.

Item Information		
Answer:	A, F	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.NS.C.6.b	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; explain that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
Evidence Statement:	6.NS.6b-2	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. b. Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
Subclaim:	A - Major Content	The student solves problems involving the Major Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.196	

Item Set 1 – Question 4 (Selected Response)

Which question is a statistical question?

- A. Which students in an elementary school class can speak another language?
- B. How many students in a middle school class like each type of food?
- C. Which elementary classes is the principal visiting this week?
- D. How many students are in a middle school?

Item Information		
Answer:	B	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.SP.A.1	Identify a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.
Evidence Statement:	6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students" ages. i) Tasks do not assess mode and range.
Subclaim:	B - Supporting Content	The student solves problems involving the Additional and Supporting Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.402	

Item Set 1 – Question 5 (Selected Response)

What is the value of this expression?

$$1{,}224 \div 16$$

- A. 76.0
- B. 76.2
- C. 76.5
- D. 76.8

Item Information		
Answer:	C	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.NS.B.2	Fluently divide multi-digit numbers using the standard algorithm.
Evidence Statement:	6.NS.2	Fluently divide multi-digit numbers using the standard algorithm. i) The given dividend and divisor are such as to require an efficient/standard algorithm (e.g., 40584 ÷ 76). Numbers in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 40064 ÷ 16). ii) Tasks do not have a context. iii) Only the answer is required. iv) Tasks are not to exceed five-digit dividends and two-digit divisors, with or without remainder. v) Tasks may or may not have a remainder. Students understand that remainders can be written as fractions or decimals.
Subclaim:	B - Supporting Content	The student solves problems involving the Additional and Supporting Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.424	

Item Set 1 – Question 6 (Fill in the Blank)

A baker mixes 42.68 grams of flour and 19.125 grams of sugar in a bowl. The baker then uses 52.76 grams of the mixture in a cake.

How many grams of the mixture does the baker still have?

Enter your answer in the box.

9.045

Item Information		
Answer:	See Image	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
Evidence Statement:	6.Int.1	Solve two-step word problems requiring operations on multi-digit whole numbers or decimals. i) Operations are no more complex than those specified for 6.NS.2, 6.NS.3-1, 6.NS.3-2, 6.NS.3-3, and 6.NS.3-4. ii) For purposes of assessment, the possibilities for multiplication are 1-digit x 2- digit, 1-digit x 3-digit, 2-digit x 3-digit, 2-digit x 4-digit, 2-digit x 5-digit, or 3-digit x 3-digit (For example, 7.68 x 15.3 or 0.35 x 18.241.)
Subclaim:	B - Supporting Content	The student solves problems involving the Additional and Supporting Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.394	

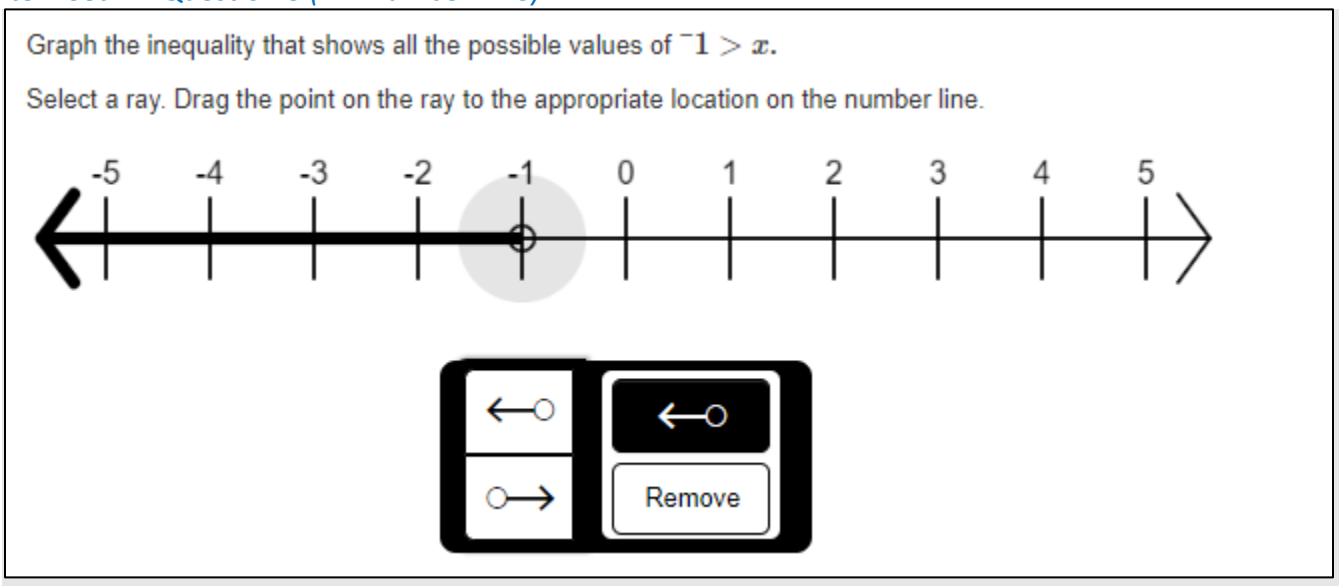
Item Set 1 – Question 7 (Selected Response)

Which number is closest to zero on a number line?

- A. $-\frac{3}{5}$
- B. $-\frac{2}{5}$
- C. $\frac{1}{5}$
- D. $\frac{4}{5}$

Item Information		
Answer:	C	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.NS.C.7.c	Define the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of -30 dollars, write |-30|=30 to describe the size of the debt in dollars.
Evidence Statement:	6.NS.7c-1	Understand ordering and absolute value of rational numbers. c. Understand the absolute value of a rational number as its distance from 0 on the number line. i) Tasks do not have a context. ii) Tasks are not limited to integers.
Subclaim:	A – Major Content	The student solves problems involving the Major Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.868	

Item Set 1 – Question 8 (TEI Number Line)



Item Information		
Answer:	See Image	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.EE.B.8	Write an inequality of the form x > c, x ≥ c, x < c, or x ≤ c to represent a constraint or condition in a real-world or mathematical problem. Show that inequalities of the form x > c, x ≥ c, x < c, or x ≤ c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
Evidence Statement:	6.EE.8	Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams. i) Constraint values (denoted c in standard 6.EE.8) are not limited to integers. ii) Tasks involve < and >, not "less than or equal to" or "greater than or equal to."
Subclaim:	A – Major Content	The student solves problems involving the Major Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	Not Available	

Item Set 1, Calculator Section – Question 9 (Equation Editor, Constructed Response)

A student makes two statements.

Statement 1: $2x - 5 + 6 = 2x - 11$ because the sum of 5 and 6 is 11.

Statement 2: $2x - 5 + 6 = 8x - 5$ because the sum of $2x$ and 6 is $8x$.

Part A

Evaluate the expressions for $x = 10$ to show that Statement 1 and Statement 2 are incorrect.

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

$2x - 5 + 6 = 21$

$2x - 11 = 9$

$8x - 5 = 75$

Part B

Explain why the student's reasoning in Statement 1 is incorrect.

Explain why the student's reasoning in Statement 2 is incorrect.

Enter your explanation in the space provided.

Item Information		
Answer:	See Scoring Rubric and Sample Student Responses	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.EE.A.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.
Evidence Statement:	6.C.7	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. Content Scope: Knowledge and skills articulated in 6.EE.4.
Subclaim:	C - Expressing Mathematical Reasoning	The student expresses grade/course-level appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others, and/or attending to precision when making mathematical statements.
P Value:	0.212	

Scoring Rubric – Part A	
Points	**Attributes**
1	**Computation Component:** Student provides the correct values: • Box 1: 21 or equivalent number • Box 2: 9 or equivalent number • Box 3: 75 or equivalent number **Note**: The three values must be correct to receive credit.
0	Student response is incorrect or irrelevant.

Scoring Rubric – Part B	
Points	**Attributes**
2	Student response includes each of the following 2 elements. • **Reasoning Component**: Valid explanation of why the reasoning in statement 1 is incorrect. • **Reasoning Component**: Valid explanation of why the reasoning in statement 2 is incorrect.
1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.
Sample Student Response:	**Sample Solution 1:** The student's reasoning in Statement 1 is incorrect because he added wrong. There is a negative sign in front of 5. This means that it's negative five. When you add -5 to 6, you get a positive 1, not -11. Statement 2 is incorrect because you have to combine like terms, and 2 is a coefficient with x as its variable, so you can't add together 2x + 6 to get 8x since they are unlike terms and should not be added.
Annotation for Sample Student Response:	**Solution 1, Score Point 2** The response receives full credit. It includes each of the two required elements. **Reasoning Component:** • **Student Response:** The student's reasoning in Statement 1 is incorrect because he added wrong. There is a negative sign in front of 5. This means that it's negative five. When you add -5 to 6, you get a positive 1, not -11. o **Rationale for Score:** A valid explanation is provided that explains the incorrect reasoning in Statement 1 (reasoning in Statement 1 is incorrect because he added wrong. There is a negative sign in front of 5. This means that it's negative five. When you add -5 to 6, you get a positive 1, not -11). The student identifies that -5 plus 6 were added incorrectly (When you add -5 to 6, you get a positive 1) and therefore Statement 1 is incorrect. **Reasoning Component:** • **Student Response:** Statement 2 is incorrect because you have to combine like terms, and 2 is a coefficient with x as its variable, so you can't add together 2x + 6 to get 8x since they are unlike terms and should not be added. o **Rationale for score:** A valid explanation is provided that explains the incorrect reasoning in Statement 2 (Statement 2 is incorrect because you have to combine like terms, and 2 is a coefficient with x as its variable, so you can't add together 2x + 6 to get 8x since they are unlike terms and should not be added). The student identified that unlike terms were incorrectly added (can't add together 2x + 6 to get 8x since they are unlike terms) and therefore Statement 2 is incorrect. **Note:** Sample student responses are not representative of all correct answers for an item and are only provided as a guide to assist teachers with scoring.

ANSWER KEY: ITEM SET 2, CALCULATOR SECTION

Item Set 2 – Question 1 (Selected Response)

Part A

In right triangle RST, point T is graphed at $(2, -3)$, and point R is graphed at $(-1, 1)$.

Which coordinate pair describes the location of point S?

- (●) A. $(-1, -3)$
- ( ) B. $(-1, 3)$
- ( ) C. $(1, 2)$
- ( ) D. $(1, 3)$

Part B

Triangle MRT is graphed with point M at $(-4, -3)$.

What is the length, in units, of side $\overline{MT}$?

- ( ) A. 3
- ( ) B. 4
- (●) C. 6
- ( ) D. 7

Item Information		
Answer:	Part A = A; Part B = C	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.G.A.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
Evidence Statement:	6.G.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
Subclaim:	B - Supporting Content	The student solves problems involving the Additional and Supporting Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.492	

Item Set 2 – Question 2 (Selected Response, Fill in the Blank)

The table shows the number of words four students can type in a given amount of time.

Typing Speeds for Students

Student	Typing Speed
W	225 words in 5 minutes
X	246 words in 6 minutes
Y	266 words in 4 minutes
Z	303 words in 6 minutes

Part A

Which student can type the **fewest** number of words in 60 minutes?

- A. Student W
- B. Student X
- C. Student Y
- D. Student Z

Part B

How many words could students X and Y type together in 2 hours?

- A. 12,900
- B. 10,750
- C. 9,675
- D. 6,450

Part C

Student Z is typing a document with 5,454 words. How many minutes will it take this student to type this document?

Enter your answer in the box.

108

Part D

How many more words can Student Y type in 20 minutes compared to Student W?

Enter your answer in the box.

430

Item Information		
Answer:	Part A = B Part B = A Part C = 108 Part D = 430	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.RP.A.3.b	Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?
Evidence Statement:	6.RP.3b	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?
Subclaim:	A – Major Content	The student solves problems involving the Major Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.373	

Item Set 2 – Question 3 (TEI Gap Match, Constructed Response)

Volunteers go to a park to plant trees and build benches. A total of 32 volunteers go to the park. The volunteers are split into groups to do the tasks.

Part A

There are 26 volunteers planting trees. In 1 hour, 4 volunteers can plant 8 trees. How many trees can the volunteers plant at the park in 3 hours?

Drag and drop each number into the boxes. Each number may be used once or not at all.

1 | 4 | 16 | 24 | 26 | 48 | 52 | 144

Each volunteer can plant [2] trees in 1 hour. The volunteers can plant [156] trees in 3 hours.

Part B

In 4 hours, 6 volunteers can build 60% of the total benches needed. The volunteers will continue to work at the same rate until all the benches are built.

- At this rate, how many more hours will the volunteers need to build the remaining benches?
- Show or explain your steps.

Enter your answer and your steps in the space provided.

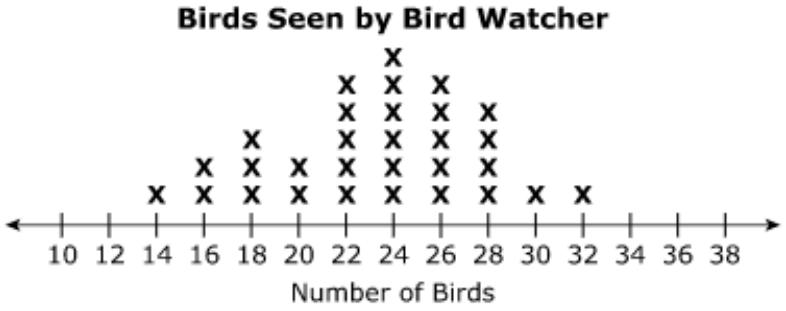
Item Information		
Answer:	See Scoring Rubric and Sample Student Responses	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.RP.A.3.b	Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?
	6.RP.A.3.c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
Evidence Statement:	6.D.1	Solve multi-step contextual word problems with degree of difficulty appropriate to Grade 6, requiring application of knowledge and skills articulated in Type I, Sub-Claim A Evidence Statements.
Subclaim:	D - Modeling and Application	The student solves real-world problems with a degree of difficulty appropriate to the grade/course by applying knowledge and skills articulated in the standards for the current grade/course (or for more complex problems, knowledge and skills articulated in the standards for previous grades/courses), engaging particularly in the Modeling practice, and where helpful making sense of problems and persevering to solve them (MP. 1), reasoning abstractly and quantitatively (MP. 2), using appropriate tools strategically (MP.5), looking for and making use of structure (MP.7), and/or looking for and expressing regularity in repeated reasoning (MP.8).
P Value:	0.128	

Scoring Rubric – Part A	
Points	**Attributes**
1	**Computation Component:** Student provides the correct values: Gap 1: 2 Gap 2: 156 Each volunteer can plant **2** trees in 1 hour. The volunteers can plant **156** trees in 3 hours. **Note**: The two values must be correct to receive credit.
0	Student response is incorrect or irrelevant.

Scoring Rubric – Part B	
Points	**Attributes**
2	Student response includes each of the following 2 elements. • **Computation Component**: Correct hours needed to finish building all of the benches, $2\frac{2}{3}$ or equivalent • **Modeling Component**: Valid explanation or work to find the hours needed to finish building all of the benches **Note**: Decimal equivalent answers are considered correct.
1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.
Sample Student Response:	**Sample Solution 1:** First you set up: $\frac{4}{60} = \frac{x}{100}$ because you are building 60% of the benches in 4 hours but you do not know how many hours it will take to build 100% of the benches. Then you set 4 × 100 equal to 60 × X. 400 = 60*x*. Divide each side by 60 and it will take $6.6\overline{6}$ total hours to finish all the benches. To find how much longer it will take them to finish building the benches, you subtract 4 from the total to find the additional hours needed. $6.6\overline{6} - 4 = 2.6\overline{6}$ hours or $2\frac{2}{3}$ hours.
Annotation for Sample Student Response:	**Solution 1, Score Point 2** The response receives full credit. It includes each of the two required elements. **Computation Component:** • **Student Response:** $2.6\overline{6}$ hours or $2\frac{2}{3}$ hours ○ **Rationale for Score:** Correct number of hours needed to finish building all of the benches is provided ($2.6\overline{6}$ or $2\frac{2}{3}$). Note that decimal equivalent answers are considered correct. **Modeling Component:** • **Student Response:** First you set up: $\frac{4}{60} = \frac{x}{100}$ . . . Then you set 4 × 100 equal to 60 × X. 400 = 60*x*. Divide each side by 60 and it will take $6.6\overline{6}$ total hours to finish all the benches. To find how much longer it will take them to finish building the benches, you subtract 4 from the total to find the additional hours needed. $6.6\overline{6} - 4 = 2.6\overline{6}$ ○ **Rationale for score:** Valid work is provided to find the hours needed to finish building all of the benches. The student provides a proportion to determine how many total hours it will take to build all the benches ($\frac{4}{60} = \frac{x}{100}$). The student sets each expression equal and solves to find the total hours, *x* (4 × 100 equal to 60 × *X*. 400 = 60*x*. Divide each side by 60 and it will take $6.6\overline{6}$ total hours). The 4 hours already spent are then subtracted from total hours to find the additional hours needed to finish building all the benches (subtract 4 from the total to find the additional hours needed. $6.6\overline{6} - 4 = 2.6\overline{6}$). Note that the final answer can be provided as hours or the decimal equivalent. **Note:** Sample student responses are not representative of all correct answers for an item and are only provided as a guide to assist teachers with scoring.

Item Set 2 – Question 4 (Selected Response)

The number of birds seen by a bird watcher each day for 30 days is recorded in a line plot.



Part A

What is the mean number of birds seen by the bird watcher each day?

- A. 18
- B. 21.81
- C. 23.27
- D. 24

Part B

The bird watcher describes the center of the data set as the mean.

Which statement explains a reason the bird watcher would choose the mean to describe the center of the data set?

- A. More than half of the recorded number of birds seen by the bird watcher are less than the mean.
- B. The line plot showing the number of birds seen by the bird watcher is equally distributed.
- C. There are about the same number of data points above and below the mean.
- D. The mean is lower than all the data points.

Item Information		
Answer:	Part A = C; Part B = C	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.SP.B.5.c	Summarize numerical data sets in relation to their context, such as by: Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
Evidence Statement:	6.SP.5	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
Subclaim:	B - Supporting Content	The student solves problems involving the Additional and Supporting Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.273	

Item Set 2 – Question 5 (Constructed Response)

A serving of dog food is $\frac{5}{8}$ cup. There are $3\frac{3}{4}$ cups of dog food in a bag.

- Write an expression to determine how many servings of dog food are in the bag. Your expression must include fractions.
- Determine the number of servings of dog food in the bag. Show your work.
- Explain how to check your answer for the number of servings of dog food by using an equation with a different operation. Your equation must include fractions.

Enter your expression, your answer, your equation, and your explanations in the space provided.

Item Information		
Answer:	See Scoring Rubric and Sample Student Responses	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.NS.A.1	Interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $\frac{2}{3} \div \frac{3}{4}$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $\frac{2}{3} \div \frac{3}{4} = \frac{8}{9}$ because $\frac{3}{4}$ of $\frac{8}{9}$ is $\frac{2}{3}$. (In general, $\frac{a}{b} \div \frac{c}{d} = \frac{ad}{bc}$.) How much chocolate will each person get if 3 people share $\frac{1}{2}$ lb of chocolate equally? How many $\frac{3}{4}$ cup servings are in $\frac{2}{3}$ of a cup of yogurt? How wide is a rectangular strip of land with length $\frac{3}{4}$ mi and area $\frac{1}{2}$ square mi? (CCSS: 6.NS.A.1)
Evidence Statement:	6.C.2	Base explanations/reasoning on the relationship between addition and subtraction or the relationship between multiplication and division. Content Scope: Knowledge and skills articulated in 6.NS.1.
Subclaim:	C - Expressing Mathematical Reasoning	The student expresses grade/course-level appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others, and/or attending to precision when making mathematical statements.
P Value:	0.176	

Scoring Rubric	
Points	**Attributes**
4	Student response includes each of the following 4 elements. • **Reasoning component**: Valid expression, using fractions, to determine how many servings of dog food are in the bag • **Computation component:** Correct number of servings of dog food in the bag, 6 • **Reasoning component:** Valid work to find the number of servings of dog food in the bag • **Reasoning component**: Valid explanation to check the student's computed number of dog food servings by using an equation with a different operation and that includes fractions.

3	Student response includes 3 of the 4 elements.
2	Student response includes 2 of the 4 elements.
1	Student response includes 1 of the 4 elements.
0	Student response is incorrect or irrelevant.
Sample Student Response:	**Sample Solution 1:** Expression: $3\frac{3}{4} \div \frac{5}{8}$ To find the number of servings: $3\frac{3}{4} = \frac{15}{4}, \frac{15}{4} \div \frac{5}{8}, \frac{15}{4} \times \frac{8}{5} = \frac{120}{20} = 6$ Answer = 6 servings of dog food in the bag. To check this answer, I did the inverse operation, $\frac{6}{1} \times \frac{5}{8} = x$. I first multiplied 6 x 5 and 1 x 8 to equal $\frac{30}{8}$. I then turned the fraction into a simplified mixed fraction which is $3\frac{3}{4}$, the starting number of cups of dog food.
Annotation for Sample Student Response:	**Solution 1, Score Point 4** The response receives full credit. It includes each of the 4 required elements. **Reasoning Component:** • **Student Response:** $3\frac{3}{4} \div \frac{5}{8}$ o **Rationale for Score:** A valid expression, that includes fractions, is provided to determine how many servings of dog food are in the bag, $(3\frac{3}{4} \div \frac{5}{8})$. **Computation Component:** • **Student Response:** 6 servings of dog food in the bag. o **Rationale for score:** Correct number of servings of dog food in the bag is provided (6). **Reasoning Component:** • **Student Response:** To find the number of servings: $3\frac{3}{4} = \frac{15}{4}, \frac{15}{4} \div \frac{5}{8}, \frac{15}{4} \times \frac{8}{5} = \frac{120}{20} = 6$. o **Rationale for score:** Valid work to find the number of servings of dog food in the bag is provided, $(3\frac{3}{4} = \frac{15}{4}, \frac{15}{4} \div \frac{5}{8}, \frac{15}{4} \times \frac{8}{5} = \frac{120}{20} = 6)$. The student divides the cups of dog food in the bag by one serving to find the number of servings remaining in the bag. **Reasoning Component:** • **Student Response:** To check this answer, I did the inverse operation, $\frac{6}{1} \times \frac{5}{8} = x$. I first multiplied 6 x 5 and 1 x 8 to equal $\frac{30}{8}$. I then turned the fraction into a simplified mixed fraction which is $3\frac{3}{4}$, the starting number of cups of dog food. o **Rationale for score:** A valid equation using fractions and a different operation is used to check that the computed number of dog food servings in the bag is correct (To check this answer, I did the inverse operation, $\frac{6}{1} \times \frac{5}{8} = x$). The student multiplies the computed number of servings (6) by one serving size, $\frac{5}{8}$) to check that the cups of dog food is correct (I first multiplied 6 x 5 and 1 x 8 to equal $\frac{30}{8}$. I then turned the fraction into a simplified mixed fraction which is $3\frac{3}{4}$, the starting number of cups of dog food). **Note:** Sample student responses are not representative of all correct answers for an item and are only provided as a guide to assist teachers with scoring.

Item Set 2 – Question 6 (Constructed Response)

An artist is filling jars with sand of different colors and different amounts.

- The artist divides the same amount of blue sand, the same amount of green sand, and the same amount of red sand into each of 20 jars.
- Each jar holds a total of 3.2 ounces of sand.
- The price of the sand is $0.17 per ounce.

Sand Needed

Color	Total Amount of Sand (ounces)
Blue	18
Green	24
Red	?

Part A

- Determine the amount of red sand, in ounces, needed for all 20 jars.
- Write an equation or set of equations that can be used to find r, the amount of red sand, in ounces, the artist needs for all 20 jars.
- Write an equation or set of equations to find p, the price of the red sand needed for all 20 jars.

Enter your answer and your equations in the space provided.

Part B

The artist sells 12 of the 20 jars. The sand from the jars the artist did not sell will be poured into large jars that each hold 10 ounces when full.

- Determine the fewest number of full large jars needed to hold the sand from the jars the artist did not sell.
- Write an equation or set of equations to model n, the total number of ounces of sand in the jars the artist did not sell.
- Write an equation or set of equations to model j, the number of large jars needed to hold the sand from the jars the artist did not sell.

Enter your answer and your equations in the space provided.

Item Information		
Answer:	See Scoring Rubric and Sample Student Responses	
Colorado Academic Standards (CAS) Evidence Outcome(s):	5.NBT.B.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
Evidence Statement:	6.D.2	Solve multi-step contextual problems with degree of difficulty appropriate to Grade 6, requiring application of knowledge and skills articulated in 5.NBT.B, 5.NF, 5.MD, and 5.G.A.
Subclaim:	D - Modeling and Application	The student solves real-world problems with a degree of difficulty appropriate to the grade/course by applying knowledge and skills articulated in the standards for the current grade/course (or for more complex problems, knowledge and skills articulated in the standards for previous grades/courses), engaging particularly in the Modeling practice, and where helpful making sense of problems and persevering to solve them (MP. 1), reasoning abstractly and quantitatively (MP. 2), using appropriate tools strategically (MP.5), looking for and making use of structure (MP.7), and/or looking for and expressing regularity in repeated reasoning (MP.8).
P Value:	0.118	

Item Set 2 – Question 7 (Selected Response)

A store sells cherries for $3.70 per pound.

Part A

A person buys x pounds of cherries for $7.56.

Which equation can be used to find the number of pounds of cherries the person buys?

- A. $3.70 + x = 7.56$
- B. $7.56 + x = 3.70$
- C. $3.70x = 7.56$
- D. $7.56x = 3.70$

Part B

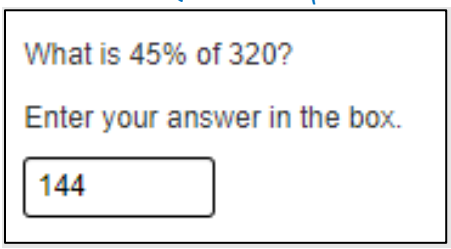
The store changes the price of the cherries. The equation $3.70 + p = 4.66$ represents the relationship between the old and new prices of cherries, where p is the change in the price per pound of cherries.

What is the value of p in this equation?

- A. 0.81
- B. 0.90
- C. 0.96
- D. 1.23

Item Information		
Answer:	Part A = C; Part B = C	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.EE.B.7	Solve real-world and mathematical problems by writing and solving equations of the form x ± p = q and px = q for cases in which p,q and x are all nonnegative rational numbers.
Evidence Statement:	6.EE.7	Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers. i) Problem situations are of "algebraic" type, not "arithmetic" type. ii) 50% of tasks involve whole-number values of p, q, and/or x; 50% of tasks involve fraction or decimal values of p, q, and/or x. Fractions and decimals should not appear together in the same problem. (Cf. 7.EE.3.) iii) These tasks only involve equations with addition and multiplication. iv) A valid equation and the correct answer are both required for full credit.
Subclaim:	A – Major Content	The student solves problems involving the Major Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.684	

Item Set 2 – Question 8 (Fill in the Blank)

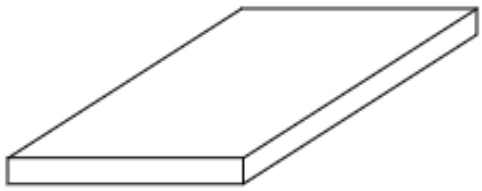


Item Information		
Answer:	See Image	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.RP.A.3.c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
Evidence Statement:	6.RP.3c-1	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity). i) Pool should contain tasks with and without context. ii) Expectations for ratios in this grade are limited to ratios of non-complex fractions. The initial numerator and denominator should be whole numbers.
Subclaim:	A – Major Content	The student solves problems involving the Major Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.228	

Item Set 2 – Question 9 (Selected Response)

Part A

A playground has a sandbox in the shape of a right rectangular prism. The length of the sandbox is $4\frac{1}{2}$ feet, and the width is $5\frac{1}{3}$ feet. The height of the sandbox is $\frac{1}{2}$ foot.



Playground Sandbox

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

- A. $4\frac{11}{12}$
- B. $10\frac{1}{3}$
- C. 12 (selected)
- D. 24

Part B

Another area of the playground has a soft mat for safety. The area of the rectangular mat is $9\frac{1}{3}$ square feet. The mat is $\frac{1}{4}$-foot thick.

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

- A. $2\frac{1}{3}$ (selected)
- B. $9\frac{7}{12}$
- C. $21\frac{7}{9}$
- D. $37\frac{1}{3}$

Item Information		
Answer:	Part A = C; Part B = A	
Colorado Academic Standards (CAS) Evidence Outcome(s):	6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
Evidence Statement:	6.G.2-2	Apply the formulas V = l w h and V = B h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. i) Tasks focus using the formulas in problem-solving contexts.
Subclaim:	B - Supporting Content	The student solves problems involving the Additional and Supporting Content for her grade/course with connections to the Standards for Mathematical Practice.
P Value:	0.29	

Item Set 2 – Question 10 (Constructed Response)

Two students are comparing the decimals 13.310, 13.28, and 13.301.

Student A makes an error. He says that $13.28 > 13.301$ because 8 is greater than 1.

Student B also makes an error. He says that $13.310 < 13.28$ because 13.310 has a 3 in the tenths place and $\frac{2}{10}$ is greater than $\frac{3}{10}$.

- Explain why the reasoning for Student A is incorrect.
- Explain why the reasoning for Student B is incorrect.
- Explain or show how to order the numbers from least to greatest.
- Find the sum of the three decimals rounded to the nearest tenth.

Enter your explanations and your answer in the space provided.

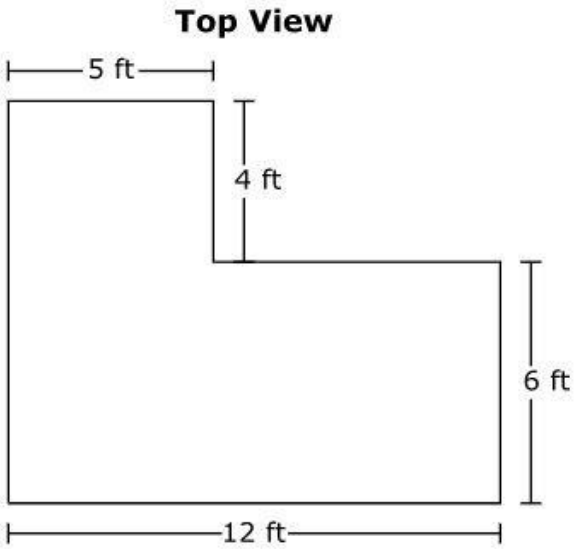
Item Information		
Answer:	See Scoring Rubric and Sample Student Responses	
Colorado Academic Standards (CAS) Evidence Outcome(s):	5.NBT.A.4	Use place value understanding to round decimals to any place.
	5.NBT.A.3.b	Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
Evidence Statement:	6.C.9	Distinguish correct explanation/reasoning from that which is flawed, and –if there is a flaw in the argument – present corrected reasoning. (For example, some flawed ''student'' reasoning is presented, and the task is to correct and improve it.) Content Scope: Knowledge and skills articulated in5.NBT, 5.MD.C. i) Tasks may have scaffolding if necessary, in order to yield a degree of difficulty appropriate to Grade 6.
Subclaim:	C - Expressing Mathematical Reasoning	The student expresses grade/course-level appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning ofothers, and/or attending to precision when making mathematical statements.
Score Point Distribution:	5.5% of students earned 4 points. 9.8% of students earned 3 points. 16.8% of students earned 2 points. 23.2% of students earned 1 point. 44.8% of students earned 0 points.	

Scoring Rubric	
Points	**Attributes**
4	Student response includes each of the following 4 elements. • **Reasoning component**: Valid explanation of the error in Student A's reasoning • **Reasoning component:** Valid explanation of the error in Student B's reasoning • **Reasoning component:** Valid explanation or work for how to order the decimal numbers from least to greatest • **Computation component**: Correct sum of the three decimals rounded to the nearest tenth, 39.9
3	Student response includes 3 of the 4 elements.
2	Student response includes 2 of the 4 elements.
1	Student response includes 1 of the 4 elements.
0	Student response is incorrect or irrelevant.
Sample Student Response:	Student A is incorrect because, while 8 is greater than 1, 8 and 1 are not in the same decimal place. He should have looked at the tenths place when comparing them. 3 and 2 are both in the tenths place and can be compared correctly. 13.28 is less than 13.301 because the 3 in the tenths place is greater than the 2 in the tenths place. Student B is incorrect because $\frac{3}{10}$ is greater than $\frac{2}{10}$, making 13.28 less than 13.310. 13.310 is greater than 13.301 and 13.28, 13.301 is less than 13.310 but greater than 13.28, and 13.28 is less than both 13.310 and 13.301. The pattern least to greatest would go as follows: 13.28, 13.301, 13.310. The sum of the three decimals rounded to the nearest tenth is the same as 13.3 x 3, which is 39.9.

Item Set 2 – Question 11 (Constructed Response)

Part A

An L-shaped pool is made of two right rectangular prisms. The figure shows a top view of this pool. The pool height is the same for the entire pool.



The pool is filled with water to a height of 4 feet.

- Create an equation or set of equations that can be used to find the volume, in cubic feet, of the pool.
- Explain how you created the equation or set of equations.
- Find the volume, in cubic feet, of the pool.

Enter your equation or set of equations, your explanation, and your answer in the space provided.

Part B

A different pool is in the shape of a right rectangular prism and has a volume of 192 cubic feet. The area of the base of the pool is 32 square feet.

- Create an equation to find the height, in feet, of the water in the pool.
- Find the height, in feet, of the water in the pool. Show your work.

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

Equation: $192 \div 32 = height$

Height of water: 6 feet

Your Work: $192 \div 32 = 6\,\text{ft}$

Item Information		
Answer:	See Scoring Rubric and Sample Student Responses	
Colorado Academic Standards (CAS) Evidence Outcome(s):	5.MD.C.5.b	Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.
	5.MD.C.5.c	Use the additive nature of volume to find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.
Evidence Statement:	6.D.2	Solve multi-step contextual problems with degree of difficulty appropriate to Grade 6, requiring application of knowledge and skills articulated in 5.NBT.B, 5.NF, 5.MD, and 5.G.A. i) Tasks may have scaffolding if necessary in order to yield a degree of difficulty appropriate to Grade 6.
Subclaim:	D - Modelingand Application	The student solves real-world problems with a degree of difficulty appropriate to the grade/course by applying knowledge and skills articulated in the standards for the current grade/course (or for more complex problems, knowledge and skills articulated in the standards for previous grades/courses), engaging particularly in the Modeling practice, and where helpful making sense of problems and persevering to solve them (MP. 1) ,reasoning abstractly and quantitatively (MP. 2), using appropriate tools strategically (MP.5), looking for and making use of structure (MP.7), and/or looking for and expressing regularity in repeated reasoning (MP.8).
Score Point Distribution:	7.0% of students earned 6 points. 6.5% of students earned 5 points. 4.0% of students earned 4 points. 23.4% of students earned 3 points. 6.1% of students earned 2 points. 6.2% of students earned 1 point. 46.7% of students earned 0 points.	

<table>
<tr><th colspan="2">Scoring Rubric – Part A</th></tr>
<tr><th>Points</th><th>Attributes</th></tr>
<tr><td>3</td><td>Student response includes each of the following 3 elements.
Modeling component: Valid equations or expressions to find the volume, in cubic feet, of the pool.
Modeling component: Valid explanation for how to create the equations or expressions to find the volume of the pool.
Computation component: Correct volume, in cubic feet, of the pool, 368.</td></tr>
<tr><td>2</td><td>Student response includes 2 of the 3 elements.</td></tr>
<tr><td>1</td><td>Student response includes 1 of the 3 elements.</td></tr>
<tr><td>0</td><td>Student response is incorrect or irrelevant.</td></tr>
<tr><td>Sample Student Response:</td><td>(4 x 5 + 6 x 12)4 = volume. I made this equation by cutting the shape into 2 shapes. A 5 by 4 rectangle and a 6 by 12 rectangle. If you add those together, you get the area, and I know area times height equals volume so in my equation made it so you multiply the area times the height for volume.
4 x 5 = 20
6 x 12 = 72
20 + 72 = 92
92 x 4 = 368
volume = 368
The volume of the pool is 368 feet cubed.</td></tr>
<tr><td>Annotation for Sample Student Response:</td><td>Score Point 3
The response receives full credit. It includes each of the 3 required elements.
Modeling Component:
Student Response: (4 x 5 + 6 x 12)4 = volume.
Rationale for Score: The student provides a valid equation to find the volume of the pool [(4 x 5 + 6 x 12)4 = volume]. Expressions are provided for each rectangle that multiply the length times the width to find the area (4 x 5 + 6 x 12), added together, and then multiplied by the height (4) to find the volume of the pool.
Modeling Component:
Student Response: I made this equation by cutting the shape into 2 shapes. A 5 by 4 rectangle and a 6 by 12 rectangle. If you add those together, you get the area, and I know area times height equals volume so in my equation made it so you multiply the area times the height for volume.
Rationale for score: The student provides a detailed explanation of how the equation is created to find the volume of the pool (cutting the shape into 2 shapes. A 5 by 4 rectangle and a 6 by 12 rectangle . . . add those together, you get the area . . . area times height equals volume so in my equation made it so you multiply the area times the height for volume).
Computation Component:
Student Response: The volume of the pool is 368 feet cubed.
Rationale for score: The correct volume of the pool, in cubic feet, is provided (368).
Note: Sample student responses are not representative of all correct answers for an item and are only provided as a guide to assist teachers with scoring.</td></tr>
</table>

Scoring Rubric – Part B	
Points	**Attributes**
3	Student response includes each of the following 3 elements. • **Modeling component**: Valid equation to find the height, in feet, of the water in the pool. • **Computation component:** Correct height, in feet, of the water in the pool, 6 • **Modeling component**: Valid work to find the height of water in the pool.
2	Student response includes 2 of the 3 elements.
1	Student response includes 1 of the 3 elements.
0	Student response is incorrect or irrelevant.
Sample Student Response:	**Equation:** 192 ÷ 32 = height **Height of water:** 6 feet **Your Work:** 192 ÷ 32 = 6 ft
Annotation for Sample Student Response:	**Score Point 3** The response receives full credit. It includes each of the 3 required elements. **Modeling Component:** • **Student Response: Equation:** 192 ÷ 32 = height o **Rationale for Score:** The student provides a valid equation to find the height of the water in the pool (192 ÷ 32 = height). **Computation Component:** • **Student Response:** Height of water: 6 feet o **Rationale for score:** The correct height, in feet, of the water in the pool is provided (6). **Modeling Component:** • **Student Response: Your Work:** 192 ÷ 32 = 6 ft o **Rationale for score:** The student provides valid work to find the height of the water in the pool (192 ÷ 32 = 6 ft). **Note:** Sample student responses are not representative of all correct answers for an item and are only provided as a guide to assist teachers with scoring.