

Interim Assessment 1

Mathematics

Grade 7

student: _____

teacher: _____

school: _____

DIRECTIONS

In this assessment you will answer a total of 21 questions, including 4 constructed-response question(s). Mark all of your answers to the questions on the answer sheet provided.

You may use this test booklet to work out the questions, but remember to mark all of your answers on the answer sheet. For constructed-response questions, record your answers directly on the page in the test booklet.

Calculator Section

You may use a calculator to solve the questions in this section.



1. Which table does **not** represent a proportional relationship?

A.

x	y
3	2
6	4
9	6
12	8
15	10

B.

x	y
3	6
6	12
9	18
12	24
15	30

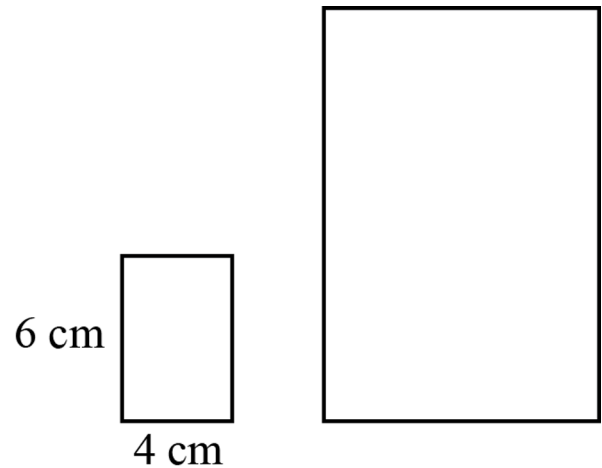
C.

x	y
2	4
5	7
8	10
11	13
14	16

D.

x	y
5	1
10	2
15	3
20	4
25	5

2. The large rectangle below was created from the small rectangle using a scale factor of 2.5.



What is the area of the large rectangle, in square centimeters?

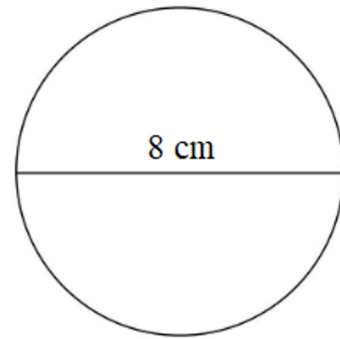
- A. 26.5
- B. 55.25
- C. 60
- D. 150

3. A person bikes $2\frac{1}{2}$ miles at a constant rate in $\frac{1}{8}$ of an hour.

What distance, in miles, does the person bike in an hour?

- A. $\frac{1}{20}$
B. $\frac{5}{16}$
C. 16
D. 20

4. A circle has a diameter of 8 centimeters, as shown below.



What is the area, in square centimeters, of the circle?

- A. 4π
B. 8π
C. 16π
D. 64π

5. Nathan is using his grandmother's recipe to make pies.

On Monday, he used $15\frac{3}{4}$ cups of sugar to make 9 pies.

On Tuesday, he used $22\frac{3}{4}$ cups of sugar to make 13 pies.

Which of the following statements must be true?

Select **all** that apply.

- A. He used 1 cup of sugar for every $1\frac{3}{4}$ pies he made.
- B. He would use 14 cups of sugar to make 8 pies.
- C. The number of cups of sugar is proportional to the number of pies he made because he used the same number of cups of sugar for each pie he made.
- D. The number of cups of sugar is not proportional to the number of pies he made because the increase in the number of cups of sugar between Monday and Tuesday is greater than the increase in the number of pies.
- E. If Nathan uses $8\frac{3}{4}$ cups of sugar to make 5 pies on Wednesday and then graphs the points, for all three days, to represent the relationship between the cups of sugar used and the number of pies made, the points would not fall on a straight line.

6. A student graphs a line that passes through the point $(3, 15)$ and the origin.

Which points could also be on the graph of the line?

Select **all** that apply.

- A. $(1, 3)$
 - B. $(2, 10)$
 - C. $(2, 14)$
 - D. $(6, 30)$
 - E. $(7, 21)$
 - F. $(9, 45)$
 - G. $(8, 20)$
7. Anna made a scale drawing, in inches, of a building using a scale of 1:600. Her scale drawing was 6 inches long. Greg made a scale drawing of the same building using a scale of 1:300.

How long, in inches, was Greg's scale drawing?

- A. 2
- B. 3
- C. 12
- D. 50

8. The table below shows the total number of hours Jessica, Emily, and Trina each studied after a given number of weeks.

Weeks	Jessica's Total Hours Studied	Emily's Total Hours Studied	Trina's Total Hours Studied
2	5	5	5
4	10	10	10
8	20	15	20
10	40	20	25

Part A

One of the relationships between weeks and total hours studied is proportional.

- Whose number of total hours studied is proportional to the number of weeks studied?
- For the proportional relationship, write an equation to represent y , the total number of hours studied, in terms of x , the number of weeks.
- Explain how you determined your equation.

Respond in the space provided.

Part B

If the proportional relationship continues, what is the total number of hours this person will have studied after 14 weeks? Write your answer as an ordered pair.

Respond in the space provided.

9. Johan is mixing paint. He mixes $2\frac{2}{3}$ pints of blue paint and $4\frac{1}{6}$ pints of yellow paint.

Which of the following has a ratio of blue paint to yellow paint that is proportional to the amounts used in Johan's paint mixture?

- A. $\frac{2}{3}$ pints of blue paint and $2\frac{1}{6}$ pints of yellow paint
- B. $1\frac{1}{3}$ pints of blue paint and $2\frac{1}{12}$ pints of yellow paint
- C. $8\frac{1}{3}$ pints of blue paint and $5\frac{1}{3}$ pints of yellow paint
- D. $8\frac{2}{3}$ pints of blue paint and $16\frac{1}{6}$ pints of yellow paint

10. Mora is using a map to find the distance between her house and her cousin's house. She knows that 2 centimeters on the map represent 300 miles. On the map, the distance between her house and her cousin's house is 20 centimeters.

What is the distance, in miles, between Mora's house and her cousin's house?

- A. 150
- B. 320
- C. 3,000
- D. 6,000

11. Katherine uses $\frac{7}{10}$ of a gallon of red paint to paint $\frac{3}{5}$ of her wall.

How many gallons of red paint will she use to paint her whole wall?

- A. $\frac{21}{50}$
- B. $\frac{7}{15}$
- C. $1\frac{1}{6}$
- D. $1\frac{3}{10}$

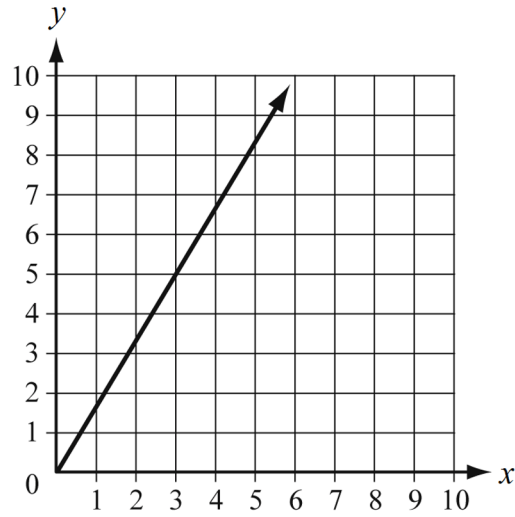
12. A circular piece of wood has a circumference of exactly 60.5 inches.

Which measurement is closest to the **radius**, in inches, of the piece of wood?

Use 3.14 as an approximation of π .

- A. 4.4
- B. 9.6
- C. 19.3
- D. 95.0

13. Use the graph to answer the prompts below.



Part A

Determine whether the graph above represents a proportional relationship. Give two pieces of evidence that support your answer.

Respond in the space provided.

Part B

When extended, does the ray pass through the point $(18, 30)$? Justify your answer.

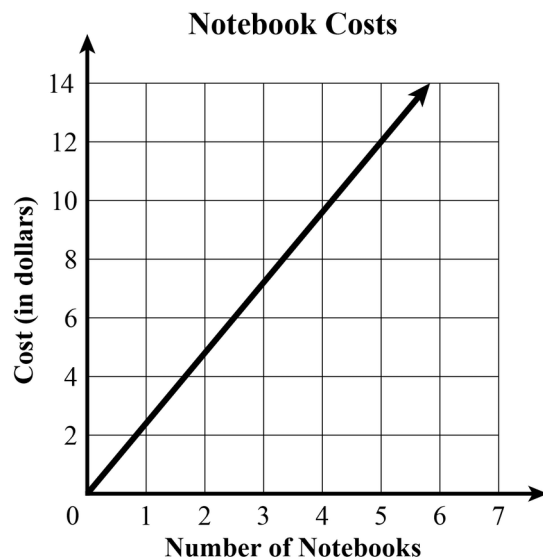
Respond in the space provided.

Non-Calculator Section

You may **not** use a calculator to solve the questions in this section.



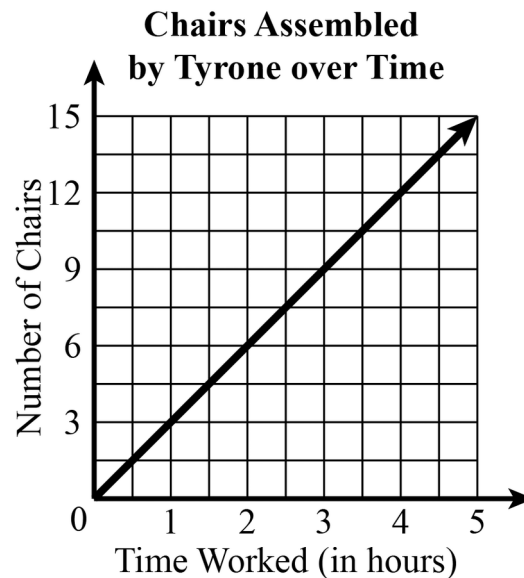
14. The graph below shows the cost, in dollars, per notebook at the school store.



Which equation represents the total cost, t , per n notebooks?

- A. $n = 2t$
- B. $n = 2.4t$
- C. $t = 2.4n$
- D. $t = 0.42n$

15. Tyrone works at a furniture store and assembles chairs at a constant rate. The number of chairs that Tyrone assembles is proportional to the amount of time he works, as shown in the graph below.



Based on the graph, which statements are true?

Select **all** that apply.

- A. The point $(0, 0)$ shows Tyrone assembles 0 chairs when he works for 0 hours.
- B. The point $(0.5, 1.5)$ shows Tyrone assembles 0.5 chairs when he works for 1.5 hours.
- C. The point $(1, 3)$ shows Tyrone assembles 3 chairs when he works for 1 hour.
- D. The point $(3, 9)$ shows that, when Tyrone works for 9 hours, he assembles 3 chairs.
- E. The point $(3.5, 10.5)$ shows that, when Tyrone works for 3.5 hours, he assembles 10.5 chairs.

16. In the table below, the number of pounds of blueberries is proportional to the number of pounds of strawberries.

Pounds of Strawberries	Pounds of Blueberries
$7\frac{1}{3}$	$5\frac{1}{2}$
$10\frac{4}{5}$	$8\frac{1}{10}$
$12\frac{1}{2}$	$9\frac{3}{8}$
15	$11\frac{1}{4}$

What is the number of pounds of blueberries per pound of strawberries?

- A. $\frac{3}{4}$
- B. $\frac{5}{7}$
- C. $1\frac{1}{3}$
- D. $1\frac{5}{6}$

17. Part A

On Monday, Becca ran $3\frac{3}{4}$ miles in $\frac{1}{2}$ of an hour, and Alice ran $5\frac{1}{4}$ miles in $\frac{3}{4}$ of an hour.

Who ran faster, and by how many miles per hour? Justify your answer.

Respond in the space provided.

Part B

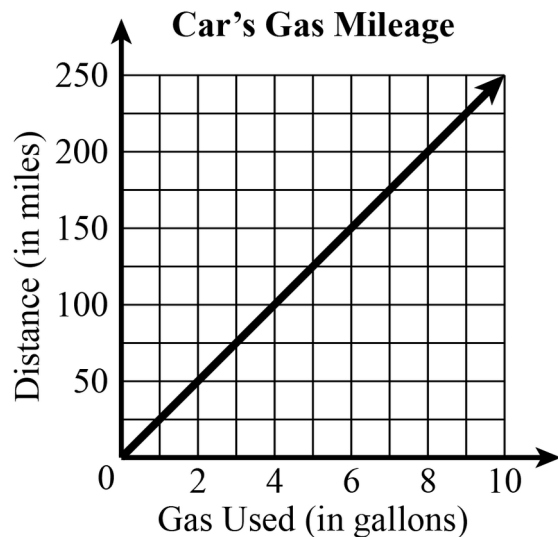
Write an equation that represents the number of miles, m , Becca ran in h hours on Monday.

Write an equation that represents the number of miles, m , Alice ran in h hours on Monday.

Explain how you determined your equations.

Respond in the space provided.

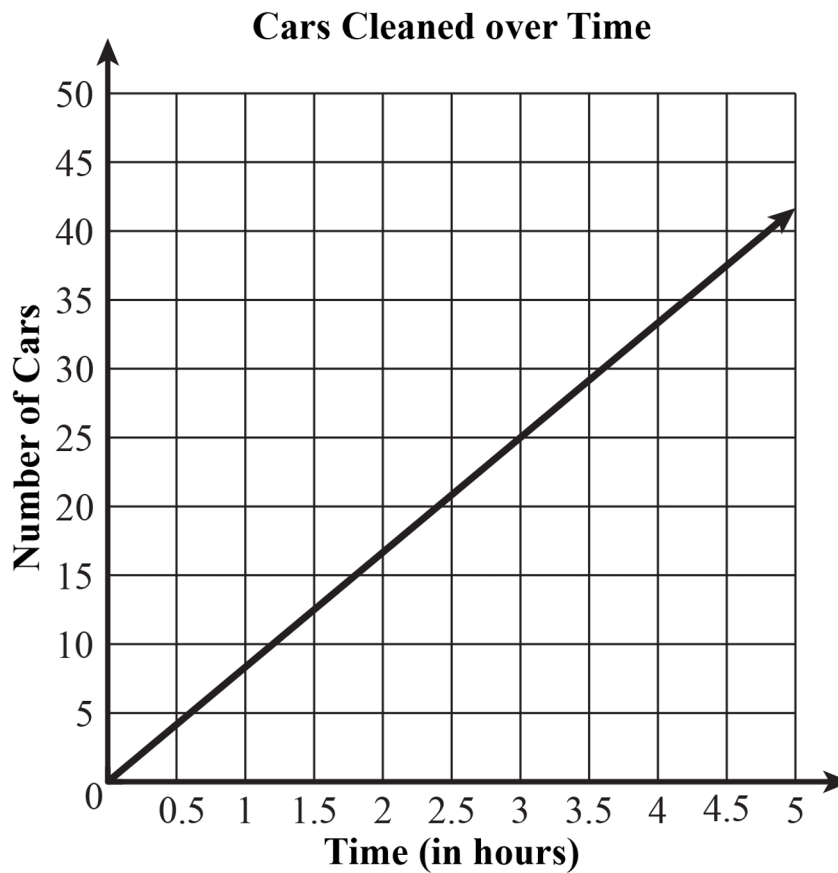
18. The graph below shows the relationship between the distance traveled by a car and the gas used by the car.



Which statement correctly represents the point $(7, 175)$?

- A. The car travels 7 miles per gallon of gas used.
- B. The car travels 175 miles per gallon of gas used.
- C. The car travels 7 miles for every 175 gallons of gas used.
- D. The car travels 175 miles for every 7 gallons of gas used.

19. The graph below represents the number of cars that can be cleaned over time at Sparkle Car Wash.



How many cars can Sparkle Car Wash clean per hour, rounded to the **nearest tenth**?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

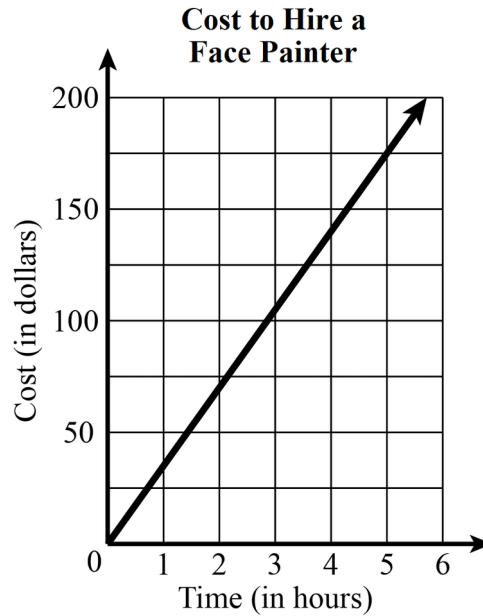
20. Kenwyn is making flower arrangements for an event. The table shows the number of flower arrangements, f , she can make in m minutes.

Time, in minutes (m)	Number of flower arrangements (f)
32	4
48	6
64	8
80	10

Which equation represents the relationship between the number of flower arrangements she can make and the time, in minutes, it takes her to make the flower arrangements?

- A. $f = 0.125m$
- B. $f = 2m$
- C. $f = 8m$
- D. $f = m + 16$

21. The graph below shows the relationship between the time in hours, x , and the cost in dollars, y , to hire a face painter.



What is the value of y in the point $(1, y)$? Explain what this coordinate point represents in the context of the situation.

Respond in the space provided.

Assessment Analysis Guide
Interim Assessment 1
Mathematics
Grade 7

1

Item Id: i138981**Item Type: Selected Response**

Standards Description:

7.RP.A.2.a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

Primary Standard: cc:7.RP.A.2.a

Points Possible: 1

Which table does **not** represent a proportional relationship?

A. Student chose a proportional relationship (3:2).

x	y
3	2
6	4
9	6
12	8
15	10

B. Student chose a proportional relationship (1:2).

x	y
3	6
6	12
9	18
12	24
15	30

C.

Correct.

x	y
2	4
5	7
8	10
11	13
14	16

D.

Student chose a proportional relationship (5:1).

x	y
5	1
10	2
15	3
20	4
25	5

2

Item Id: i113217**Item Type: Selected Response**

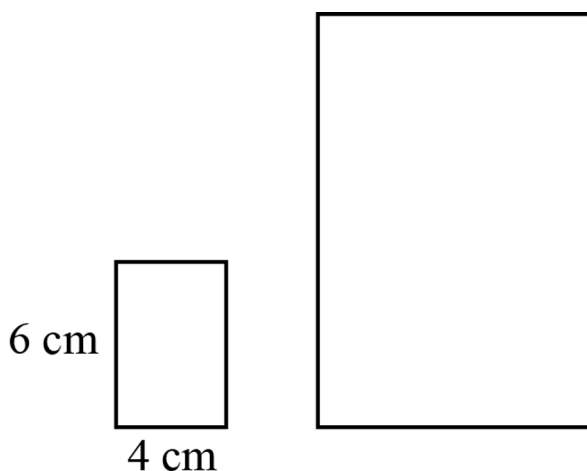
Standards Description:

7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Primary Standard: cc:7.G.A.1

Points Possible: 1

The large rectangle below was created from the small rectangle using a scale factor of 2.5.



What is the area of the large rectangle, in square centimeters?

A. 26.5

Student added 2.5 to the area of the small rectangle.

B. 55.25

Student added 2.5 to each dimension before multiplying the dimensions to find the area; did not recognize to multiply each dimension by 2.5.

C. 60

Student multiplied the area of the small rectangle by 2.5; did not recognize to multiply by 2.5 twice to equate to multiplying each dimension by 2.5.

D. 150

Correct.

3

Item Id: i138125**Item Type: Selected Response**

Standards Description:

7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

Primary Standard: cc:7.RP.A.1

Points Possible: 1

A person bikes $2\frac{1}{2}$ miles at a constant rate in $\frac{1}{8}$ of an hour.

What distance, in miles, does the person bike in an hour?

- A. $\frac{1}{20}$ Student divided $\frac{1}{8}$ by $2\frac{1}{2}$.
- B. $\frac{5}{16}$ Student multiplied $2\frac{1}{2}$ by $\frac{1}{8}$ instead of dividing.
- C. 16 Student divided 2 by $\frac{1}{8}$, ignoring the $\frac{1}{2}$ in $2\frac{1}{2}$.
- D. 20 Correct.

4

Item Id: i138872**Item Type: Selected Response**

Standards Description:

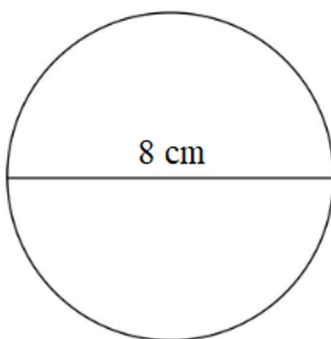
7.G.B.4

Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Primary Standard: cc:7.G.B.4

Points Possible: 1

A circle has a diameter of 8 centimeters, as shown below.



What is the area, in square centimeters, of the circle?

A. 4π Student calculated $\pi \times r$ instead of $\pi \times r^2$.B. 8π Student confused the circumference with the area, OR student squared 4 as 4×2 instead of 4×4 .C. 16π

Correct.

D. 64π

Student confused the radius with the diameter.

Item Id: i116490**Item Type: Multiple Select**

Standards Description:

7.RP.A.2 Recognize and represent proportional relationships between quantities.

Primary Standard: cc:7.RP.A.2

Points Possible: 1

Nathan is using his grandmother's recipe to make pies.

On Monday, he used $15\frac{3}{4}$ cups of sugar to make 9 pies.On Tuesday, he used $22\frac{3}{4}$ cups of sugar to make 13 pies.

Which of the following statements must be true?

Select **all** that apply.A. He used 1 cup of sugar for every $1\frac{3}{4}$ pies he made.Student found the constant of proportionality, but reversed the quantities; did not recognize that he uses $1\frac{3}{4}$ cups of sugar per pie.**B. He would use 14 cups of sugar to make 8 pies.**

Correct.

C. The number of cups of sugar is proportional to the number of pies he made because he used the same number of cups of sugar for each pie he made.

Correct.

D. The number of cups of sugar is not proportional to the number of pies he made because the increase in the number of cups of sugar between Monday and Tuesday is greater than the increase in the number of pies.

Student did not recognize that the quantities are in a proportional relationship.

E. If Nathan uses $8\frac{3}{4}$ cups of sugar to make 5 pies on Wednesday and then graphs the points, for all three days, to represent the relationship between the cups of sugar used and the number of pies made, the points would not fall on a straight line.

Student did not recognize that the quantities are in a proportional relationship, and therefore the points would fall on a straight line; did not understand that no matter how many points are added, the line will be straight because the quantities are proportional.

6

Item Id: i138946**Item Type: Multiple Select**

Standards Description:

7.RP.A.2.a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

Primary Standard: cc:7.RP.A.2.a

Points Possible: 1

A student graphs a line that passes through the point (3, 15) and the origin.

Which points could also be on the graph of the line?

Select **all** that apply.

- | | |
|------------|--|
| A. (1, 3) | Student miscalculated the constant of proportionality as 3 instead of 5. |
| B. (2, 10) | Correct. |
| C. (2, 14) | Student thought that subtracting the same value (1) from the x- and y-coordinates would result in a point with the same proportional relationship. |
| D. (6, 30) | Correct. |
| E. (7, 21) | Student miscalculated the constant of proportionality as 3 instead of 5 and identified a point proportional to (1, 3). |
| F. (9, 45) | Correct. |

G. (8, 20)

Student thought that adding the same value (5) to the x- and y-coordinates would result in a point with the same proportional relationship, OR student chose a point which has the same difference between the x- and y-coordinates as (3, 15).

Item Id: i113099**Item Type: Selected Response**

Standards Description:

7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Primary Standard: cc:7.G.A.1

Points Possible: 1

Anna made a scale drawing, in inches, of a building using a scale of 1:600. Her scale drawing was 6 inches long. Greg made a scale drawing of the same building using a scale of 1:300.

How long, in inches, was Greg's scale drawing?

- A. 2 Student divided 600 by 300.
- B. 3 Student did not find the actual length of the building using Anna's scale and calculated the length with $600/6 = 300/x$, OR student reasoned that since 300 was half of 600, Greg's length would be half of 6.
- C. 12 Correct.
- D. 50 Student divided 300 by 6; possibly confused replicating the scale drawing with a new scale with finding the scale factor.

8

Item Id: i130836**Item Type: Constructed Response**

Standards Description:

7.RP.A.2 Recognize and represent proportional relationships between quantities.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

In this item, students need to make sense of quantities and their relationships in the context of the situation. In Part A, students represent the situation with an equation using given variables, and in Part B, students need to contextualize the mathematics to find an unknown value.

MP4 Model with mathematics.

In this item, students need to write an equation to represent a real-world problem. In Part B, students can use this equation to solve for a missing value in the context of the situation.

8A

Primary Standard: cc:7.RP.A.2

Points Possible: 3

The table below shows the total number of hours Jessica, Emily, and Trina each studied after a given number of weeks.

Weeks	Jessica's Total Hours Studied	Emily's Total Hours Studied	Trina's Total Hours Studied
2	5	5	5
4	10	10	10
8	20	15	20
10	40	20	25

Part A

One of the relationships between weeks and total hours studied is proportional.

- Whose number of total hours studied is proportional to the number of weeks studied?
- For the proportional relationship, write an equation to represent y , the total number of hours studied, in terms of x , the number of weeks.
- Explain how you determined your equation.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

There is a proportional relationship between weeks and Trina's total hours studied.

$$2.5x = y$$

Each number in the Weeks column can be multiplied by 2.5 to get the number of hours Trina studied after that many weeks. This means $2.5x$ will give you y .

Evidence Statement(s):

1. Student identified the proportional relationship of weeks to total hours studied by testing equivalent ratios, or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
2. Student represented the proportional relationship with an equation relating weeks, x , and total hours studied, y .
3. Student explained how they found the constant of proportionality and used it to represent the proportional relationship in the equation.

Common Misconception(s):

- Student may have confused linear with proportional and chose Emily's total hours as proportional to weeks because they increase by 5, possibly creating the equation $y = 5x$.
- Student may have thought a geometric pattern in Jessica's total hours represented a proportional relationship, possibly creating the equation $y = 2x$; may not recognize all proportional relationships create a straight line.
- Student may not have recognized a proportional relationship needs to go through $(0, 0)$.
- Student may have reversed the x - and y -variables.
- Student may have used the pattern in the total hours studied as the constant of proportionality (possibly representing Emily's relationship as $y = 5x$), not recognizing that the weeks do not increase by 1 and therefore the change in the total hours is not the constant of proportionality.

8B

Primary Standard: cc:7.RP.A.2

Points Possible: 1

Part B

If the proportional relationship continues, what is the total number of hours this person will have studied after 14 weeks? Write your answer as an ordered pair.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

$$2.5x = y$$

$$2.5(14) = 35$$

(14, 35)

Trina will have studied 35 hours after 14 weeks.

Evidence Statement(s):

1. Student used the proportional relationship (identified in Part A) to determine the number of hours Trina will have studied after 14 weeks; may have used equivalent ratios or used an equation.
2. Student represented the ratio as an ordered pair in which the x -value represented the weeks and the y -value represented the hours studied.

Common Misconception(s):

- Student may have reversed the variables when solving and divided the number of weeks by 2.5 to get $5\frac{3}{5}$ hours.
- Student may have reversed the coordinates when writing an ordered pair.
- Student may have used the pattern in the “Trina’s Total Hours Studied” column of the table (add 5, multiply by 2); multiplied 25, the last value in Trina’s column, by 2 and wrote (14, 50).

Item Id: i138953**Item Type: Selected Response**

Standards Description:

7.RP.A.2.a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

Primary Standard: cc:7.RP.A.2.a

Points Possible: 1

Johan is mixing paint. He mixes $2\frac{2}{3}$ pints of blue paint and $4\frac{1}{6}$ pints of yellow paint.

Which of the following has a ratio of blue paint to yellow paint that is proportional to the amounts used in Johan's paint mixture?

- A. $\frac{2}{3}$ pints of blue paint and $2\frac{1}{6}$ pints of yellow paint Student subtracted 2 from the amount of both paint colors; thought that subtracting the same number from both values would create a ratio with a proportional relationship.
- B. $1\frac{1}{3}$ pints of blue paint and $2\frac{1}{12}$ pints of yellow paint** Correct.
- C. $8\frac{1}{3}$ pints of blue paint and $5\frac{1}{3}$ pints of yellow paint Student multiplied each quantity by 2 to find proportional amounts of blue and yellow paint, but switched the respective values (in setting up the proportion or after finding the proportional amounts).
- D. $8\frac{2}{3}$ pints of blue paint and $16\frac{1}{6}$ pints of yellow paint Student chose amounts of paint where only the whole numbers are proportional to the amounts used in Johan's mixture; did not take into account that the fractional amounts should also be multiplied by 4.

10

Item Id: i112404**Item Type: Selected Response**

Standards Description:

7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Primary Standard: cc:7.G.A.1

Points Possible: 1

Mora is using a map to find the distance between her house and her cousin's house. She knows that 2 centimeters on the map represent 300 miles. On the map, the distance between her house and her cousin's house is 20 centimeters.

What is the distance, in miles, between Mora's house and her cousin's house?

- | | |
|-----------------|---|
| A. 150 | Student found the scale of 150 miles to 1 centimeter, but did not multiply 150 by 20. |
| B. 320 | Student added 300 miles and 20 centimeters. |
| C. 3,000 | Correct. |
| D. 6,000 | Student multiplied 300 miles by 20 centimeters; did not find the miles per centimeter (150) before multiplying by 20 centimeters. |

Item Id: i138129**Item Type: Selected Response**

Standards Description:

7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

Primary Standard: cc:7.RP.A.1

Points Possible: 1

Katherine uses $\frac{7}{10}$ of a gallon of red paint to paint $\frac{3}{5}$ of her wall.

How many gallons of red paint will she use to paint her whole wall?

- A. $\frac{21}{50}$ Student multiplied the fractions instead of dividing; student possibly set up the proportion incorrectly.
- B. $\frac{7}{15}$ Student found the gallons of red paint used to paint the remaining $\frac{2}{5}$ of the wall.
- C. $1\frac{1}{6}$ Correct.
- D. $1\frac{3}{10}$ Student added the fractions instead of dividing; student possibly confused "whole" with "total" and used addition.

12

Item Id: i138873**Item Type: Selected Response**

Standards Description:

7.G.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Primary Standard: cc:7.G.B.4

Points Possible: 1

A circular piece of wood has a circumference of exactly 60.5 inches.

Which measurement is closest to the **radius**, in inches, of the piece of wood?

Use 3.14 as an approximation of π .

- A. 4.4 Student calculated the radius as though 60.5 were the area instead of the circumference.
- B. 9.6** Correct.
- C. 19.3 Student forgot to divide by 2, calculating the diameter instead of the radius.
- D. 95.0 Student multiplied by pi instead of dividing by pi (60.5×3.14)/2.

13

Item Id: i110209**Item Type: Constructed Response**

Standards Description:

7.RP.A.2.a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

Standard(s) for Mathematical Practice:

MP3 Construct viable arguments and critique the reasoning of others.

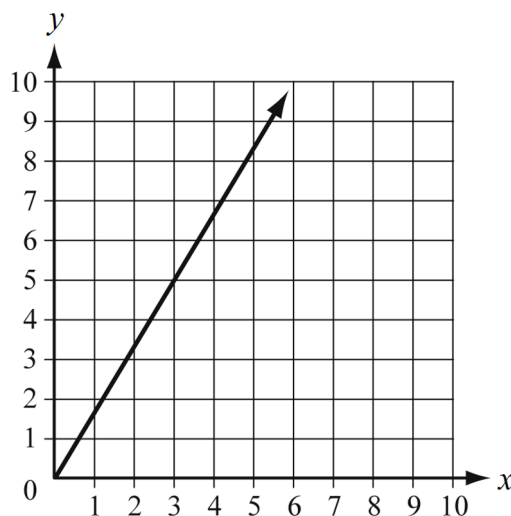
In this item, students need to support their conclusion with evidence from the graph.

13A

Primary Standard: cc:7.RP.A.2.a

Points Possible: 1

Use the graph to answer the prompts below.

**Part A**

Determine whether the graph above represents a proportional relationship. Give two pieces of evidence that support your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

This graph represents a proportional relationship because it is a straight line and it goes through the origin.

Evidence Statement(s):

1. Student determined that the graph represents a proportional relationship.
2. Student stated a characteristic of a proportional relationship is all the points fall in a straight line; student may or may not have provided points on the graph (3, 5) and (6, 10) that are proportional.
3. Student stated a characteristic of a proportional relationship is the inclusion of (0, 0).

Common Misconception(s):

- Student thought the line does not represent a proportional relationship; may have thought the line needed to go through more distinct points on the graph (for example (1, 2)) to be able to test for a constant of proportionality.
- Student thought the line does not represent a proportional relationship; possibly tried to identify the constant of proportionality to test points on the graph, but was unable to with the given point (3, 5); may not have understood how to find the unit rate when y is not a multiple of x.

13B

Primary Standard: cc:7.RP.A.2.a

Points Possible: 1

Part B

When extended, does the ray pass through the point (18, 30)? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Yes, the ray passes through the point (18, 30) because it is proportional to the point (3, 5), which is also on the ray.

$$\frac{3}{5} = \frac{18}{30}$$

Evidence Statement(s):

1. Student used proportional reasoning, made equivalent ratios, or found the constant of proportionality to determine that the ray goes through the point (18, 30).

Common Misconception(s):

- Student tried to use the constant of proportionality but used the inverse (0.6) instead of $\frac{5}{3}$.
- Student may have reversed the coordinates and thought the ray would go through (30, 18) instead of (18, 30).
- Student did not understand how to use a point on the graph to determine if a point off the graph was proportional; may not understand how a point not represented on the graph is related to points on the graph.

14

Item Id: i139099

Item Type: Selected Response

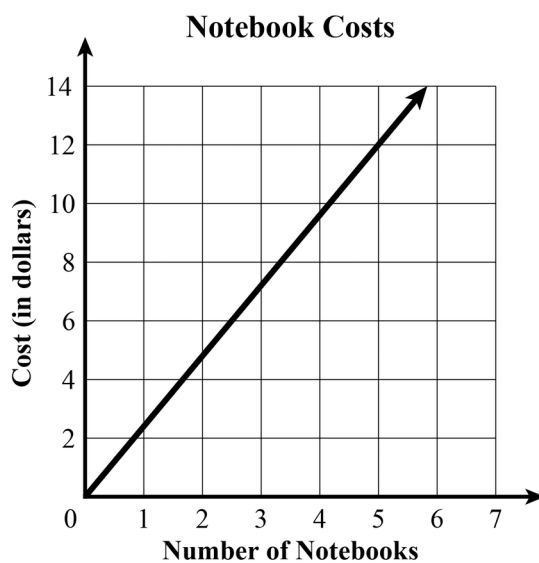
Standards Description:

7.RP.A.2.c Represent proportional relationships by equations.

Primary Standard: cc:7.RP.A.2.c

Points Possible: 1

The graph below shows the cost, in dollars, per notebook at the school store.



Which equation represents the total cost, t , per n notebooks?

A. $n = 2t$

Student represented the intervals on the y-axis as the constant of proportionality and switched the variables.

B. $n = 2.4t$

Student switched the variables.

C. $t = 2.4n$

Correct.

D. $t = 0.42n$

Student correctly used a point on the graph, but represented the inverse unit rate, OR reversed the variables, and rounded to the nearest hundredth.

15

Item Id: i138288

Item Type: Multiple Select

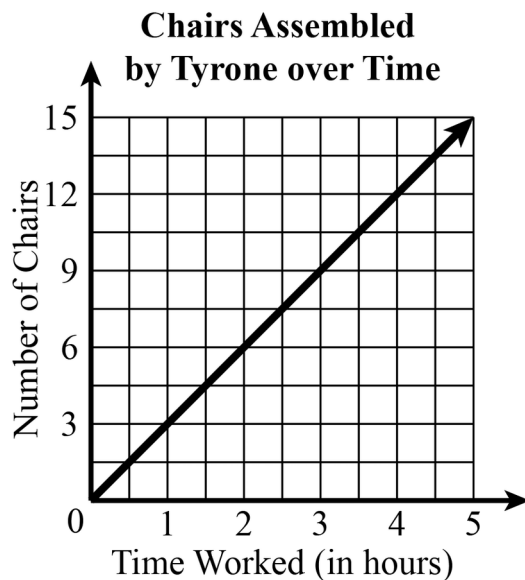
Standards Description:

7.RP.A.2.d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.

Primary Standard: cc:7.RP.A.2.d

Points Possible: 2

Tyrone works at a furniture store and assembles chairs at a constant rate. The number of chairs that Tyrone assembles is proportional to the amount of time he works, as shown in the graph below.



Based on the graph, which statements are true?

Select **all** that apply.

A. The point $(0, 0)$ shows Tyrone assembles 0 chairs when he works for 0 hours. Correct.

B. The point $(0.5, 1.5)$ shows Tyrone assembles 0.5 chairs when he works for 1.5 hours.

Student misinterpreted the x- and y-values.

C. The point $(1, 3)$ shows Tyrone assembles 3 chairs when he works for 1 hour. Correct.

D. The point $(3, 9)$ shows that, when Tyrone works for 9 hours, he assembles 3 chairs. Student misinterpreted the x- and y-values.

E. The point $(3.5, 10.5)$ shows that, when Tyrone works for 3.5 hours, he assembles 10.5 chairs. Correct.

16

Item Id: i137889**Item Type: Selected Response**

Standards Description:

7.RP.A.2.b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Primary Standard: cc:7.RP.A.2.b

Points Possible: 1

In the table below, the number of pounds of blueberries is proportional to the number of pounds of strawberries.

Pounds of Strawberries	Pounds of Blueberries
$7\frac{1}{3}$	$5\frac{1}{2}$
$10\frac{4}{5}$	$8\frac{1}{10}$
$12\frac{1}{2}$	$9\frac{3}{8}$
15	$11\frac{1}{4}$

What is the number of pounds of blueberries per pound of strawberries?

- A. $\frac{3}{4}$ Correct.
- B. $\frac{5}{7}$ Student found the unit rate of pounds of blueberries per pound of strawberries in the first row using whole numbers only; may have thought only whole pounds should be used to calculate a unit rate.
- C. $1\frac{1}{3}$ Student found the unit rate of pounds of strawberries per pound of blueberries.
- D. $1\frac{5}{6}$ Student found the difference between pounds of strawberries and pounds of blueberries in the first row.

17

Item Id: i112950**Item Type: Constructed Response**

Standards Description:

7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

7.RP.A.2.c Represent proportional relationships by equations.

17A

Primary Standard: cc:7.RP.A.1

Points Possible: 2

Part A

On Monday, Becca ran $3\frac{3}{4}$ miles in $\frac{1}{2}$ of an hour, and Alice ran $5\frac{1}{4}$ miles in $\frac{3}{4}$ of an hour.

Who ran faster, and by how many miles per hour? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Becca:

$$3\frac{3}{4} \text{ miles} / \frac{1}{2} \text{ hour} =$$

$$\frac{15}{4} \text{ miles} / \frac{1}{2} \text{ hour} =$$

$$\frac{15}{4} \times \frac{2}{1} = \frac{30}{4} = 7\frac{1}{2} \text{ miles per hour}$$

Alice:

$$5\frac{1}{4} \text{ miles} / \frac{3}{4} \text{ hour} =$$

$$\frac{21}{4} \text{ miles} / \frac{3}{4} \text{ hour} =$$

$$\frac{21}{4} \times \frac{4}{3} = \frac{84}{12} = 7 \text{ miles per hour}$$

Becca ran faster than Alice by $\frac{1}{2}$ of a mile per hour.

Evidence Statement(s):

1. Student computed unit rates associated with ratios of fractions to determine how many miles per hour Becca and Alice ran.
2. Student used their calculated unit rates to determine which runner ran faster and by how many miles per hour.

Common Misconception(s):

- Student attempted to compare the runners' rates without calculating the unit rates; may have thought that Alice ran at a faster rate per hour because she ran more total miles.
- Student did not calculate unit rates with fractions; may have rounded up or only calculated using whole numbers.
- Student made a computational error when solving for the runners' unit rates.

17B

Primary Standard: cc:7.RP.A.2.c

Points Possible: 2

Part B

Write an equation that represents the number of miles, m , Becca ran in h hours on Monday.

Write an equation that represents the number of miles, m , Alice ran in h hours on Monday.

Explain how you determined your equations.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Becca:

$$m = 7.5h$$

Alice:

$$m = 7h$$

I created both of these equations by multiplying each runner's unit rate by h , the number of hours, to calculate the number of miles, m , each runner ran in h hours.

Evidence Statement(s):

1. Student used the unit rate calculated in Part A to create an equation to represent the number of miles Becca ran in h hours.
2. Student used the unit rate calculated in Part A to create an equation to represent the number of miles Alice ran in h hours.
3. Student explained how they used their calculated unit rates from Part A to create the equations.

Common Misconception(s):

- Student reversed the variables in their equations.
- Student did not recognize to use the unit rates from Part A as parts of their equations; may have used the ratios given in Part A to create their equations.

Item Id: i138289**Item Type: Selected Response**

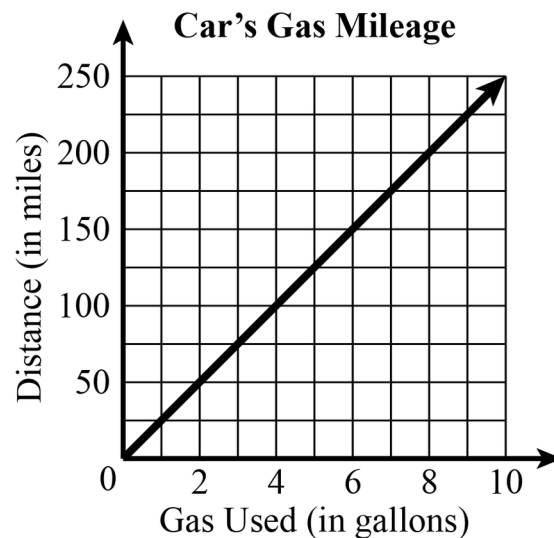
Standards Description:

7.RP.A.2.d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.

Primary Standard: cc:7.RP.A.2.d

Points Possible: 1

The graph below shows the relationship between the distance traveled by a car and the gas used by the car.



Which statement correctly represents the point $(7, 175)$?

- | | |
|---|---|
| A. The car travels 7 miles per gallon of gas used. | Student thought the x-value of the point represented the unit rate. |
| B. The car travels 175 miles per gallon of gas used. | Student thought the y-value of the point represented the unit rate. |
| C. The car travels 7 miles for every 175 gallons of gas used. | Student switched the x- and y-values. |

D. The car travels 175 miles for every 7 gallons of gas used. Correct.

Item Id: i129749**Item Type: Math Short Answer**

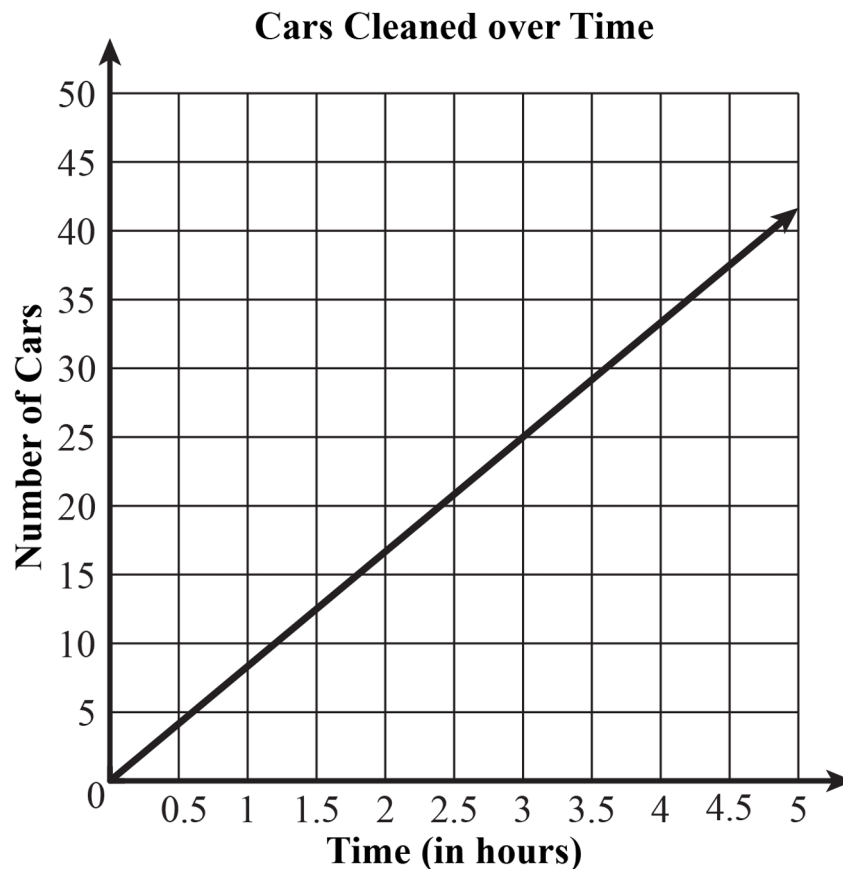
Standards Description:

7.RP.A.2.b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Primary Standard: cc:7.RP.A.2.b

Points Possible: 1

The graph below represents the number of cars that can be cleaned over time at Sparkle Car Wash.



How many cars can Sparkle Car Wash clean per hour, rounded to the **nearest tenth**?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

Correct Answer:

8.3 cars

20

Item Id: i138984**Item Type: Selected Response**

Standards Description:

7.RP.A.2.c Represent proportional relationships by equations.

Primary Standard: cc:7.RP.A.2.c

Points Possible: 1

Kenwyn is making flower arrangements for an event. The table shows the number of flower arrangements, f , she can make in m minutes.

Time, in minutes (m)	Number of flower arrangements (f)
32	4
48	6
64	8
80	10

Which equation represents the relationship between the number of flower arrangements she can make and the time, in minutes, it takes her to make the flower arrangements?

A. $f = 0.125m$

Correct.

B. $f = 2m$

Student used the interval increase in the number of flower arrangements as the constant of proportionality.

C. $f = 8m$

Student found the constant of proportionality that, when multiplied by the number of flower arrangements, will yield the number of minutes; did not attend to the placement of variables in the equation.

D. $f = m + 16$

Student represented the interval increase in the minutes, without looking at the number of flower arrangements.

Item Id: i138290**Item Type: Constructed Response**

Standards Description:

7.RP.A.2.d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

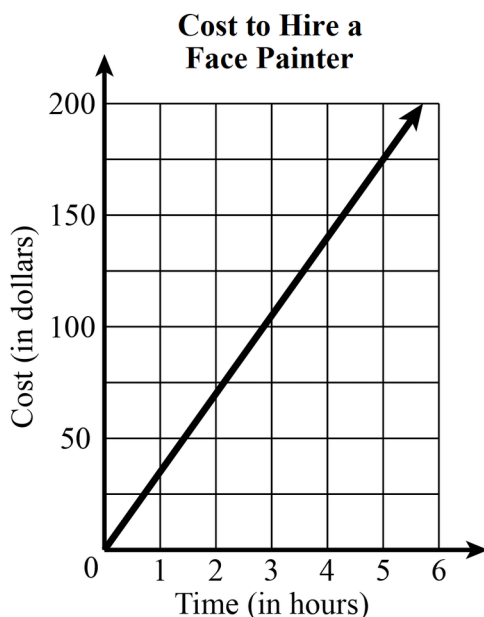
In this item, students must be able to decontextualize to determine a coordinate point, reasoning that because the graph is a straight line through the origin, the point will be proportional to $(5, 175)$, and then contextualize the meaning of that point.

Primary Standard: cc:7.RP.A.2.d

Secondary Standard(s): cc:7.RP.A.2.b

Points Possible: 2

The graph below shows the relationship between the time in hours, x , and the cost in dollars, y , to hire a face painter.



What is the value of y in the point $(1, y)$? Explain what this coordinate point represents in the context of the situation.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

$$\frac{175}{5} = 35$$

$$y = 35$$

The y -value is the cost and the x -value is the time, so the point represents that the cost of hiring a face painter for 1 hour is 35 dollars.

Evidence Statement(s):

1. Student used the proportionality of the relationship represented in the graph to determine the value of y in the point $(1, y)$.
2. Student explained that the point represents the cost of hiring a face painter for one hour.

Common Misconception(s):

- Student tried to visually identify the y -value when x is 1 instead of using the point $(5, 175)$.
- Student interpreted the interval on the y -axis as the unit rate; concluded it costs \$50 for 1 hour.

Interim Assessment 2

Mathematics

Grade 7

student: _____

teacher: _____

school: _____

DIRECTIONS

In this assessment you will answer a total of 25 questions, including 4 constructed-response question(s). Mark all of your answers to the questions on the answer sheet provided.

You may use this test booklet to work out the questions, but remember to mark all of your answers on the answer sheet. For constructed-response questions, record your answers directly on the page in the test booklet.

Calculator Section

You may use a calculator to solve the questions in this section.



1. The temperature increases from 18°F to 27°F .

What is the percent increase of the temperature?

- A. 3%
- B. 9%
- C. 33%
- D. 50%

2. Maria invests \$600 in a bank account that earns simple interest. She earns \$30 at the end of 12 months. Janae invests \$350 at the same rate of interest for 12 months.

How much money will Janae earn on her \$350 investment after the 12 months?

- A. \$5.00
- B. \$12.50
- C. \$17.50
- D. \$47.50

3. Luisa buys a plane ticket that has an original price of \$240. She uses a coupon code to get a 30% discount off of the original price. She is then charged a 7% tax on the discounted price.

What is the final cost for Luisa's plane ticket?

- A. \$77.04
- B. \$156.24
- C. \$179.76
- D. \$217.00

4. In March, Arnold finds a guitar with a price of \$650 that he wants to buy, but he only has \$300 saved.

In September, Arnold has 75% more money saved, and the guitar is on sale for a 30% discount off the original price. The sales tax is 5% of the sale price.

Does Arnold have enough money to buy the guitar in September? Justify your answer.

Respond in the space provided.

Non-Calculator Section

You may **not** use a calculator to solve the questions in this section.



5. Which expression is equivalent to the expression below?

$$y - x$$

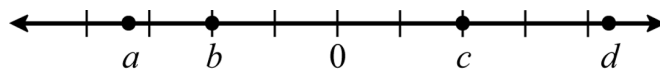
- A. $(-y) + (-x)$
 B. $y + x$
 C. $y + (-x)$
 D. $-y + x$

6. Find the product.

$$-\frac{8}{9} \times -\frac{6}{7}$$

- A. $-\frac{56}{54}$
 B. $-\frac{48}{63}$
 C. $\frac{48}{63}$
 D. $\frac{56}{54}$

7. Use the number line to answer the question below.



Which of the following are true?

Select **all** that apply.

- A. $b + c = 0$
 B. $a + b > b$
 C. $b + d > 0$
 D. $c + a > c$
 E. $d + a = 0$

8. Because Kendall's business spent more money than it collected, the business's balance sheet showed a balance of $-\$1,280$ at the end of the month. The next day, Kendall's business spent $\$560$ on new tools.

Part A

Kendall determines that the new balance is $-\$720$ because $-1,280 + 560 = -720$.

Did Kendall correctly determine the new balance?

- Explain why or why not.
- If not, calculate the new balance.

Respond in the space provided.

Part B

The following month, Kendall's business's balance sheet shows a balance of $-\$516$. Kendall wants his business to have a balance of $\$300$ after 6 more months.

If Kendall's business plans to profit the same amount each month, how much money does it need to profit each month to have a balance of $\$300$ after 6 more months? Show your work.

Respond in the space provided.

9. Which expression can be used to find the value of the expression below?

$$6.1 - 5.4 - (-7.7)$$

- A. $6.1 - 5.4 - 7.7$
 B. $6.1 + 5.4 + (-7.7)$
 C. $6.1 + 7.7 - 5.4$
 D. $6.1 + 7.7 + 5.4$

10. Which expression could be used to evaluate the expression below?

$$-2\frac{3}{5} \times 6$$

- A. $-2 \times 6 - \frac{3}{5}$
 B. $-2(\frac{3}{5} \times -3)$
 C. $(-2 \times 6) + (\frac{3}{5} \times 6)$
 D. $(-2 \times 6) + (-\frac{3}{5} \times 6)$

11. What is the value of the expression?

$$-\frac{4}{5} + \frac{2}{3}$$

- A. $-1\frac{7}{15}$
 B. -1
 C. $-\frac{2}{15}$
 D. $\frac{2}{15}$

12. Which expressions will have the same quotient as the expression below?

$$-\left(\frac{y}{x}\right)$$

Select **all** that apply.

- A. $\frac{-y}{x}$
 B. $\frac{-y}{-x}$
 C. $\frac{y}{-x}$
 D. $-(y \div -x)$
 E. $-(-y \div -x)$

13. The lowest elevations of Argentina and Peru are both below sea level. The lowest elevation in Argentina is about 345 feet below sea level. The lowest elevation in Peru is about $\frac{1}{3}$ the value of Argentina's lowest elevation.

Which value **best** represents the lowest elevation, in feet, in Peru?

- A. $-1,035$
- B. -115
- C. 115
- D. $1,035$

- 14.** The lowest land altitude in the world is -413 meters. The lowest land altitude in the United States of America is -86 meters.

Part A

Write two different expressions that correctly represent the vertical distance, in meters, between the two altitudes.

Respond in the space provided.

Part B

What is the vertical distance, in meters, between the two altitudes? Show your work.

Respond in the space provided.

15. Which expression can be used to find the value of the expression below?

$$-4(5 + (-2))$$

- A. $-4 \times 5 - 2$
- B. $(-4 \times 5) + (4 \times 2)$
- C. $(-4 \times 5) \times (-4 \times -2)$
- D. $(-1) \times ((4 \times 5) + (4 \times 2))$

16. Which expression can be used to find the value of the expression below?

$$-\left(\frac{7}{10}\right) + \frac{2}{8} + \frac{1}{10} - \left(\frac{4}{8}\right)$$

- A. $\frac{8}{10} + \frac{6}{8}$
- B. $\left(-\frac{6}{10}\right) + \frac{2}{8}$
- C. $\left(-\frac{6}{10}\right) + \left(-\frac{2}{8}\right)$
- D. $\left(-\frac{8}{10}\right) + \left(-\frac{6}{8}\right)$

17. Which decimal **best** represents $\frac{15}{33}$?

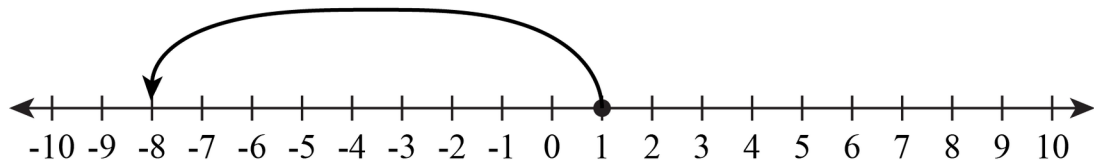
- A. 0.4545
- B. $0.\overline{45}$
- C. 0.455
- D. $0.4\overline{55}$

18. During a scientific experiment the temperature of a container decreased by 35.7°C at a constant rate over $8\frac{1}{2}$ hours.

What value represents the change in the temperature of the container each hour?

- A. -8.9°C
- B. -4.4°C
- C. -4.2°C
- D. 4.2°C

19. Which equations are represented by the number line below?



Select **all** that apply.

- A. $1 - 8 = 9$
- B. $1 - 9 = -8$
- C. $1 + (9) = -8$
- D. $1 - (-9) = -8$
- E. $1 + (-9) = -8$

20. Compute.

$$\frac{3}{8} \div -0.25$$

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

21. The temperature at noon was -4°C . By midnight, the temperature dropped 8°C .

Which expressions represent the temperature at midnight?

Select **all** that apply.

- A. $-4 + 8$
- B. $-4 - 8$
- C. $|-4 - 8|$
- D. $-4 + (-8)$
- E. $-4 - (-8)$
- F. $|-4 - (-8)|$

22. Which expression could be used to find the value of the expression below?

$$\frac{17}{-8} \div -4$$

- A. $17 \div \frac{-4}{-8}$
- B. $\frac{-17}{-4} \times 8$
- C. $-\left(\frac{17}{8} \times \frac{1}{4}\right)$
- D. $17 \times -\frac{1}{8} \times -\frac{1}{4}$

23. Which situation describes quantities that combine to make zero?

- A. Fred owes his friend a debt of \$30.50. Fred spends the same amount on gas.
- B. A climber starts at $10\frac{2}{3}$ feet above sea level. The climber climbs up $10\frac{2}{3}$ feet.
- C. Kara borrows \$25.25 from her sister. Kara pays back the full amount to her sister.
- D. Chad has $100\frac{1}{2}$ rewards points after the first month of joining a rewards program. By the end of the second month, he still has $100\frac{1}{2}$ reward points.

- 24.** Box A weighs 212.04 kilograms. Box B weighs $212\frac{1}{4}$ kilograms.

Which statement is true?

- A.** The boxes weigh the same amount.
- B.** Box B weighs 0.10 of a kilogram more than Box A.
- C.** Box A weighs 0.15 of a kilogram more than Box B.
- D.** Box B weighs 0.21 of a kilogram more than Box A.

25. Part A

Karissa says that to represent the expression $-7 - (-9)$ on a number line, she should start at -7 and move 9 units to the left.

Is she correct? Explain why or why not.

Respond in the space provided.

Part B

Hugo thinks that the equation below is true.

$$(-3) + (-8) - 4 = (-3) - 8 - 4$$

Is he correct? Explain why or why not.

Respond in the space provided.

Assessment Analysis Guide
Interim Assessment 2
Mathematics
Grade 7

1

Item Id: i130561**Item Type: Selected Response**

Standards Description:

7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.

Primary Standard: cc:7.RP.A.3

Points Possible: 1

The temperature increases from 18°F to 27°F.

What is the percent increase of the temperature?

- A. 3% Student divided the final value (27) by the difference in value (9), and represented the quotient as a percent.
- B. 9% Student misinterpreted the temperature increase, in degrees, as the same as the percent increase.
- C. 33% Student divided the difference in value (9) by the final value (27) instead of the initial value (18), rounded to the nearest hundredth, and represented the quotient as a percent.
- D. 50% Correct.

2

Item Id: i130562**Item Type: Selected Response**

Standards Description:

7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.

Primary Standard: cc:7.RP.A.3

Points Possible: 1

Maria invests \$600 in a bank account that earns simple interest. She earns \$30 at the end of 12 months. Janae invests \$350 at the same rate of interest for 12 months.

How much money will Janae earn on her \$350 investment after the 12 months?

A. \$5.00

Student found the interest earned on \$100 for a year, OR represented the percent increase as a dollar amount.

B. \$12.50

Student found the difference in the amount of simple interest earned between \$350 and \$600.

C. \$17.50

Correct.

D. \$47.50

Student calculated the interest earned on \$350 and added it to the interest earned on \$600.

3

Item Id: i130560**Item Type: Selected Response**

Standards Description:

7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.

Primary Standard: cc:7.RP.A.3

Points Possible: 1

Luisa buys a plane ticket that has an original price of \$240. She uses a coupon code to get a 30% discount off of the original price. She is then charged a 7% tax on the discounted price.

What is the final cost for Luisa's plane ticket?

A. \$77.04

Student correctly found 30% of the original price, but then used that as the sale price instead of the discount, and correctly added the tax based on the incorrect first step.

B. \$156.24

Student subtracted the tax instead of adding.

C. \$179.76

Correct.

D. \$217.00

Student ignored the percent signs, subtracted \$30 from \$240, and then added \$7 for the tax.

Item Id: i138607**Item Type: Constructed Response**

Standards Description:

7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.

Standard(s) for Mathematical Practice:

MP1 Make sense of problems and persevere in solving them.

In this item, students need to plan a solution pathway for solving a multi-step real-world problem. Students should monitor their progress with each step, asking themselves “does this make sense?” with reference back to the context of the problem.

MP4 Model with mathematics.

In this item, students may create models, like equations, to help simplify a complex situation.

Primary Standard: cc:7.RP.A.3

Points Possible: 4

In March, Arnold finds a guitar with a price of \$650 that he wants to buy, but he only has \$300 saved.

In September, Arnold has 75% more money saved, and the guitar is on sale for a 30% discount off the original price. The sales tax is 5% of the sale price.

Does Arnold have enough money to buy the guitar in September? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Arnold's money in September:

$$300 \times 0.75 = 225$$

$$300 + 225 = 525$$

Cost of the guitar in September:

$$650 \times 0.7 = 455$$

$$455 \times 0.05 = 22.75$$

$$455 + 22.75 = 477.75$$

In September, Arnold has \$525 and the guitar can be purchased for \$477.75. Yes, Arnold has enough money to buy the guitar in September.

Evidence Statement(s):

1. Student used proportional relationships to calculate the total amount of money Arnold has in September.
2. Student used proportional relationships to calculate the sale price of the guitar in September.
3. Student used proportional relationships to calculate the sale price of the guitar with the sales tax in September.
4. Student determined that Arnold has enough money to buy the guitar in September.

Common Misconception(s):

- Student did not understand how to find percent of a number and instead may have used the percent values as whole numbers.
- Student did not understand how to apply a percent increase, sales tax, and/or a discount and may have used the incorrect operation.

Item Id: i116567**Item Type: Selected Response**

Standards Description:

7.NS.A.1.c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

Primary Standard: cc:7.NS.A.1.c

Points Possible: 1

Which expression is equivalent to the expression below?

$$y - x$$

A. $(-y) + (-x)$

Student changed the operation but thought they needed to use the additive inverse of both terms.

B. $y + x$

Student changed the operation without using the additive inverse of x.

C. $y + (-x)$

Correct.

D. $-y + x$

Student changed the operation but used the additive inverse of the wrong term (y instead of x).

6

Item Id: i110213**Item Type: Selected Response**

Standards Description:

7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

Primary Standard: cc:7.NS.A.2

Points Possible: 1

Find the product.

$$-\frac{8}{9} \times -\frac{6}{7}$$

A. $-\frac{56}{54}$

Student multiplied the first fraction by the reciprocal of the second and made the product negative; perhaps confused the procedure for multiplying fractions with the procedure for dividing fractions.

B. $-\frac{48}{63}$

Student represented the product of two negative numbers as a negative number.

C. $\frac{48}{63}$

Correct.

D. $\frac{56}{54}$

Student multiplied the first fraction by the reciprocal of the second; perhaps confused the procedure for multiplying fractions with the procedure for dividing fractions.

Item Id: i113028**Item Type: Multiple Select**

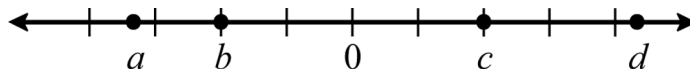
Standards Description:

7.NS.A.1.b Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

Primary Standard: cc:7.NS.A.1.b

Points Possible: 1

Use the number line to answer the question below.



Which of the following are true?

Select **all** that apply.

A. $b + c = 0$

Correct.

B. $a + b > b$

Student did not recognize that adding a negative, b , to a negative, a , would decrease its value by $|b|$ and therefore make $a + b < b$.

C. $b + d > 0$

Correct.

D. $c + a > c$

Student did not recognize that because a is negative, the value of c will decrease instead of increase; thought that the value of c would increase, instead of decrease, by $|a|$.

E. $d + a = 0$

Student did not recognize that adding a to d would decrease d's value by $|a|$, resulting in a difference greater than 0; may have thought that a and d were opposites and would sum to zero.

8

Item Id: i110227**Item Type: Constructed Response**

Standards Description:

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Standard(s) for Mathematical Practice:

MP1 Make sense of problems and persevere in solving them.

In Part B, students need to determine a solution pathway to solve a multi-step word problem. Students may use equations to solve and should interpret their solution in the context of the situation to determine if their model, or equation, was effective.

MP3 Construct viable arguments and critique the reasoning of others.

In this item, students need to identify and explain an incorrect solution. They need to communicate clearly and provide a correct solution.

8A

Primary Standard: cc:7.NS.A.3

Points Possible: 2

Because Kendall's business spent more money than it collected, the business's balance sheet showed a balance of $-\$1,280$ at the end of the month. The next day, Kendall's business spent $\$560$ on new tools.

Part A

Kendall determines that the new balance is $-\$720$ because $-1,280 + 560 = -720$.

Did Kendall correctly determine the new balance?

- Explain why or why not.
- If not, calculate the new balance.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Kendall did not correctly determine the new balance. He should have subtracted $\$560$ or added $-\$560$ to

show the balance is decreasing. The equation should be $-1,280 - 560 = -1,840$.

The new balance is $-\$1,840$.

Evidence Statement(s):

1. Student recognized that Kendall's business's balance should decrease, instead of increase.
2. Student applied understandings of addition and subtraction to solve.

Common Misconception(s):

- Student thought Kendall made a computation mistake; may have thought $-1,280 + 560$ was equal to $-1,840$.
- Student identified Kendall used the incorrect operation, but thought $-1,280 - 560$ was equal to -720 .

8B

Primary Standard: cc:7.NS.A.3

Points Possible: 2

Part B

The following month, Kendall's business's balance sheet shows a balance of $-\$516$. Kendall wants his business to have a balance of $\$300$ after 6 more months.

If Kendall's business plans to profit the same amount each month, how much money does it need to profit each month to have a balance of $\$300$ after 6 more months? Show your work.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

$$300 - (-516)$$

$$300 + 516$$

$$816$$

$$816 \div 6 = 136$$

Kendall's business needs to profit $\$136$ each month. He wants the balance to increase by $\$816$, and $\$816$

divided over 6 months is \$136 per month.

Evidence Statement(s):

1. Student applied an understanding of distance between two rational numbers as the absolute value of their difference, or adding the additive inverse, to find the total amount of money Kendall's business needs to profit.
2. Student applied understandings of multiplication and division to determine the amount Kendall's business needs to profit each month.

Common Misconception(s):

- Student found the difference by subtracting $-516 - 300$ but did not find the absolute value, representing the difference with a negative integer.
- Student added to represent an increase, not recognizing they needed to find the difference.
- Student represented the total amount Kendall's business needs to profit instead of the amount each month.

Item Id: i138065**Item Type: Selected Response**

Standards Description:

7.NS.A.1.d Apply properties of operations as strategies to add and subtract rational numbers.

Primary Standard: cc:7.NS.A.1.d

Points Possible: 1

Which expression can be used to find the value of the expression below?

$$6.1 - 5.4 - (-7.7)$$

A. $6.1 - 5.4 - 7.7$

Student thought $-(-7.7) = -7.7$, OR student may have confused parentheses with absolute value.

B. $6.1 + 5.4 + (-7.7)$

Student may have tried to use the additive inverse but only changed the operations.

C. $6.1 + 7.7 - 5.4$

Correct.

D. $6.1 + 7.7 + 5.4$

Student rearranged the expression to show adding 7.7 to 6.1 first, but then incorrectly added 5.4 instead of subtracting 5.4.

10

Item Id: i138059**Item Type: Selected Response**

Standards Description:

7.NS.A.2.c Apply properties of operations as strategies to multiply and divide rational numbers.

Primary Standard: cc:7.NS.A.2.c

Points Possible: 1

Which expression could be used to evaluate the expression below?

$$-2\frac{3}{5} \times 6$$

A. $-2 \times 6 - \frac{3}{5}$

Student multiplied the whole numbers, not recognizing the fraction also needs to be multiplied by 6.

B. $-2\left(\frac{3}{5} \times -3\right)$

Student tried to use the distributive property, thinking $-2 \times \frac{3}{5} = -2\frac{3}{5}$.

C. $(-2 \times 6) + \left(\frac{3}{5} \times 6\right)$

Student did not recognize both 2 and $\frac{3}{5}$ need to be negative to represent $-2\frac{3}{5}$.

D. $(-2 \times 6) + \left(-\frac{3}{5} \times 6\right)$

Correct.

Item Id: i129742**Item Type: Selected Response**

Standards Description:

7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

Primary Standard: cc:7.NS.A.1

Points Possible: 1

What is the value of the expression?

$$-\frac{4}{5} + \frac{2}{3}$$

A. $-1\frac{7}{15}$

Student created like denominators, added $12/15 + 10/15$ to get $22/15$, and kept the negative sign from $-4/5$ to get $-1\frac{7}{15}$.

B. -1

Student subtracted the numerators and denominators going across and transferred the negative sign from $-4/5$ into the answer.

C. $-\frac{2}{15}$

Correct.

D. $\frac{2}{15}$

Student did not realize that because $-4/5$ has a greater absolute value than $2/3$, the answer would be negative.

Item Id: i129891**Item Type: Multiple Select**

Standards Description:

7.NS.A.2.b Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

Primary Standard: cc:7.NS.A.2.b

Points Possible: 1

Which expressions will have the same quotient as the expression below?

$$-\left(\frac{y}{x}\right)$$

Select **all** that apply.

A. $\frac{-y}{x}$

Correct.

B. $\frac{-y}{-x}$

Student thought that the negative sign in the original expression needed to be distributed to both variables; misapplied the distributive property.

C. $\frac{y}{-x}$

Correct.

D. $-(y \div -x)$

Student thought that since this expression has a negative sign outside of the parentheses, like the original expression, it would result in the same quotient; did not recognize that this expression would result in a quotient with the opposite sign of the original expression.

E. $-(-y \div -x)$

Correct.

Item Id: i130385**Item Type: Selected Response**

Standards Description:

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Primary Standard: cc:7.NS.A.3

Points Possible: 1

The lowest elevations of Argentina and Peru are both below sea level. The lowest elevation in Argentina is about 345 feet below sea level. The lowest elevation in Peru is about $\frac{1}{3}$ the value of Argentina's lowest elevation.

Which value **best** represents the lowest elevation, in feet, in Peru?

A. -1,035

Student calculated 3 times the value instead of $\frac{1}{3}$ the value.

B. -115

Correct.

C. 115

Student represented "below sea level" as a positive value.

D. 1,035

Student calculated 3 times the value instead of $\frac{1}{3}$ the value and represented "below sea level" as a positive value.

14

Item Id: i112597**Item Type: Constructed Response**

Standards Description:

7.NS.A.1.c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

In this item, students need to represent a real-world context with expressions, taking into account their understanding of distance and how to write an expression to represent the distance between two points. Students need to use their understanding of properties of addition and subtraction to manipulate the expression to create an equivalent expression and solve.

14A

Primary Standard: cc:7.NS.A.1.c

Points Possible: 1

The lowest land altitude in the world is -413 meters. The lowest land altitude in the United States of America is -86 meters.

Part A

Write two different expressions that correctly represent the vertical distance, in meters, between the two altitudes.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Expression 1:

$$(-86) - (-413)$$

Expression 2:

$$(-86) + 413$$

Evidence Statement(s):

1. Student demonstrated subtraction of rational numbers as adding the additive inverse OR that the distance between two rational numbers on the number line is the absolute value of their difference.

Common Misconception(s):

- Student used the incorrect operation and added, OR student may have tried to represent subtraction of rational numbers as adding the additive inverse but did not take the inverse.
- Student did not use the absolute value of $(-413) - (-86)$; may not understand the distance between two points is always positive.

14B

Primary Standard: cc:7.NS.A.1.c

Points Possible: 1

Part B

What is the vertical distance, in meters, between the two altitudes? Show your work.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

$$(-86) - (-413)$$

$$(-86) + 413$$

$$413 + (-86)$$

$$413 - 86$$

$$327$$

The distance between the two altitudes is 327 meters.

Evidence Statement(s):

1. Student applied an understanding of addition and subtraction of rational numbers to a real-world context to find a positive distance.

Common Misconception(s):

- Student did not use the absolute value of $(-413) - (-86)$; may not understand the distance between two points is always positive.

15

Item Id: i132472**Item Type: Selected Response**

Standards Description:

7.NS.A.2.a Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

Primary Standard: cc:7.NS.A.2.a

Points Possible: 1

Which expression can be used to find the value of the expression below?

$$-4(5 + (-2))$$

A. $-4 \times 5 - 2$

Student rewrote the expression without recognizing that the -4 needs to be distributed to the two terms in parentheses; simplified the expression by rewriting the additive inverse as subtraction.

B. $(-4 \times 5) + (4 \times 2)$

Correct.

C. $(-4 \times 5) \times (-4 \times -2)$

Student distributed correctly, but multiplied distributed products instead of adding them together.

D. $(-1) \times ((4 \times 5) + (4 \times 2))$

Student factored out a negative from the 4 when applying the distributive property, but incorrectly changed the sign of -2 to positive when rewriting the expression; may have thought the negative was being factored out of the -4 and -2 .

Item Id: i138064**Item Type: Selected Response**

Standards Description:

7.NS.A.1.d Apply properties of operations as strategies to add and subtract rational numbers.

Primary Standard: cc:7.NS.A.1.d

Points Possible: 1

Which expression can be used to find the value of the expression below?

$$-\left(\frac{7}{10}\right) + \frac{2}{8} + \frac{1}{10} - \left(\frac{4}{8}\right)$$

A. $\frac{8}{10} + \frac{6}{8}$

Student used the commutative property to add fractions with like denominators but did not apply the rules of adding and subtracting negative numbers, making the fractions positive, instead of negative.

B. $\left(-\frac{6}{10}\right) + \frac{2}{8}$

Student combined the fractions with like denominators but kept the sign of the fractions that came first in the original expression.

C. $\left(-\frac{6}{10}\right) + \left(-\frac{2}{8}\right)$

Correct.

D. $\left(-\frac{8}{10}\right) + \left(-\frac{6}{8}\right)$

Student tried to apply the commutative property to add fractions with like denominators but added the absolute values of each fraction together and made them negative; student may not know properties of adding and subtracting positive and negative rational numbers.

Item Id: i112086**Item Type: Selected Response**

Standards Description:

7.NS.A.2.d Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

Primary Standard: cc:7.NS.A.2.d

Points Possible: 1

Which decimal **best** represents $\frac{15}{33}$?

A. 0.4545

Student calculated to four decimal places, but did not recognize that the decimal continues infinitely or did not recognize that the overline represents infinite repetition in the decimal.

B. $0.\overline{45}$

Correct.

C. 0.455

Student rounded to the thousandths place or made a computation error; did not recognize that the decimal continues infinitely or did not recognize that the overline represents infinite repetition in the decimal.

D. $0.4\overline{55}$

Student rounded to the thousandths place and attempted to represent the decimal repeating infinitely.

Item Id: i112689**Item Type: Selected Response**

Standards Description:

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Primary Standard: cc:7.NS.A.3

Secondary Standard(s): cc:7.RP.A.1

Points Possible: 1

During a scientific experiment the temperature of a container decreased by 35.7°C at a constant rate over $8\frac{1}{2}$ hours.

What value represents the change in the temperature of the container each hour?

A. -8.9°C

Student attempted to use properties of operations and calculated -35.7 divided by 8 , divided the quotient by $1/2$, and rounded to the nearest tenth.

B. -4.4°C

Student incorrectly converted $8\frac{1}{2}$ to 8.2 and divided -35.7 by 8.2 and rounded to the nearest tenth, OR divided -35.7 by 8 and truncated the decimal after the tenths place.

C. -4.2°C

Correct.

D. 4.2°C

Student divided 35.7 by $8\frac{1}{2}$; did not represent a decrease as negative.

Item Id: i129739**Item Type: Multiple Select**

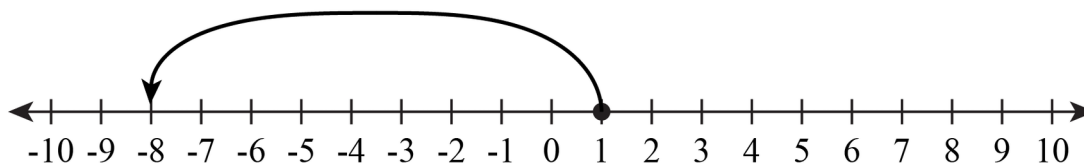
Standards Description:

7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

Primary Standard: cc:7.NS.A.1

Points Possible: 1

Which equations are represented by the number line below?

Select **all** that apply.

A. $1 - 8 = 9$

Student represented decreasing 1 by 8 instead of 9; possibly tried to represent the distance between 1 and -8 but incorrectly subtracted 8 instead of -8.

B. $1 - 9 = -8$

Correct.

C. $1 + (9) = -8$

Student represented the incorrect operation, and did not recognize that $1 + 9 = 10$ instead of -8.

D. $1 - (-9) = -8$

Student represented the distance between -8 and 1 as -9 instead of 9; did not recognize $1 - (-9)$ is the same as $1 + 9$, therefore resulting in an answer moving in the positive direction and a positive sum.

E. $1 + (-9) = -8$

Correct.

20

Item Id: i113011**Item Type: Selected Response**

Standards Description:

7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

Primary Standard: cc:7.NS.A.2

Points Possible: 1

Compute.

$$\frac{3}{8} \div -0.25$$

A. $-1\frac{1}{2}$

Correct.

B. $-\frac{2}{3}$

Student took the reciprocal of the first fraction instead of the second when changing from division to multiplication.

C. $\frac{2}{3}$

Student took the reciprocal of the first fraction instead of the second when changing from division to multiplication and did not use the rules for multiplying a positive and a negative correctly.

D. $1\frac{1}{2}$

Student did not use the rules for multiplying a positive and a negative correctly.

Item Id: i112679**Item Type: Multiple Select**

Standards Description:

7.NS.A.1.c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

Primary Standard: cc:7.NS.A.1.c

Points Possible: 1

The temperature at noon was -4°C . By midnight, the temperature dropped 8°C .

Which expressions represent the temperature at midnight?

Select **all** that apply.

A. $-4 + 8$

Student represented an increase in temperature instead of a decrease; may have tried adding the additive inverse but did not use the additive inverse of 8.

B. $-4 - 8$

Correct.

C. $|-4 - 8|$

Student may have interpreted 8 degrees as the temperature at midnight and represented the difference between the two temperatures.

D. $-4 + (-8)$

Correct.

E. $-4 - (-8)$

Student represented a decrease of 8 degrees as a decrease of -8 degrees; did not recognize this would actually result in an increase.

F. $|-4 - (-8)|$

Student may have interpreted a drop of 8 degrees to be a temperature of -8 degrees and represented the difference between the two temperatures.

Item Id: i138060**Item Type: Selected Response**

Standards Description:

7.NS.A.2.c Apply properties of operations as strategies to multiply and divide rational numbers.

Primary Standard: cc:7.NS.A.2.c

Points Possible: 1

Which expression could be used to find the value of the expression below?

$$\frac{17}{-8} \div -4$$

A. $17 \div \frac{-4}{-8}$

Student incorrectly rearranged the expression when attempting to have the negative values together.

B. $\frac{-17}{-4} \times 8$

Student incorrectly represented multiplying by 8 instead of $1/8$; may not have understood that $17/8$ is equal to $17 \times 1/8$.

C. $-(\frac{17}{8} \times \frac{1}{4})$

Student correctly turned the division by -4 into multiplication by $-1/4$, but dropped the negative before $1/4$ when pulling a negative sign outside of the expression.

D. $17 \times -\frac{1}{8} \times -\frac{1}{4}$

Correct.

Item Id: i130563**Item Type: Selected Response**

Standards Description:

7.NS.A.1.a Describe situations in which opposite quantities combine to make 0.

Primary Standard: cc:7.NS.A.1.a

Points Possible: 1

Which situation describes quantities that combine to make zero?

A. Fred owes his friend a debt of \$30.50. Fred spends the same amount on gas.

Student chose two equal negative numbers as additive inverses; did not recognize that “debt of \$30.50” and “spends the same amount” would not sum to zero since they both represent negative amounts.

B. A climber starts at $10\frac{2}{3}$ feet above sea level. The climber climbs up $10\frac{2}{3}$ feet.

Student chose two equal positive numbers as additive inverses; did not recognize that “ $10\frac{2}{3}$ feet above sea level” and “climbs up $10\frac{2}{3}$ feet” would not sum to zero since they both represent positive amounts.

C. Kara borrows \$25.25 from her sister. Kara pays back the full amount to her sister.

Correct.

D. Chad has $100\frac{1}{2}$ rewards points after the first month of joining a rewards program. By the end of the second month, he still has $100\frac{1}{2}$ reward points.

Student chose a situation that represents a change of zero; confused a change of zero with a sum of zero.

Item Id: i130376**Item Type: Selected Response**

Standards Description:

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Primary Standard: cc:7.NS.A.3

Secondary Standard(s): cc:7.NS.A.2.d

Points Possible: 1

Box A weighs 212.04 kilograms. Box B weighs $212\frac{1}{4}$ kilograms.

Which statement is true?

A. The boxes weigh the same amount.

Student thought $1/4 = 0.04$; may not know how to convert a decimal to a fraction, or a fraction to a decimal.

B. Box B weighs 0.10 of a kilogram more than Box A.

Student thought $1/4 = 0.14$ and subtracted 212.04 from 212.14 (instead of 212.25).

C. Box A weighs 0.15 of a kilogram more than Box B.

Student represented 212.04 as $212\frac{4}{10}$ and subtracted $212\frac{1}{4}$ from $212\frac{4}{10}$ (instead of $212\frac{4}{100}$) to find the difference.

D. Box B weighs 0.21 of a kilogram more than Box A.

Correct.

25

Item Id: i116560**Item Type: Constructed Response**

Standards Description:

7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

Standard(s) for Mathematical Practice:

MP7 Look for and make use of structure.

In this item, students need to understand the relationship between addition and subtraction to explain how to represent an expression on the number line and identify equivalent expressions.

25A

Primary Standard: cc:7.NS.A.1

Secondary Standard(s): cc:7.NS.A.1.c

Points Possible: 1

Part A

Karissa says that to represent the expression $-7 - (-9)$ on a number line, she should start at -7 and move 9 units to the left.

Is she correct? Explain why or why not.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

No, Karissa is not correct. She should start at -7 , but then move 9 units to the right, since subtracting a negative is the same as adding a positive.

Evidence Statement(s):

1. Student demonstrated understanding that subtracting a negative number results in a greater value and can be represented as moving to the right on a number line.

Common Misconception(s):

- Student thought Karissa was correct; thought that after starting at -7, she should move to the left since the operation is subtraction.
- Student thought Karissa was correct; thought that after starting at -7, she should move to the left since the second number (-9) is negative.

25B

Primary Standard: cc:7.NS.A.1

Points Possible: 1

Part B

Hugo thinks that the equation below is true.

$$(-3) + (-8) - 4 = (-3) - 8 - 4$$

Is he correct? Explain why or why not.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Hugo is correct because $(-3) + (-8)$ means that -3 is being decreased by 8, which can also be written as $(-3) - 8$.

Both $(-3) + (-8) - 4$ and $(-3) - 8 - 4$ are equal to -15 .

Evidence Statement(s):

1. Student demonstrated an understanding of subtraction of a rational number as adding the additive inverse.

Common Misconception(s):

- Student did not recognize that adding -8 was equivalent to subtracting 8.

Interim Assessment 3

Mathematics

Grade 7

student: _____

teacher: _____

school: _____

DIRECTIONS

In this assessment you will answer a total of 38 questions, including 4 constructed-response question(s). Mark all of your answers to the questions on the answer sheet provided.

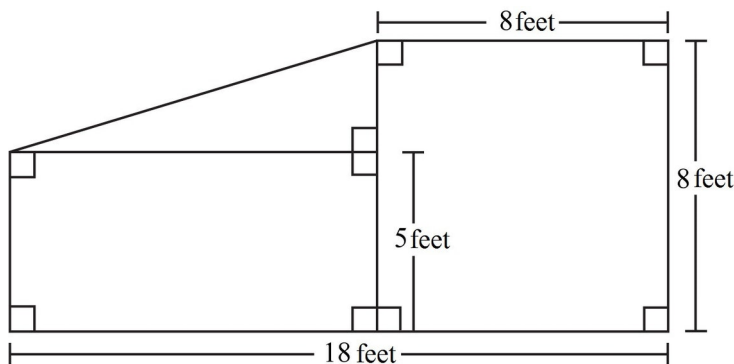
You may use this test booklet to work out the questions, but remember to mark all of your answers on the answer sheet. For constructed-response questions, record your answers directly on the page in the test booklet.

Calculator Section

You may use a calculator to solve the questions in this section.



1. The floor plan for Jacob's living room is shown below.



What is the area, in square feet, of Jacob's living room?

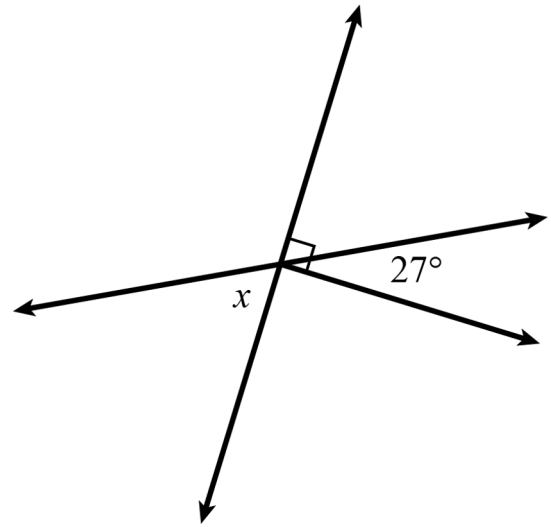
- A. 114
- B. 129
- C. 144
- D. 181

2. The price of a carton of eggs at Supermarket A is \$2.10. The price of a carton of eggs at Supermarket B is 40% less than the price at Supermarket A .

What is the price of a carton of eggs at Supermarket B ?

- A. \$0.84
- B. \$1.26
- C. \$1.70
- D. \$2.94

3. Use the figure to answer the question below.



The figure is not drawn to scale.

What is the value of x , in degrees?

Respond in the space provided.

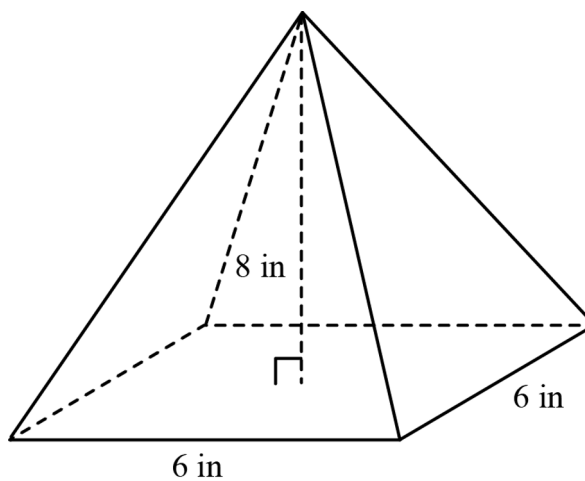
If your test is on paper, write your answer on the answer sheet.

4. Malik estimated that 150 people would attend a concert. The exact attendance was 215 people.

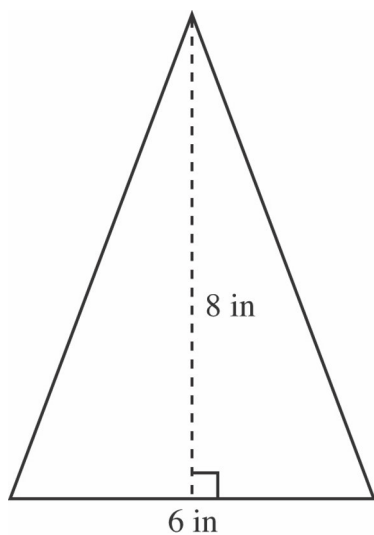
What is his percent error, to the nearest percent?

- A. 18%
- B. 30%
- C. 43%
- D. 65%

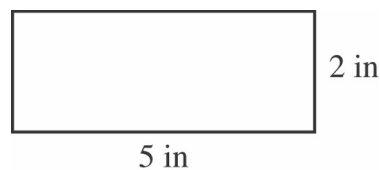
5. Which two-dimensional plane section **cannot** be made from making a single vertical or horizontal slice through the pyramid below?



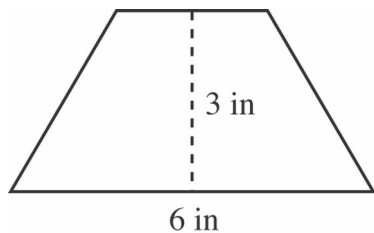
A.



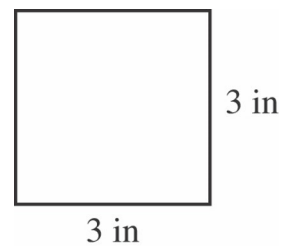
C.



B.



D.

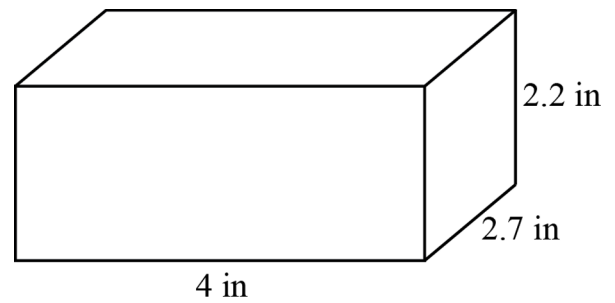


6. In November, the average temperature at the North Pole is -8.3° Fahrenheit. In December, the average temperature at the North Pole is 7.7° Fahrenheit colder than November's average temperature. In January, the average temperature at the North Pole is $1\frac{1}{4}$ times colder than December's average temperature.

What is the average temperature, in degrees Fahrenheit, at the North Pole in January?

- A. -0.75
- B. -14.75
- C. -17.25
- D. -20

7. What is the surface area, in square inches, of the rectangular prism below?



- A. 23.76
- B. 25.54
- C. 40.28
- D. 51.08

8. Which table shows a proportional relationship between gallons of gas and the cost of gas?

A.

Gallons of Gas	Cost
1	\$3.25
3	\$9.75
5	\$15.25

B.

Gallons of Gas	Cost
3	\$14.75
5	\$18.75
7	\$22.75

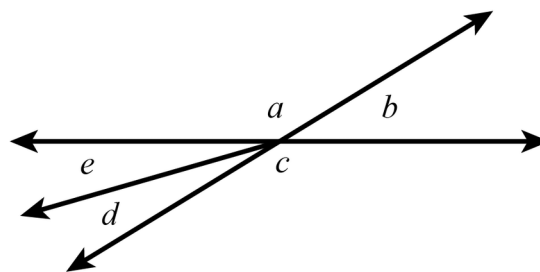
C.

Gallons of Gas	Cost
5	\$16.25
6	\$19.50
7	\$22.75

D.

Gallons of Gas	Cost
7	\$22.75
8	\$23.75
9	\$24.75

9. Use the figure to answer the question below.



Which equations must be true?

Select **all** that apply.

- A. $a = c$
- B. $d + e = b$
- C. $a + e = 90^\circ$
- D. $c + d + e = 180^\circ$
- E. $b + (d + e) = 180^\circ$

10. Which set of side lengths can form a triangle?

- A. 2 cm, 2 cm, 6 cm
- B. 3 cm, 6 cm, 9 cm
- C. 4 cm, 8 cm, 5 cm
- D. 8 cm, 3 cm, 4 cm

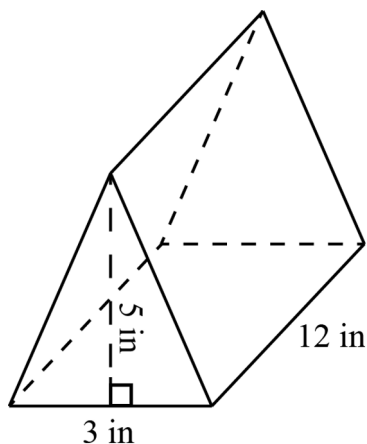
11. Currently, there are 350 students in the seventh grade at Winchester Heights Middle School. For the upcoming school year, they are planning to increase the number of seventh graders by 10%.

How many seventh-grade students does Winchester Heights Middle School plan to have in the upcoming school year?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

12. What is the volume, in cubic inches, of the right triangular prism shown below?



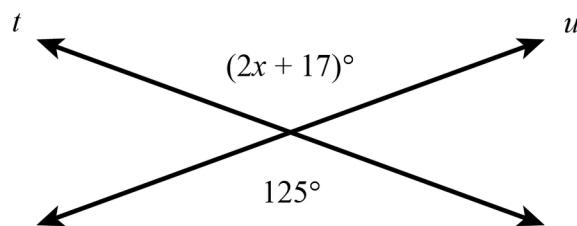
- A. 45
- B. 60
- C. 90
- D. 180

13. Ryan has $3\frac{1}{2}$ **pints** of milk. He uses $1\frac{1}{2}$ **cups** of milk to make Recipe A and $1\frac{1}{2}$ **cups** of milk to make Recipe B.

After making both recipes, how many **pints** of milk does Ryan have?

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

14. Line t intersects line u , as shown below.



What is the value of x ?

- A. 54
- B. 71
- C. 108
- D. 125

Non-Calculator Section

You may **not** use a calculator to solve the questions in this section.



15. Talia runs and swims every day. She runs for 0.75 hours per day. She swims for s hours per day. Over 4 days, she runs and swims for a total of 5 hours.

Which equation can be used to find the number of hours Talia swims per day?

- A. $4s + 0.75 = 5$
- B. $0.75(s + 4) = 5$
- C. $4(0.75 + s) = 5$
- D. $s + 0.75(4) = 5$

16. Which expression could be used to solve the expression below?

$$-\left(\frac{3}{4}\right) \div \left(\frac{5}{6}\right) \times -7$$

- A. $-\left(\frac{3}{4}\right) \div -7 \times \left(\frac{5}{6}\right)$
- B. $\left(\frac{3}{4}\right) \times -\left(\frac{6}{5}\right) \times 7$
- C. $-7 \times -\left(\frac{3}{4}\right) \times \left(\frac{6}{5}\right)$
- D. $-7 \times \left(\frac{5}{6}\right) \div -\left(\frac{3}{4}\right)$

17. In the table below, the number of cups of flour is proportional to the number of cups of sugar.

Cups of Sugar	Cups of Flour
$13\frac{4}{5}$	23
$19\frac{1}{5}$	32
$30\frac{3}{4}$	$51\frac{1}{4}$
$37\frac{4}{5}$	63

What is the number of cups of flour per cup of sugar?

- A. $\frac{3}{5}$
- B. $1\frac{2}{3}$
- C. $5\frac{2}{5}$
- D. $9\frac{1}{5}$

18. Alyssa had -180 points after the first round of a game. At the end of the second round Alyssa has 225 points.

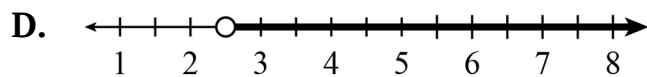
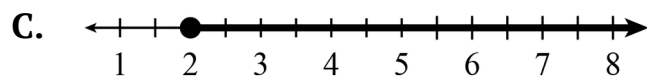
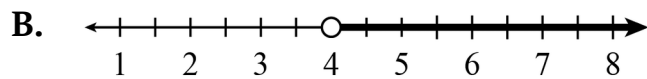
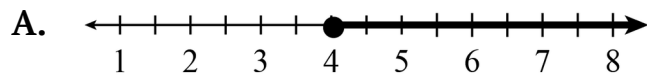
Which expressions represent the number of points Alyssa earned in the second round?

Select **all** that apply.

- A. $|-180 - 225|$
- B. $225 - (-180)$
- C. $-180 + 225$
- D. $|225 - 180|$
- E. $-180 - 225$

19. Marco set a goal to read at least 30 books in 12 months. He's already read 10 books and has 5 months left to reach his goal.

Which graph **best** represents the possible values for the number of books, b , Marco needs to read per month in the remaining 5 months in order to meet his goal?



20. Write **two** expressions that are equivalent to the expression below.

$$(9 - c) + (9 - c) + (9 - c) + (9 - c)$$

Respond in the space provided.

21. Which expression is equivalent to the expression below?

$$-1.25 + (-x) - \left(-\frac{4}{9}\right)$$

- A. $-1.25 - \frac{4}{9} - x$
- B. $\frac{4}{9} - 1.25 - x$
- C. $(x - 1.25) - \left(\frac{4}{9}\right)$
- D. $(-x) + (-1.25) + \left(-\frac{4}{9}\right)$
22. Jesse bought a 340-gram bag of coffee beans. He uses 18.75 grams of coffee beans each day. When there are 40 grams of coffee beans remaining in the bag, Jesse will buy another bag to make sure he doesn't run out of coffee.

Which equation and solution correctly represent d , the number of days until Jesse buys another bag of coffee beans?

- A. $340 - 18.75d = 40$
 $d = 16$
- B. $340 - 18.75d = 40$
 $d = 20.27$
- C. $18.75d - 40 = 340$
 $d = 20.27$
- D. $40 + 18.75d = 340$
 $d = 18.13$

23. In one round of a board game, Chrissy scored 43 points. In the next round, she lost 103 points.

How many points did Chrissy have in total after two rounds?

- A. -146
- B. -60
- C. 60
- D. 146
24. Sienna bought an acre of land for d dollars. When she sold it, the value of her land was $1.35d$ dollars.
- Which describes the change in the value of her land?
- A. 0.35% increase
- B. 1.35% increase
- C. 35% increase
- D. 135% increase

25. A box has s snack bags in it. Each snack bag contains c carrot sticks.

Which equation can be used to find b , the number of carrot sticks in one box?

- A. $b = \frac{s}{c}$
- B. $b = sc$
- C. $b = s + c$
- D. $b = \frac{c}{s}$

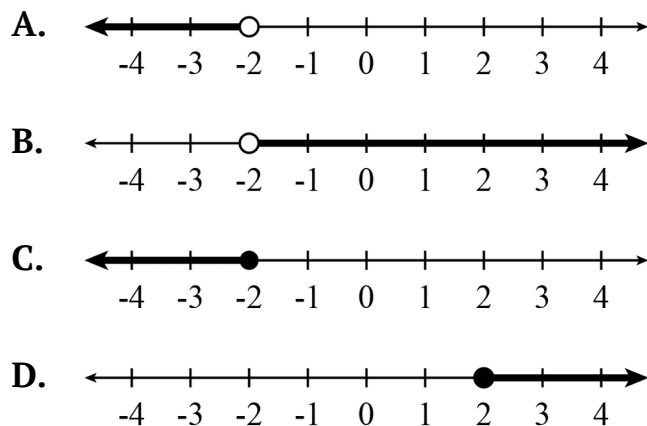
26. Paul says that $\frac{x}{y}$ can result in either a positive or negative quotient.

Is Paul correct? Explain why or why not and use examples to support your answer.

Respond in the space provided.

27. Which graph represents the solution to the inequality below?

$$8 - 2x > 12$$



28. Gini is playing a card game in which she receives -1 point for every red card and 1 point for every black card in her hand. Gini earns a score of -3 points.

What could Gini's cards be?

- A. 1 red card and 2 black cards
 B. 3 red cards and 3 black cards
 C. 4 red cards and 7 black cards
 D. 8 red cards and 5 black cards

29. Which expressions are equivalent to the expression below?

$$-p(q + r + 5)$$

Select **all** that apply.

- A. $-pq + r + 5$
 B. $-pq - pr - 5p$
 C. $-pq - p(r + 5)$
 D. $p(q - r - 5)$
 E. $p(-q - r) - 5p$
 F. $p - (q + r + 5)$

30. A submarine starts at sea level and descends at a rate of 7 feet per second.

What will be the altitude, in feet, of the submarine after 30 seconds?

- A. -210
 B. -37
 C. 23
 D. 210

- 31.** Camille buys a veggie tray for \$24.99. She also buys 12 muffins. Each muffin costs the same amount. She spends \$39.99 on the veggie tray and the muffins.

Camille finds the cost of each muffin by calculating $(39.99 - 24.99) \div 12$. Tanya finds the cost of each muffin by solving the equation $39.99 + 12b = 24.99$, where b is the cost of each muffin.

Which approach uses the sequence of operations necessary to find the cost of each muffin: Camille's, Tanya's, both, or neither? Explain why.

Respond in the space provided.

32. Which expression could be used to evaluate the expression below?

$$-8 \div \frac{-2}{-5}$$

A. $-\left(\frac{8 \times 5}{8 \times 2}\right)$

B. $-\frac{8}{2} \times -5$

C. $-\left(\frac{8 \times 5}{2}\right)$

D. $\frac{-8}{-2} \div -5$

33. A restaurant is hosting a dinner event for a maximum of 95 people. So far, 23 people have registered to attend the event. There are 12 tables left and each table can seat p people.

Which inequality and corresponding solution correctly represent the number of people, p , that can be seated at each table?

A. $95 > 23 + 12p$

There must be fewer than 6 people at each table.

B. $95 \geq 23 + 12p$

There must be 6 or fewer people at each table.

C. $95 > 23p + 12$

There must be fewer than 3 people at each table.

D. $95 \geq 23p + 12$

There must be 3 or fewer people at each table.

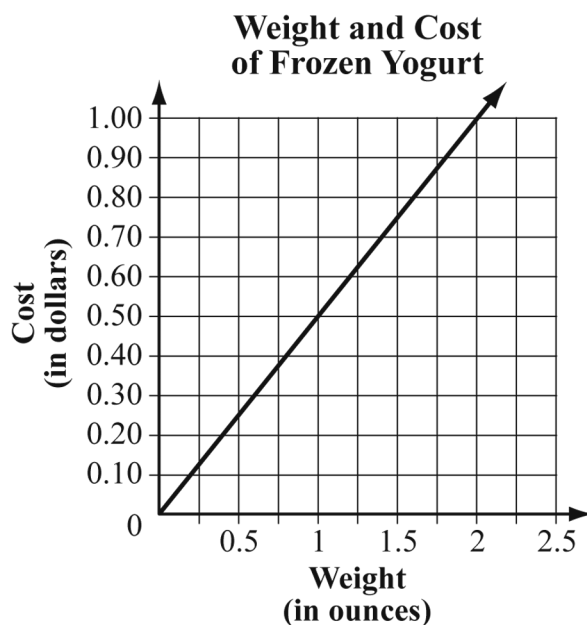
34. Which expressions are equivalent to the expression below?

$$-\frac{1}{3} - (-4 + \frac{1}{6})$$

Select **all** that apply.

- A. $\frac{1}{6} - \frac{1}{3} - 4$
- B. $-\frac{1}{3} + 4 + \frac{1}{6}$
- C. $-(\frac{1}{3} - \frac{1}{6}) + 4$
- D. $-\frac{1}{3} - \frac{1}{6} + 4$
- E. $-\frac{1}{3} - (4 - \frac{1}{6})$
- F. $4 - (\frac{1}{3} + \frac{1}{6})$

35. Troy buys frozen yogurt from a store. The cost, in dollars, is proportional to the weight, in ounces, of the yogurt, as shown below.



Which point on the graph represents the cost, in dollars, of one ounce of frozen yogurt?

- A. (0.50, 1)
- B. (1, 0.10)
- C. (1, 0.50)
- D. (2, 1)

- 36.** Which expression is equivalent to the expression below?

$$4(-a + 7) + 2.5a$$

- A.** $-4a + 28$
 - B.** $-1.5a + 28$
 - C.** $-1.5a + 7$
 - D.** $-6.5a + 28$
- 37.** Ana needs a total of \$350 to hire a band for a school event. She is selling chocolate bars for \$2.50 each to raise money. She has already raised \$120.

How many more chocolate bars does Ana need to sell to reach \$350?

- A.** 92
- B.** 140
- C.** 188
- D.** 230

- 38.** Some students are keeping track of how much money they earn and spend in one week. Use the table below to answer the following questions.

Activity	Money earned or spent (in dollars)
Hourly pay	14
Weekly allowance	21
Buy dinner	-12
Ride the bus	-2.50

Part A

If Kevin gets paid for 3 hours, gets 1 weekly allowance, rides the bus 6 times, and has 0 dollars at the end of the week, how many times did he buy dinner? Justify your answer.

Respond in the space provided.

Part B

Two students keep track of their activities during one week as follows:

- Dana gets paid for 4 hours, buys dinner once, and rides the bus 4 times.
- Melanie gets paid for 2 hours, gets 1 weekly allowance, and rides the bus 7 times.

Which student has more money at the end of the week, and by how much? Justify your answer.

Respond in the space provided.

Assessment Analysis Guide

Interim Assessment 3

Mathematics

Grade 7

Item Id: i138600**Item Type: Selected Response**

Standards Description:

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Primary Standard: cc:7.EE.B.3

Points Possible: 1

The price of a carton of eggs at Supermarket *A* is \$2.10. The price of a carton of eggs at Supermarket *B* is 40% less than the price at Supermarket *A*.

What is the price of a carton of eggs at Supermarket *B*?

A. \$0.84

Student found 40% of \$2.10 instead of 40% less than \$2.10.

B. \$1.26

Correct.

C. \$1.70

Student found 0.40 less than \$2.10 instead of 40% less than \$2.10.

D. \$2.94

Student found 40% more than \$2.10.

3

Item Id: i138878**Item Type: Math Short Answer**

Standards Description:

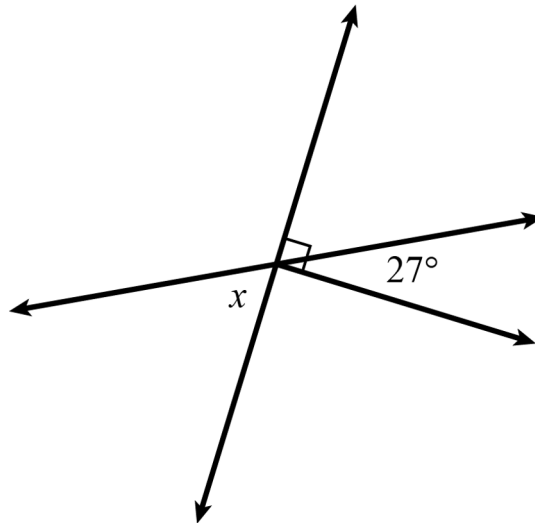
7.G.B.5

Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

Primary Standard: cc:7.G.B.5

Points Possible: 1

Use the figure to answer the question below.



The figure is not drawn to scale.

What is the value of x , in degrees?

Respond in the space provided.

*If your test is on paper, write your answer on the answer sheet.***Correct Answer:**

$$x = 63^\circ$$

4

Item Id: i112665**Item Type: Selected Response**

Standards Description:

7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.

Primary Standard: cc:7.RP.A.3

Points Possible: 1

Malik estimated that 150 people would attend a concert. The exact attendance was 215 people.

What is his percent error, to the nearest percent?

A. 18%

Student calculated the difference (65) and then divided it by the total (365).

B. 30%

Correct.

C. 43%

Student divided the difference (65) by the estimated amount (150) instead of the exact amount (215).

D. 65%

Student subtracted to find the error (65), but did not divide to find the percent error.

5

Item Id: i112810

Item Type: Selected Response

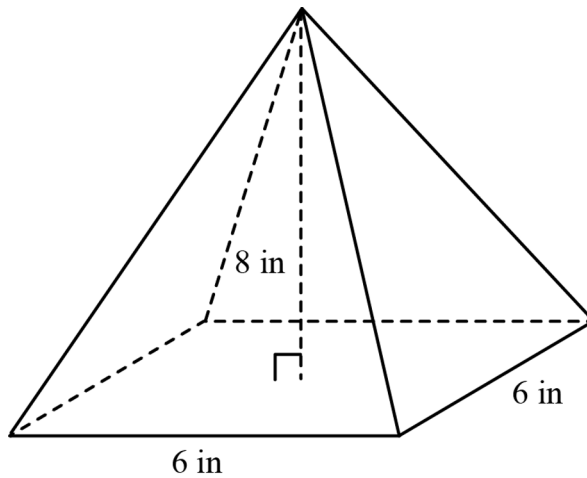
Standards Description:

7.G.A.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

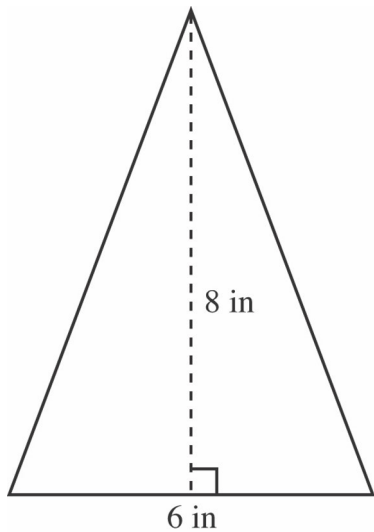
Primary Standard: cc:7.G.A.3

Points Possible: 1

Which two-dimensional plane section **cannot** be made from making a single vertical or horizontal slice through the pyramid below?

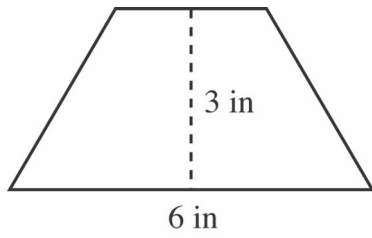


A.



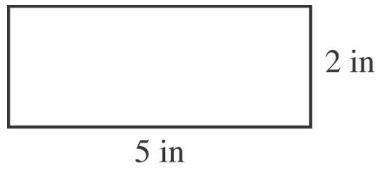
Student did not recognize a vertical plane section through the apex of the pyramid.

B.



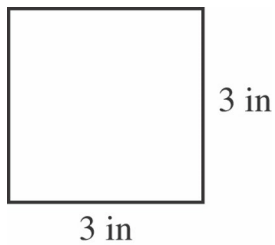
Student did not recognize a vertical plane section that does not go through the apex of the pyramid.

C.



Correct.

D.



Student did not recognize a horizontal plane section.

Item Id: i138604**Item Type: Selected Response**

Standards Description:

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Primary Standard: cc:7.EE.B.3

Points Possible: 1

In November, the average temperature at the North Pole is -8.3° Fahrenheit. In December, the average temperature at the North Pole is 7.7° Fahrenheit colder than November's average temperature. In January, the average temperature at the North Pole is $1\frac{1}{4}$ times colder than December's average temperature.

What is the average temperature, in degrees Fahrenheit, at the North Pole in January?

- A. -0.75 Student subtracted -7.7 from -8.3 OR added 7.7 to -8.3 ; found $(-8.3 + 7.7)(1.25)$.
- B. -14.75 Student added 1.25 instead of multiplying by 1.25 ; found $(-8.3 - 7.7 + 1.25)$.
- C. -17.25 Student added -1.25 instead of multiplying by 1.25 ; found $(-8.3 - 7.7 - 1.25)$.
- D. -20 Correct.

7

Item Id: i111740**Item Type: Selected Response**

Standards Description:

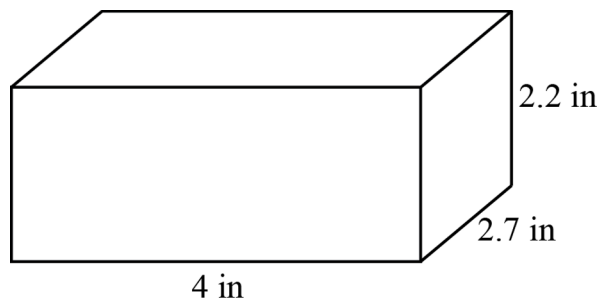
7.G.B.6

Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Primary Standard: cc:7.G.B.6

Points Possible: 1

What is the surface area, in square inches, of the rectangular prism below?



A. 23.76

Student found the volume of the prism instead of the surface area.

B. 25.54

Student found the area of the visible faces; did not multiply by 2 when finding the surface area.

C. 40.28

Student did not account for the area of the bottom face.

D. 51.08

Correct.

Item Id: i113129**Item Type: Selected Response**

Standards Description:

7.RP.A.2.a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

Primary Standard: cc:7.RP.A.2.a

Points Possible: 1

Which table shows a proportional relationship between gallons of gas and the cost of gas?

A.

Gallons of Gas	Cost
1	\$3.25
3	\$9.75
5	\$15.25

Student identified a table in which the first two rows exhibit equivalent ratios but the third row does not.

B.

Gallons of Gas	Cost
3	\$14.75
5	\$18.75
7	\$22.75

Student recognized that both columns increase in whole number increments but did not recognize they are not proportional.

C.

Gallons of Gas	Cost
5	\$16.25
6	\$19.50
7	\$22.75

Correct.

D.

Gallons of Gas	Cost
7	\$22.75
8	\$23.75
9	\$24.75

Student recognized the incremental increase in the dollar amounts is the same as the incremental increase in the number of gallons of gas and thought this indicated proportionality, OR student recognized that both columns increase in whole number increments but did not recognize they are not proportional.

9

Item Id: i138876**Item Type: Multiple Select**

Standards Description:

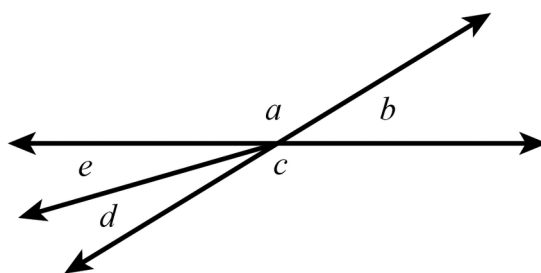
7.G.B.5

Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

Primary Standard: cc:7.G.B.5

Points Possible: 1

Use the figure to answer the question below.



Which equations must be true?

Select **all** that apply.

A. $a = c$

Correct.

B. $d + e = b$

Correct.

C. $a + e = 90^\circ$

Student may have thought adjacent angles were complementary.

D. $c + d + e = 180^\circ$

Correct.

E. $b + (d + e) = 180^\circ$

Student may have thought vertical angles were supplementary.

10

Item Id: i112439**Item Type: Selected Response**

Standards Description:

7.G.A.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

Primary Standard: cc:7.G.A.2

Points Possible: 1

Which set of side lengths can form a triangle?

A. 2 cm, 2 cm, 6 cm

Student did not apply the Triangle Inequality Theorem; possibly thought that because two side lengths were equal it was an isosceles triangle.

B. 3 cm, 6 cm, 9 cm

Student misinterpreted the Triangle Inequality Theorem to mean that the sum of the two shortest sides could be equal to the longest side.

C. 4 cm, 8 cm, 5 cm

Correct.

D. 8 cm, 3 cm, 4 cm

Student misinterpreted the Triangle Inequality Theorem; possibly subtracted the longest and shortest side lengths and thought it had to be greater than the remaining side ($8 - 3 > 4$).

11

Item Id: i113164**Item Type: Math Short Answer**

Standards Description:

7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.

Primary Standard: cc:7.RP.A.3

Points Possible: 1

Currently, there are 350 students in the seventh grade at Winchester Heights Middle School. For the upcoming school year, they are planning to increase the number of seventh graders by 10%.

How many seventh-grade students does Winchester Heights Middle School plan to have in the upcoming school year?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

Correct Answer:

385 seventh-grade students

12

Item Id: i112429**Item Type: Selected Response**

Standards Description:

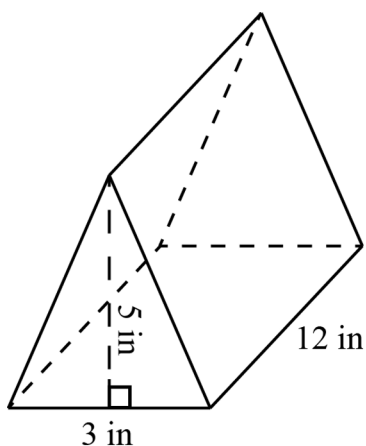
7.G.B.6

Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Primary Standard: cc:7.G.B.6

Points Possible: 1

What is the volume, in cubic inches, of the right triangular prism shown below?



- A. 45 Student divided by 2 twice when solving the problem; perhaps divided by 2 when finding the area of the triangle and again after multiplying by 12.
- B. 60 Student multiplied the height of the triangle by the length of the rectangle, possibly using the formula $V = b \times h$.
- C. 90 Correct.
- D. 180 Student did not divide by 2 when solving for the area of the triangular base.

Item Id: i138602**Item Type: Selected Response**

Standards Description:

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Primary Standard: cc:7.EE.B.3

Points Possible: 1

Ryan has $3\frac{1}{2}$ **pints** of milk. He uses $1\frac{1}{2}$ **cups** of milk to make Recipe A and $1\frac{1}{2}$ **cups** of milk to make Recipe B.

After making both recipes, how many **pints** of milk does Ryan have?

- A. $\frac{1}{2}$ Student did not convert cups to pints and found $3.5 - (1.5 + 1.5)$ instead of $3.5 - (0.75 + 0.75)$.
- B. 2 Correct.
- C. $2\frac{1}{2}$ Student incorrectly converted cups to pints by multiplying by 2 instead of dividing by 2 and then subtracted the number of pints Ryan started with from the number of pints he used; found $((2 \times 1.5) + (2 \times 1.5)) - 3.5$ instead of $3.5 - ((1.5/2) + (1.5/2))$.
- D. 4 Student found the number of cups Ryan has left over.

Item Id: i138877**Item Type: Selected Response**

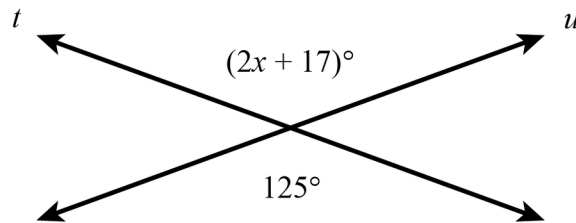
Standards Description:

7.G.B.5

Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

Primary Standard: cc:7.G.B.5

Points Possible: 1

Line t intersects line u , as shown below.What is the value of x ?

- A. 54 Correct.
- B. 71 Student did not use algebraic rules correctly to simplify the equation; added 17 to 125 and subtracted 17 from $2x + 17$, instead of subtracting 17 from both sides.
- C. 108 Student did not completely isolate the variable; did not divide by 2.
- D. 125 Student found the value of the expression $2x + 17$, instead of the value of x .

15

Item Id: i131325**Item Type: Selected Response**

Standards Description:

7.EE.B.4.a Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

Primary Standard: cc:7.EE.B.4.a

Points Possible: 1

Talia runs and swims every day. She runs for 0.75 hours per day. She swims for s hours per day. Over 4 days, she runs and swims for a total of 5 hours.

Which equation can be used to find the number of hours Talia swims per day?

A. $4s + 0.75 = 5$

Student confused running 0.75 hours per day with running 0.75 hours total.

B. $0.75(s + 4) = 5$

Student switched the number being distributed to both terms (4) with the number of hours ran per day (0.75).

C. $4(0.75 + s) = 5$

Correct.

D. $s + 0.75(4) = 5$

Student confused swimming s hours per day for 4 days (4s) with swimming for s hours total (s).

Item Id: i113196**Item Type: Selected Response**

Standards Description:

7.NS.A.2.c Apply properties of operations as strategies to multiply and divide rational numbers.

Primary Standard: cc:7.NS.A.2.c

Points Possible: 1

Which expression could be used to solve the expression below?

$$-\left(\frac{3}{4}\right) \div \left(\frac{5}{6}\right) \times -7$$

A. $-\left(\frac{3}{4}\right) \div -7 \times \left(\frac{5}{6}\right)$

Student misapplied the associative property to division; switched the placement of -7 and 5/6.

B. $\left(\frac{3}{4}\right) \times -\left(\frac{6}{5}\right) \times 7$

Student attempted to express division as multiplication of the reciprocal, but rewrote the expression using the opposite of all three terms; may have thought the value of the original expression was negative.

C. $-7 \times -\left(\frac{3}{4}\right) \times \left(\frac{6}{5}\right)$

Correct.

D. $-7 \times \left(\frac{5}{6}\right) \div -\left(\frac{3}{4}\right)$

Student swapped the two operations and the first and last terms (-3/4 and -7); did not account for the operations that correspond to each term.

Item Id: i117249**Item Type: Selected Response**

Standards Description:

7.RP.A.2.b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Primary Standard: cc:7.RP.A.2.b

Points Possible: 1

In the table below, the number of cups of flour is proportional to the number of cups of sugar.

Cups of Sugar	Cups of Flour
$13\frac{4}{5}$	23
$19\frac{1}{5}$	32
$30\frac{3}{4}$	$51\frac{1}{4}$
$37\frac{4}{5}$	63

What is the number of cups of flour per cup of sugar?

A. $\frac{3}{5}$

Student found the unit rate of cups of sugar per cup of flour.

B. $1\frac{2}{3}$

Correct.

C. $5\frac{2}{5}$

Student found the increase between the first two rows in the “Cups of Sugar” column.

D. $9\frac{1}{5}$

Student found the difference between the number of cups of flour and the number of cups of sugar in the first row.

Item Id: i112664**Item Type: Multiple Select**

Standards Description:

7.NS.A.1.c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

Primary Standard: cc:7.NS.A.1.c

Points Possible: 1

Alyssa had -180 points after the first round of a game. At the end of the second round Alyssa has 225 points.

Which expressions represent the number of points Alyssa earned in the second round?

Select **all** that apply.

A. $|-180 - 225|$

Correct.

B. $225 - (-180)$

Correct.

C. $-180 + 225$

Student did not recognize the need to find the difference between -180 and 225 .

D. $|225 - 180|$

Student did not represent 180 as negative; may have thought addition was needed and chose an expression equivalent to $225 + (-180)$.

E. $-180 - 225$

Student did not recognize distance between the two numbers is the absolute value of their difference, and thus, must be positive.

Item Id: i138394

Item Type: Selected Response

Standards Description:

7.EE.B.4.b Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

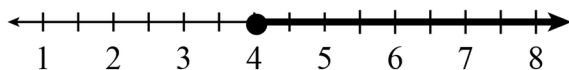
Primary Standard: cc:7.EE.B.4.b

Points Possible: 1

Marco set a goal to read at least 30 books in 12 months. He's already read 10 books and has 5 months left to reach his goal.

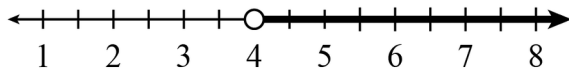
Which graph **best** represents the possible values for the number of books, b , Marco needs to read per month in the remaining 5 months in order to meet his goal?

A.



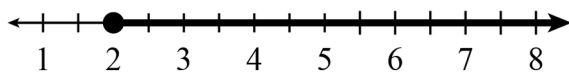
Correct.

B.



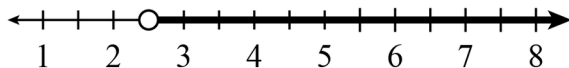
Student interpreted "at least" as "more than."

C.



Student set up the inequality correctly, combined unlike terms to get $15b$ is greater than or equal to 30, and then solved.

D.



Student set up the inequality as $10b + 5 > 30$ and then solved.

20

Item Id: i130834**Item Type: Constructed Response**

Standards Description:

7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Standard(s) for Mathematical Practice:

MP7 Look for and make use of structure.

In this item, students must understand and use properties like the distributive property, associative property, and commutative property to create equivalent expressions involving a variable.

Primary Standard: cc:7.EE.A.1

Points Possible: 2

Write **two** expressions that are equivalent to the expression below.

$$(9 - c) + (9 - c) + (9 - c) + (9 - c)$$

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

$$4(9 - c)$$

$$36 - 4c$$

Evidence Statement(s):

1. Student applied properties of operations to write an expression equivalent to the one given.
2. Student applied properties of operations to write a second expression equivalent to the one given.

Common Misconception(s):

- Student tried to collect like terms but thought that adding the same term increased the exponent resulting in an expression such as $9^4 - c^4$.
- Student tried to add unlike terms using multiplication resulting in an expression such as $36(4c)$.
- Student was only able to write one expression equivalent to the given expression.

Item Id: i116838**Item Type: Selected Response**

Standards Description:

7.NS.A.1.d Apply properties of operations as strategies to add and subtract rational numbers.

Primary Standard: cc:7.NS.A.1.d

Points Possible: 1

Which expression is equivalent to the expression below?

$$-1.25 + (-x) - \left(-\frac{4}{9}\right)$$

A. $-1.25 - \frac{4}{9} - x$

Student reversed the order of the last two terms but neglected the operation that came before the parentheses in $(-4/9)$; may have thought $-(-4/9)$ was equivalent to subtracting $4/9$.

B. $\frac{4}{9} - 1.25 - x$

Correct.

C. $(x - 1.25) - \left(\frac{4}{9}\right)$

Student neglected the negative signs in $(-x)$ and $(-4/9)$, and rewrote the expression based only on the operations that came before them; may have confused the parentheses with the absolute values of these terms.

D. $(-x) + (-1.25) + \left(-\frac{4}{9}\right)$

Student rewrote $-(-4/9)$ as $-4/9$ instead of $4/9$; did not recognize that subtraction of a negative should result in a positive.

Item Id: i131321**Item Type: Selected Response**

Standards Description:

7.EE.B.4.a Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

Primary Standard: cc:7.EE.B.4.a

Points Possible: 1

Jesse bought a 340-gram bag of coffee beans. He uses 18.75 grams of coffee beans each day. When there are 40 grams of coffee beans remaining in the bag, Jesse will buy another bag to make sure he doesn't run out of coffee.

Which equation and solution correctly represent d , the number of days until Jesse buys another bag of coffee beans?

A. $340 - 18.75d = 40$
 $d = 16$

Correct.

B. $340 - 18.75d = 40$
 $d = 20.27$

Student represented the situation with the correct equation but solved incorrectly; added, instead of subtracted, 40 to 340 and then divided 380 by 18.75 and rounded to the nearest hundredth.

C. $18.75d - 40 = 340$
 $d = 20.27$

Student incorrectly set up the equation, possibly interpreted having 40 grams of coffee beans left over as subtracting 40, and represented using 18.75 grams each day as positive instead of negative, then solved accordingly.

D. $40 + 18.75d = 340$
 $d = 18.13$

Student chose a correct equation but incorrectly solved; possibly tried to solve arithmetically and found $340/18.75$, ignoring the 40.

23

Item Id: i130383**Item Type: Selected Response**

Standards Description:

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Primary Standard: cc:7.NS.A.3

Points Possible: 1

In one round of a board game, Chrissy scored 43 points. In the next round, she lost 103 points.

How many points did Chrissy have in total after two rounds?

A. -146

Student possibly confused a strategy for multiplying by a negative with adding a negative; added the value of each addend as if positive and then changed the sign afterwards.

B. -60

Correct.

C. 60

Student added as if -103 was a positive value and 43 was a negative value.

D. 146

Student added the numbers and ignored the negative sign in the second value.

Item Id: i129750**Item Type: Selected Response**

Standards Description:

7.EE.A.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

Primary Standard: cc:7.EE.A.2

Points Possible: 1

Sienna bought an acre of land for d dollars. When she sold it, the value of her land was $1.35d$ dollars.

Which describes the change in the value of her land?

A. 0.35% increase

Student interpreted the percentage increase as the same as the decimal increase.

B. 1.35% increase

Student possibly thought 1.35 was being added to d as opposed to multiplied in the expression given, and therefore thought it represented the percent increase.

C. 35% increase

Correct.

D. 135% increase

Student identified that the final value of the land was 135% of the original value, but confused this as the percentage increase.

25

Item Id: i116828**Item Type: Selected Response**

Standards Description:

7.RP.A.2.c Represent proportional relationships by equations.

Primary Standard: cc:7.RP.A.2.c

Points Possible: 1

A box has s snack bags in it. Each snack bag contains c carrot sticks.Which equation can be used to find b , the number of carrot sticks in one box?

A. $b = \frac{s}{c}$

Student misinterpreted a multiplicative relationship as division; represented the equation as the number of carrot sticks in one box is equal to the ratio of the number of snack bags per box to the number of carrot sticks per bag.

B. $b = sc$

Correct.

C. $b = s + c$

Student misinterpreted a multiplicative relationship as an additive relationship; represented the equation as the number of carrot sticks in one box is equal to the number of snack bags per box plus the number of carrot sticks per bag.

D. $b = \frac{c}{s}$

Student misinterpreted a multiplicative relationship as division; represented the equation as the number of carrot sticks in one box is equal to the ratio of the number of carrot sticks per bag to the number of snack bags per box.

Item Id: i112713**Item Type: Constructed Response**

Standards Description:

7.NS.A.2.b Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

Standard(s) for Mathematical Practice:

MP3 Construct viable arguments and critique the reasoning of others.

In this item, students need to critique the reasoning of others and provide examples and counterexamples to prove different conclusions.

MP7 Look for and make use of structure.

In this item, students need to reason and make conclusions about variables with undefined values, looking for patterns and understanding properties of operations.

Primary Standard: cc:7.NS.A.2.b

Points Possible: 2

Paul says that $\frac{x}{y}$ can result in either a positive or negative quotient.

Is Paul correct? Explain why or why not and use examples to support your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Paul is correct.

If x and y are both positive or both negative, the quotient will be positive.

Examples:

$$\frac{3}{1} = 3 \text{ and } \frac{-3}{-1} = 3$$

If x is negative and y is positive, or vice versa, the quotient will be negative.

Examples:

$$\frac{-3}{1} = -3 \text{ and } \frac{3}{-1} = -3$$

Alternate examples are also accepted.

Evidence Statement(s):

1. Student provided an example that shows that Paul is correct because a negative divided by a negative, or a positive divided by a positive, will result in a positive quotient.
2. Student provided an example that shows that Paul is correct because a negative divided by a positive, or vice versa, will result in a negative quotient.

Common Misconception(s):

- Student thought Paul was incorrect; did not recognize that the quotient could be negative or positive based on the signs of x and y .
- Student thought Paul was correct, but gave incorrect examples to support their answer; may have confused the rules of dividing integers.
- Student thought Paul was correct, but incorrectly concluded that it would depend on the absolute values of the integers, possibly confusing rules of dividing integers with rules of adding and subtracting integers.

Item Id: i138384**Item Type: Selected Response**

Standards Description:

7.EE.B.4.b Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

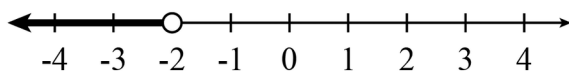
Primary Standard: cc:7.EE.B.4.b

Points Possible: 1

Which graph represents the solution to the inequality below?

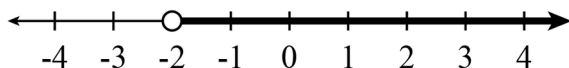
$$8 - 2x > 12$$

A.



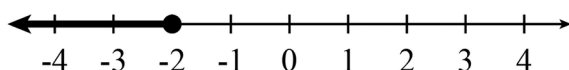
Correct.

B.



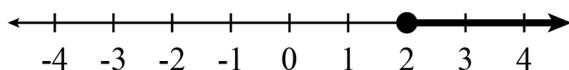
Student simplified the inequality to $-2x > 4$, but kept the inequality as " $>$ " when dividing by -2 , resulting in $x > -2$.

C.



Student interpreted the " $<$ " symbol as "less than or equal to."

D.



Student combined unlike terms to get $6x > 12$, solved to get $x > 2$, and interpreted the " $>$ " symbol as "greater than or equal to."

Item Id: i113074**Item Type: Selected Response**

Standards Description:

7.NS.A.1.b Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

Primary Standard: cc:7.NS.A.1.b

Points Possible: 1

Gini is playing a card game in which she receives -1 point for every red card and 1 point for every black card in her hand. Gini earns a score of -3 points.

What could Gini's cards be?

A. 1 red card and 2 black cards

Student chose a hand that has 3 total cards, but would not earn a score of -3 .

B. 3 red cards and 3 black cards

Student chose a hand that would score 0; possibly confused because the hand includes the score of -3 .

C. 4 red cards and 7 black cards

Student chose a hand that would score 3 instead of -3 .**D. 8 red cards and 5 black cards**

Correct.

Item Id: i138286**Item Type: Multiple Select**

Standards Description:

7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Primary Standard: cc:7.EE.A.1

Points Possible: 2

Which expressions are equivalent to the expression below?

$$-p(q + r + 5)$$

Select **all** that apply.

A. $-pq + r + 5$

Student did not distribute -p to r or 5; perhaps thought the distributed factor only gets distributed once.

B. $-pq - pr - 5p$

Correct.

C. $-pq - p(r + 5)$

Correct.

D. $p(q - r - 5)$

Student recognized addition would change to subtraction when distributing -1 but did not take the opposite of q.

E. $p(-q - r) - 5p$

Correct.

F. $p - (q + r + 5)$

Student did not recognize the operation indicated by a variable in front of parentheses as multiplication and instead represented subtraction because p is negative.

30

Item Id: i112690**Item Type: Selected Response**

Standards Description:

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Primary Standard: cc:7.NS.A.3

Points Possible: 1

A submarine starts at sea level and descends at a rate of 7 feet per second.

What will be the altitude, in feet, of the submarine after 30 seconds?

A. -210

Correct.

B. -37

Student recognized the value should be negative, but added -7 and -30 instead of multiplying 30 and -7.

C. 23

Student may have represented 7 as negative and found $30 + -7$; possibly interpreted the situation as descending 7 feet from 30 feet.

D. 210

Student did not recognize that a rate of descent would be represented with a negative integer; calculated 30×7 instead of 30×-7 .

Item Id: i130835**Item Type: Constructed Response**

Standards Description:

7.EE.B.4.a Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

In this item, students must decontextualize a real-world problem to represent it arithmetically and algebraically.

MP7 Look for and make use of structure.

In this item, students must compare an arithmetic and algebraic approach to solve a multi-step problem.

Primary Standard: cc:7.EE.B.4.a

Points Possible: 2

Camille buys a veggie tray for \$24.99. She also buys 12 muffins. Each muffin costs the same amount. She spends \$39.99 on the veggie tray and the muffins.

Camille finds the cost of each muffin by calculating $(39.99 - 24.99) \div 12$. Tanya finds the cost of each muffin by solving the equation $39.99 + 12b = 24.99$, where b is the cost of each muffin.

Which approach uses the sequence of operations necessary to find the cost of each muffin: Camille's, Tanya's, both, or neither? Explain why.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

To find the cost of each muffin, you need to first find the amount of money spent on 12 muffins, and then divide that amount by 12 to find the cost of each muffin. Camille's method follows the sequence of operations necessary to find the cost of each muffin, so her method could be used to find the cost of each muffin.

In Camille's method, her first step is to subtract the cost of the veggie tray (\$24.99) from the total cost (\$39.99) to find the amount of money spent on 12 muffins is \$15. In Camille's method, her second step is to divide the difference \$15 by 12 muffins to find the cost of each muffin is \$1.25.

In Tanya's method, her first step is to subtract \$39.99, the total cost, from both sides of the equation, rather than subtract the cost of the veggie tray (\$24.99) from both sides. Tanya's equation is incorrect because it leads to an incorrect first step and therefore cannot be used to find the cost of each muffin.

Evidence Statement(s):

1. Student explained the sequence of operations necessary to find the cost of each muffin.
2. Student showed how the sequence of operations necessary to solve the problem is reflected in Camille's method and not in Tanya's method.

Common Misconception(s):

- Student concluded that both Camille's and Tanya's approaches result in the correct cost of each muffin; may have solved Tanya's equation and got a solution of -1.25 , overlooked the negative, determined that both methods found the cost of each muffin to be \$1.25, and therefore thought both methods followed the correct sequence of operations necessary to solve.
- Student concluded that Camille's method results in the correct cost of each muffin, but was unable to show how her method uses the sequence of operations necessary to solve.
- Student thought that neither Camille's nor Tanya's approaches are correct; confused the correct sequence of operations necessary to solve.
- Student thought that Camille's approach is incorrect; did not understand how to follow the sequence of operations in Camille's approach.

Item Id: i116835**Item Type: Selected Response**

Standards Description:

7.NS.A.2.c Apply properties of operations as strategies to multiply and divide rational numbers.

Primary Standard: cc:7.NS.A.2.c

Points Possible: 1

Which expression could be used to evaluate the expression below?

$$-8 \div \frac{-2}{-5}$$

A. $-\left(\frac{8 \times 5}{8 \times 2}\right)$

Student incorrectly tried to multiply the numerator and denominator by 8; perhaps student thought this was a use of the distributive property.

B. $-\frac{8}{2} \times -5$

Student organized the terms to create an equivalent multiplication expression but made both terms negative.

C. $-\left(\frac{8 \times 5}{2}\right)$

Correct.

D. $\frac{-8}{-2} \div -5$

Student did not realize that dividing -8 by $-2/-5$ would result in multiplying $-8/-2$ by -5 instead of dividing by -5 .

Item Id: i138406**Item Type: Selected Response**

Standards Description:

7.EE.B.4.b Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

Primary Standard: cc:7.EE.B.4.b

Points Possible: 1

A restaurant is hosting a dinner event for a maximum of 95 people. So far, 23 people have registered to attend the event. There are 12 tables left and each table can seat p people.

Which inequality and corresponding solution correctly represent the number of people, p , that can be seated at each table?

A. $95 > 23 + 12p$

There must be fewer than 6 people at each table.

Student confused a situation requiring a \geq sign with a $>$ sign.

B. $95 \geq 23 + 12p$

There must be 6 or fewer people at each table.

Correct.

C. $95 > 23p + 12$

There must be fewer than 3 people at each table.

Student confused a situation requiring a \geq sign with a $>$ sign and switched the values of the coefficient and the constant, but found the correct number of people based on the (incorrect) inequality.

D. $95 \geq 23p + 12$

There must be 3 or fewer people at each table.

Student switched the values of the coefficient and the constant, but found the correct number of people based on the (incorrect) inequality.

Item Id: i112522**Item Type: Multiple Select**

Standards Description:

7.NS.A.1.d Apply properties of operations as strategies to add and subtract rational numbers.

Primary Standard: cc:7.NS.A.1.d

Secondary Standard(s): cc:7.NS.A.2.a

Points Possible: 1

Which expressions are equivalent to the expression below?

$$-\frac{1}{3} - (-4 + \frac{1}{6})$$

Select **all** that apply.

A. $\frac{1}{6} - \frac{1}{3} - 4$

Student did not distribute the negative outside the parentheses to either term inside the parentheses.

B. $-\frac{1}{3} + 4 + \frac{1}{6}$

Student did not distribute the negative outside the parentheses to the $\frac{1}{6}$.

C. $-(\frac{1}{3} - \frac{1}{6}) + 4$

Student chose an expression in which the $\frac{1}{6}$ would ultimately be a positive value, instead of negative, because the negative sign outside the parentheses would be distributed to the $-\frac{1}{6}$, making it positive.

D. $-\frac{1}{3} - \frac{1}{6} + 4$

Correct.

E. $-\frac{1}{3} - (4 - \frac{1}{6})$

Student may have tried distributing a negative from outside the parentheses but did not change the operation outside the parentheses to addition, OR student may have tried to represent $-4 + \frac{1}{6}$ as $\frac{1}{6} - 4$ but reversed the order.

F. $4 - \left(\frac{1}{3} + \frac{1}{6}\right)$

Correct.

Item Id: i111795**Item Type: Selected Response**

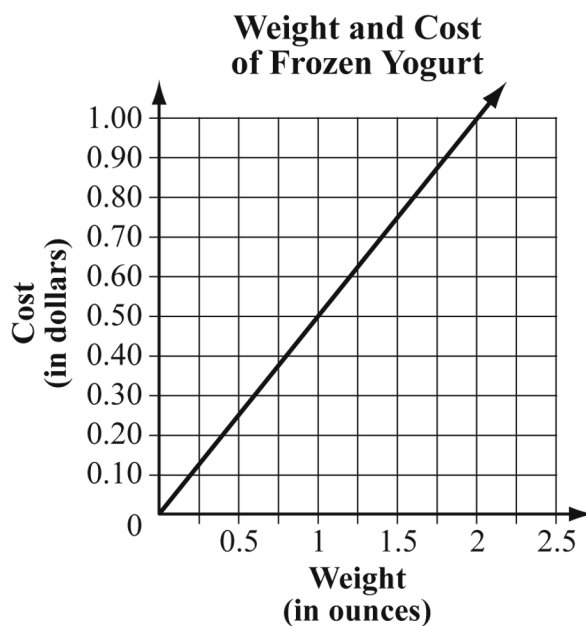
Standards Description:

7.RP.A.2.d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.

Primary Standard: cc:7.RP.A.2.d

Points Possible: 1

Troy buys frozen yogurt from a store. The cost, in dollars, is proportional to the weight, in ounces, of the yogurt, as shown below.



Which point on the graph represents the cost, in dollars, of one ounce of frozen yogurt?

A. $(0.50, 1)$

Student switched the x- and y-values of the coordinate point.

B. $(1, 0.10)$

Student used the first y-axis value, or used the increments on the y-axis to represent the unit rate.

C. $(1, 0.50)$

Correct.

D. (2, 1)

Student represented the number of ounces that cost \$1; student found 1 on the y-axis instead of on the x-axis.

Item Id: i138284**Item Type: Selected Response**

Standards Description:

7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Primary Standard: cc:7.EE.A.1

Points Possible: 1

Which expression is equivalent to the expression below?

$$4(-a + 7) + 2.5a$$

A. $-4a + 28$

Student correctly distributed but did not add the additional 2.5a.

B. $-1.5a + 28$

Correct.

C. $-1.5a + 7$

Student did not distribute the 4 to the 7.

D. $-6.5a + 28$

Student correctly distributed the 4 but miscalculated $-4a + 2.5a = -6.5a$.

Item Id: i131324**Item Type: Selected Response**

Standards Description:

7.EE.B.4.a Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

Primary Standard: cc:7.EE.B.4.a

Points Possible: 1

Ana needs a total of \$350 to hire a band for a school event. She is selling chocolate bars for \$2.50 each to raise money. She has already raised \$120.

How many more chocolate bars does Ana need to sell to reach \$350?

- A. 92 Correct.
- B. 140 Student did not factor in the \$120, and found the number of bars that need to be sold to earn the total amount of \$350.
- C. 188 Student added \$120 to the total amount of \$350 instead of subtracting before dividing by \$2.50.
- D. 230 Student found the amount of money left to raise ($350 - 120$).

38

Item Id: i138727**Item Type: Constructed Response**

Standards Description:

7.NS.A Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

In this item, students need to manipulate values with attention to their relationship back to the context of the situation.

MP7 Look for and make use of structure.

In this item, students need to be able to use properties flexibly to manipulate rational numbers efficiently in a complex expression.

38A

Primary Standard: cc:7.NS.A

Points Possible: 2

Some students are keeping track of how much money they earn and spend in one week. Use the table below to answer the following questions.

Activity	Money earned or spent (in dollars)
Hourly pay	14
Weekly allowance	21
Buy dinner	-12
Ride the bus	-2.50

Part A

If Kevin gets paid for 3 hours, gets 1 weekly allowance, rides the bus 6 times, and has 0 dollars at the end of the week, how many times did he buy dinner? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Hourly pay

$$3 \times 14 = 42 \text{ dollars}$$

Weekly allowance

$$1 \times 21 = 21 \text{ dollars}$$

Riding the bus

$$-2.5 \times 6 = -15 \text{ dollars}$$

Money left for dinner

$$42 + 21 - 15 = 48 \text{ dollars}$$

Kevin buys dinner 4 times because $-12 \times 4 = -48$ which cancels out the 48 dollars he had from his other earning and spending during the week. $48 - 48 = 0$ dollars

Evidence Statement(s):

1. Student applied an understanding of operations with rational numbers to determine the number of times Kevin buys dinner.
2. Student demonstrated, through their explanation, an understanding that a number and its opposite combine to make 0.

Common Misconception(s):

- Student did not understand how to combine negative and positive values to get a sum of 0.

38B

Primary Standard: cc:7.NS.A

Points Possible: 2

Part B

Two students keep track of their activities during one week as follows:

- Dana gets paid for 4 hours, buys dinner once, and rides the bus 4 times.
- Melanie gets paid for 2 hours, gets 1 weekly allowance, and rides the bus 7 times.

Which student has more money at the end of the week, and by how much? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Dana's weekly earning:

$$4(14) - 12 - 4(2.5)$$

$$56 - 12 - 10$$

34 dollars at the end of the week

Melanie's weekly earning:

$$2(14) + 21 - 7(2.5)$$

$$28 + 21 - 17.5$$

31.50 dollars at the end of the week

$$34 - 31.5 = 2.50 \text{ dollars}$$

Dana has \$2.50 more than Melanie at the end of the week.

Evidence Statement(s):

1. Student applied an understanding of properties of operations with rational numbers, likely using a combination of addition, subtraction, and multiplication to determine Dana's and Melanie's weekly earnings.
2. Student applied an understanding of subtraction with rational numbers to determine the difference between Dana's and Melanie's weekly earnings.

Common Misconception(s):

- Student may have a limited understanding of how to apply properties to add rational numbers and may have added, ignoring signs, or used properties of multiplication to add two negative rational numbers and recorded the result as positive.
- Student may have a limited understanding of how to apply properties to subtract rational numbers and may have added instead of adding the opposite, or subtracted, ignoring signs.

Interim Assessment 4

Mathematics

Grade 7

student: _____

teacher: _____

school: _____

DIRECTIONS

In this assessment you will answer a total of 16 questions, including 2 constructed-response question(s). Mark all of your answers to the questions on the answer sheet provided.

You may use this test booklet to work out the questions, but remember to mark all of your answers on the answer sheet. For constructed-response questions, record your answers directly on the page in the test booklet.

Calculator Section

You may use a calculator to solve the questions in this section.



1. Turica has 4 different pen colors: red, purple, blue, and green. She has 8 pens of each color. She selects a pen at random.

What is the probability she will select a green pen?

- A. $\frac{1}{2}$
- B. $\frac{1}{3}$
- C. $\frac{1}{4}$
- D. $\frac{1}{32}$

2. The table below shows the probability of each of four kinds of food being served for lunch at a school cafeteria.

Food	Probability of Each Food Being Served
Beans and Rice	$\frac{8}{30}$
Veggie Burger	$\frac{3}{30}$
Pizza	$\frac{4}{30}$
Salad Bar	$\frac{15}{30}$

The school cafeteria only serves one food each day. Eddy is trying to predict which food will be served on a randomly selected day.

Which conclusion is correct using the information in the table?

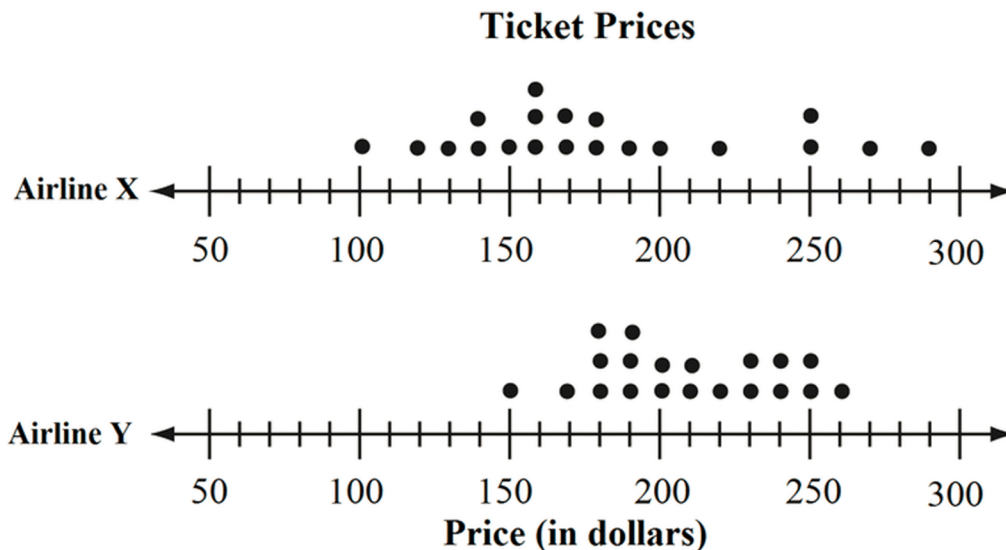
- A. It is less likely that the cafeteria will serve pizza than beans and rice.
- B. It is more likely that the cafeteria will serve veggie burgers than beans and rice.
- C. It is about twice as likely that the cafeteria will serve pizza as beans and rice.
- D. It is equally likely that the cafeteria will serve salad bar as it will serve beans and rice.

3. Hillary flips a fair coin 3 times in a row.

What is the probability that the coin lands on heads all 3 times?

- A. $\frac{1}{8}$
- B. $\frac{1}{4}$
- C. $\frac{1}{2}$
- D. $1\frac{1}{2}$

4. Lily is comparing the ticket prices for Airline X and Airline Y. She took random samples of 20 one-way flights for the two airlines and recorded their prices, rounded to the nearest ten dollars, on the line plots below.



Based on the line plots above, which statement **best** compares the airline ticket prices?

- Ticket prices for Airline X tend to be less expensive and vary less than ticket prices for Airline Y.
- Ticket prices for Airline X tend to be more expensive and vary more than ticket prices for Airline Y.
- Ticket prices for Airline X tend to be less expensive and vary more than ticket prices for Airline Y.
- Ticket prices for both airlines tend to cost about the same amount and vary equally.

5. Trish did an experiment where she dropped an empty paper cup 50 times and noted the number of times it landed in different positions. Her results are in the table.

Landing Result	Right-side up	Upside down	Sideways
Number of Outcomes	6	14	30

Which statement is **best** supported by the results of Trish's experiment?

- A. There is a 20% chance of a dropped paper cup landing right-side up.
- B. If 10 paper cups are dropped, it is likely that about 6 will land right-side up.
- C. There is a 14% chance of a dropped paper cup landing upside down.
- D. If 20 paper cups are dropped, it is likely that about 12 will land sideways.

6. A school librarian surveyed a random sample of 50 students to find out which library resources students value most. The table below shows the results.

Library Resources	Number of Students
Books	24
Study Areas	10
Classes	6
Movies	10

Which statements are **best** supported by the data?

Select **all** that apply.

- A. It is expected that 15% to 25% of all students will value movies the most.
- B. It is expected that 20% to 30% of all students will value books the most.
- C. In a group of 25 students, it is expected that around 5 students will value study areas the most.
- D. In a group of 100 students, it is expected that around 6 students will value classes the most.
- E. In a group of 200 students, it is expected that 20 students will value study areas the most, and 20 students will value movies the most.

7. Dan has a large bag of jelly beans. He selects a jelly bean from the bag, records the color, replaces the jelly bean, and repeats the process. He calculates the relative frequency of selecting a red jelly bean and records the results in the table below.

Number of Trials	Relative Frequency
10	0.30
20	0.28
50	0.20
100	0.17
150	0.18

Based on the information Dan recorded, which statements are true?

Select **all** that apply.

- A. Approximately 18% of the jelly beans are red.
- B. Out of 200 jelly beans, it is likely 34 to 40 will be red.
- C. If Dan selects 10 jelly beans again, exactly 3 will be red.
- D. The probability of selecting a red jelly bean is around 28%.
- E. Out of 300 trials, approximately 36% of the jelly beans selected will be red.

8. Jay has a bag with 2 blue marbles and 3 yellow marbles. He will randomly select one marble without replacing it, and then he will select a second marble from the bag.

What is the probability that he will select two blue marbles?

- A. $\frac{2}{25}$
- B. $\frac{1}{10}$
- C. $\frac{4}{25}$
- D. $\frac{1}{5}$

9. Use the information about data set A and data set B below to answer the question.
- Data set A has a mean of 67.
 - Data set B has a mean of 55.
 - Both data sets have a mean absolute deviation (MAD) of 3.

Based on the information, which statement **best** describes the amount of overlap in the data points between data set A and data set B?

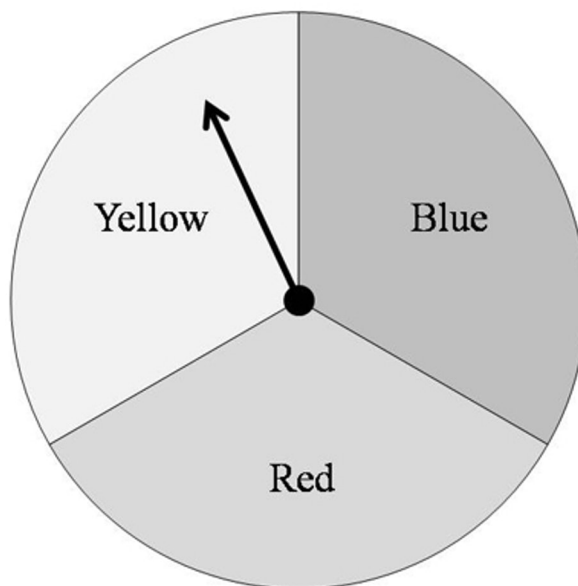
- A. Data sets A and B likely have a large amount of overlap in the data points because they have the same MAD.
- B. Data sets A and B likely have a large amount of overlap in the data points because the means are separated by 4 MADs.
- C. Data sets A and B likely have very little to no overlap in the data points because the means are separated by 4 MADs.
- D. There is not enough information to approximate the amount of overlap in the data points between data sets A and B.

10. Which statements about probability are true?

Select **all** that apply.

- A. An event with a probability of $\frac{47}{60}$ is likely to occur.
- B. An event with a probability of 0.9 is not likely to occur.
- C. An event with a probability of 1 is always going to occur.
- D. An event with a probability of $\frac{50}{350}$ is as likely as not to occur.
- E. An event with a probability of 49% is neither likely nor unlikely to occur.

11. All three sections of the spinner below are equal in size. Andy spins the spinner three times.



What is the probability the spinner will land on a different color for each spin?

- A. $\frac{1}{27}$
- B. $\frac{2}{9}$
- C. $\frac{1}{3}$
- D. $\frac{3}{3}$

Non-Calculator Section

*You may **not** use a calculator to solve the questions in this section.*



- 12.** Stephanie is going to summer camp. There are three cabins to which she could be assigned: Pine Cabin, Maple Cabin, or Spruce Cabin. She can be assigned either a top bunk bed or bottom bunk bed.

What is the probability she will be assigned to Spruce Cabin and a top bunk bed? Show or explain how you determined your answer.

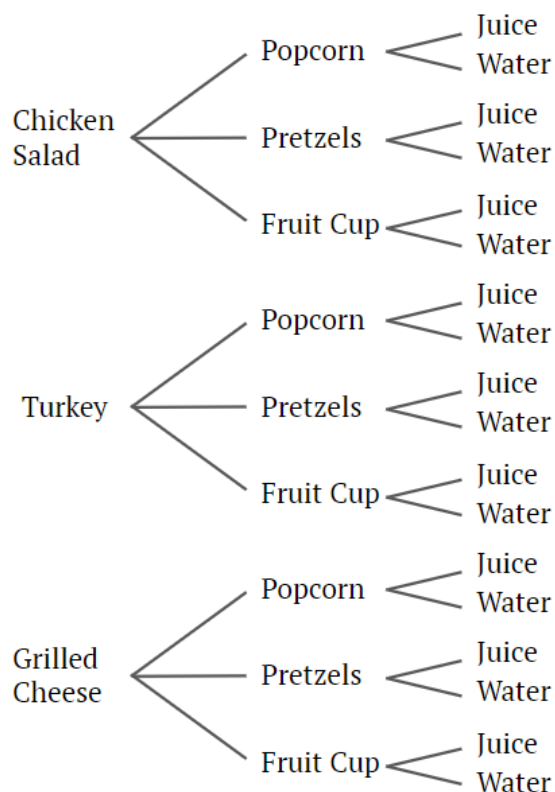
Respond in the space provided.

13. A gym manager conducts a survey to find out if members prefer morning or evening gym classes. She surveys the first 50 members to arrive at the gym each morning, and the results show that 70% of the members surveyed prefer morning gym classes. She concludes that about 70% of all members prefer morning gym classes.

Which statement **best** describes the gym manager’s conclusion?

- A. Her conclusion is valid because she surveyed a large number of people.
- B. Her conclusion is valid because the people she surveyed were randomly selected.
- C. Her conclusion is not valid because she should have surveyed every gym member.
- D. Her conclusion is not valid because the group she surveyed does not represent members who go to the gym throughout the day.

14. The tree diagram below shows the possible combinations for lunch at a new restaurant. Each customer chooses a sandwich, a side, and a drink.

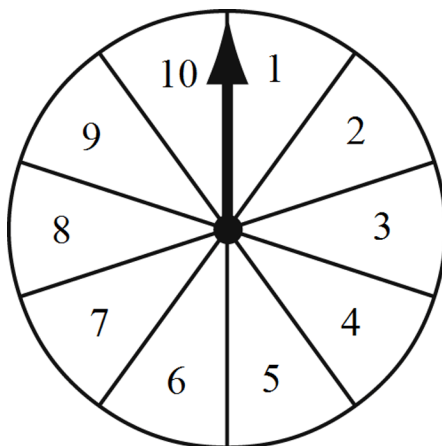


How many of the lunch combinations include popcorn **and** juice?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

15. Gary is playing a game with a spinner that has 10 equal sections numbered 1 through 10, as shown below.



His first 10 spins are shown below.

8, 8, 2, 4, 3, 1, 9, 8, 3, 10

Which statements below are true?

Select **all** that apply.

- A. The theoretical probability of spinning a 4 is $\frac{4}{10}$.
- B. The theoretical probability of spinning a 3 is $\frac{2}{10}$.
- C. If he spins 100 times, it is likely he will never spin a 6.
- D. The observed relative frequency of spinning a 10 is equal to the theoretical probability of spinning a 10.
- E. As he takes more spins, it is likely the observed relative frequency of spinning an 8 will get closer to $\frac{1}{10}$.

- 16.** Ruth knows she has a 25% chance of having a child with blue eyes and a 75% chance of having a child with brown eyes.

Part A

Ruth considers making a spinner to simulate the probability of having three children with blue eyes. Describe what the spinner should look like and the steps she should take to perform the simulation.

Respond in the space provided.

Part B

Ruth used a spinner to perform 10 trials to simulate the probability of having three children with blue eyes. She observed 1 outcome of having three children with blue eyes.

- Is Ruth's estimated probability representative of the theoretical probability of having three children with blue eyes? Explain why or why not.
- Provide the estimated probability from Ruth's simulation and the theoretical probability of having three children with blue eyes.

Respond in the space provided.

Assessment Analysis Guide

Interim Assessment 4

Mathematics

Grade 7

1

Item Id: i112276**Item Type: Selected Response**

Standards Description:

7.SP.C.7.a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.

Primary Standard: cc:7.SP.C.7.a

Points Possible: 1

Turica has 4 different pen colors: red, purple, blue, and green. She has 8 pens of each color. She selects a pen at random.

What is the probability she will select a green pen?

- A. $\frac{1}{2}$ Student may have represented the number of colors (4) over the number of pens in each color (8) as a fraction and simplified.
- B. $\frac{1}{3}$ Student may have not counted the green pens in the total and represented a ratio of green to not green pens.
- C. $\frac{1}{4}$ Correct.
- D. $\frac{1}{32}$ Student found the correct number of total outcomes, but represented the number of green pens as one; possibly confused because one of the colors is green.

Item Id: i111922**Item Type: Selected Response**

Standards Description:

7.SP.C.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

Primary Standard: cc:7.SP.C.5

Points Possible: 1

The table below shows the probability of each of four kinds of food being served for lunch at a school cafeteria.

Food	Probability of Each Food Being Served
Beans and Rice	$\frac{8}{30}$
Veggie Burger	$\frac{3}{30}$
Pizza	$\frac{4}{30}$
Salad Bar	$\frac{15}{30}$

The school cafeteria only serves one food each day. Eddy is trying to predict which food will be served on a randomly selected day.

Which conclusion is correct using the information in the table?

A. It is less likely that the cafeteria will serve pizza than beans and rice. Correct.

B. It is more likely that the cafeteria will serve veggie burgers than beans and rice.

Student thought smaller numbers indicate a greater likelihood, OR student thought $\frac{3}{30}$ was closer to 1 than $\frac{8}{30}$ because 3 is closer to 1 than 8.

C. It is about twice as likely that the cafeteria will serve pizza as beans and rice.

Student chose a probability that is half as likely as beans and rice, not twice as likely.

D. It is equally likely that the cafeteria will serve salad bar as it will serve beans and rice.

Student chose the top two most likely events and said they were equally likely.

3

Item Id: i112019**Item Type: Selected Response**

Standards Description:

7.SP.C.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

Primary Standard: cc:7.SP.C.8

Points Possible: 1

Hillary flips a fair coin 3 times in a row.

What is the probability that the coin lands on heads all 3 times?

- A. $\frac{1}{8}$ Correct.
- B. $\frac{1}{4}$ Student found the probability of getting heads twice instead of 3 times.
- C. $\frac{1}{2}$ Student found the probability of getting heads for one toss; may not understand the concept of compound probability.
- D. $1\frac{1}{2}$ Student multiplied the individual probabilities by 3 ($1/2 \times 3$); also did not recognize the probability should be between 0 and 1.

Item Id: i112847

Item Type: Selected Response

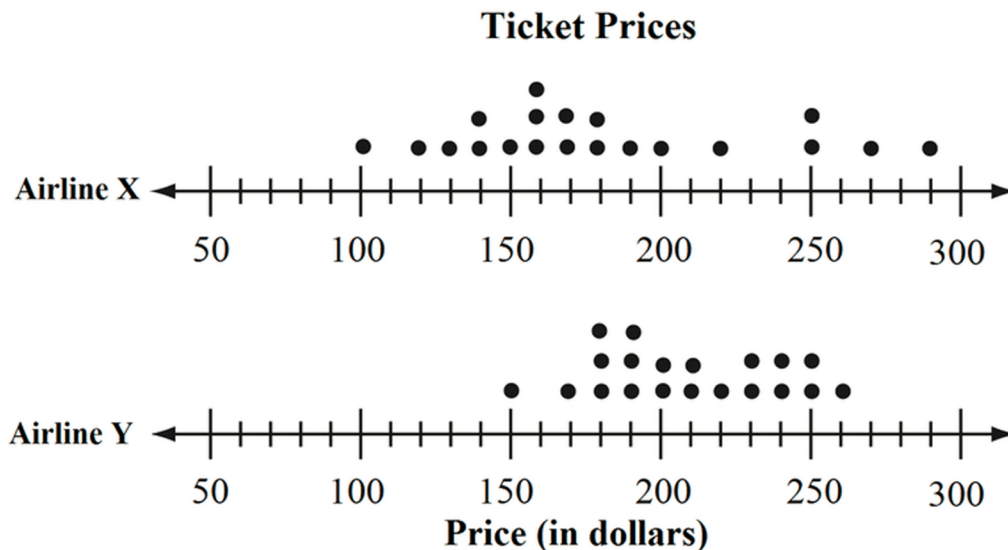
Standards Description:

7.SP.B.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

Primary Standard: cc:7.SP.B.4

Points Possible: 1

Lily is comparing the ticket prices for Airline X and Airline Y. She took random samples of 20 one-way flights for the two airlines and recorded their prices, rounded to the nearest ten dollars, on the line plots below.



Based on the line plots above, which statement **best** compares the airline ticket prices?

A. Ticket prices for Airline X tend to be less expensive and vary less than ticket prices for Airline Y. Student did not recognize that the ticket prices of Airline X tend to vary more than the ticket prices of Airline Y; may have confused the concept of more variability with less variability.

B. Ticket prices for Airline X tend to be more expensive and vary more than ticket prices for Airline Y. Student may have concluded that because Airline X has a greater maximum value its ticket prices tend to be more expensive.

C. Ticket prices for Airline X tend to be less expensive and vary more than ticket prices for Airline Y.

Correct.

D. Ticket prices for both airlines tend to cost about the same amount and vary equally.

Student did not take into account variability, and only looked at where the most values fall for both airlines.

5

Item Id: i112292**Item Type: Selected Response**

Standards Description:

7.SP.C.7.b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

Primary Standard: cc:7.SP.C.7.b

Points Possible: 1

Trish did an experiment where she dropped an empty paper cup 50 times and noted the number of times it landed in different positions. Her results are in the table.

Landing Result	Right-side up	Upside down	Sideways
Number of Outcomes	6	14	30

Which statement is **best** supported by the results of Trish's experiment?

A. There is a 20% chance of a dropped paper cup landing right-side up.

Student used the largest value in the table as the number of trials; converted $6/30$ to a percent.

B. If 10 paper cups are dropped, it is likely that about 6 will land right-side up.

Student interpreted the results of 6 out of 50 trials resulting in a right-side up cup as meaning 6 out of 10 trials will also have the same result.

C. There is a 14% chance of a dropped paper cup landing upside down.

Student interpreted the number of results in the experiment as the percent chance of that outcome.

D. If 20 paper cups are dropped, it is likely that about 12 will land sideways.

Correct.

6

Item Id: i117053**Item Type: Multiple Select**

Standards Description:

7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

Primary Standard: cc:7.SP.A.2

Points Possible: 1

A school librarian surveyed a random sample of 50 students to find out which library resources students value most. The table below shows the results.

Library Resources	Number of Students
Books	24
Study Areas	10
Classes	6
Movies	10

Which statements are **best** supported by the data?

Select **all** that apply.

A. It is expected that 15% to 25% of all students will value movies the most. Correct.

B. It is expected that 20% to 30% of all students will value books the most.

Student used the frequency of students who value books the most as the probability.

C. In a group of 25 students, it is expected that around 5 students will value study areas the most.

Correct.

D. In a group of 100 students, it is expected that around 6 students will value classes the most.

Student used the frequency from the original sample; did not recognize that the frequency would change with the sample size.

E. In a group of 200 students, it is expected that 20 students will value study areas the most, and 20 students will value movies the most.

Student used the percent of students from the sample data as the number of students; did not find the correct number of students out of 200.

Item Id: i112544**Item Type: Multiple Select**

Standards Description:

7.SP.C.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.

Primary Standard: cc:7.SP.C.6

Points Possible: 1

Dan has a large bag of jelly beans. He selects a jelly bean from the bag, records the color, replaces the jelly bean, and repeats the process. He calculates the relative frequency of selecting a red jelly bean and records the results in the table below.

Number of Trials	Relative Frequency
10	0.30
20	0.28
50	0.20
100	0.17
150	0.18

Based on the information Dan recorded, which statements are true?

Select **all** that apply.

- A. Approximately 18% of the jelly beans are red.** Correct.
- B. Out of 200 jelly beans, it is likely 34 to 40 will be red.** Correct.
- C. If Dan selects 10 jelly beans again, exactly 3 will be red. Student did not recognize the result will likely not be exactly the same as the first time.
- D. The probability of selecting a red jelly bean is around 28%. Student used a probability for fewer trials, not recognizing the probability resulting from more trials would be more accurate.

E. Out of 300 trials, approximately 36% of the jelly beans selected will be red.

Student doubled the probability for 150 trials since the number of trials doubled.

8

Item Id: i114522**Item Type: Selected Response**

Standards Description:

7.SP.C.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

Primary Standard: cc:7.SP.C.8

Points Possible: 1

Jay has a bag with 2 blue marbles and 3 yellow marbles. He will randomly select one marble without replacing it, and then he will select a second marble from the bag.

What is the probability that he will select two blue marbles?

- A. $\frac{2}{25}$ Student recognized that there was only 1 blue marble in the second draw, but did not recognize that the total number of marbles also was reduced by 1 (multiplied $\frac{2}{5}$ by $\frac{1}{5}$).
- B. $\frac{1}{10}$ Correct.
- C. $\frac{4}{25}$ Student calculated the probability as if the first marble were replaced (multiplied $\frac{2}{5}$ by $\frac{2}{5}$).
- D. $\frac{1}{5}$ Student recognized that the number of marbles for the second draw was reduced by 1, but calculated as if 2 blue marbles were still in the bag (multiplied $\frac{2}{5}$ by $\frac{2}{4}$).

Item Id: i113281**Item Type: Selected Response**

Standards Description:

- 7.SP.B.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.

Primary Standard: cc:7.SP.B.3

Points Possible: 1

Use the information about data set A and data set B below to answer the question.

- Data set A has a mean of 67.
- Data set B has a mean of 55.
- Both data sets have a mean absolute deviation (MAD) of 3.

Based on the information, which statement **best** describes the amount of overlap in the data points between data set A and data set B?

A. Data sets A and B likely have a large amount of overlap in the data points because they have the same MAD.

Student did not consider the difference in the means or interpret how many MADs the means are separated by.

B. Data sets A and B likely have a large amount of overlap in the data points because the means are separated by 4 MADs.

Student thought that since the means are separated by a large number of MADs (4), there is a large amount of overlap; did not understand that a large number of MADs typically means little to no overlap.

C. Data sets A and B likely have very little to no overlap in the data points because the means are separated by 4 MADs.

Correct.

D. There is not enough information to approximate the amount of overlap in the data points between data sets A and B.

Student did not understand how to use the MAD or difference in the means expressed as a multiple of the MAD to determine the amount of overlap in the data.

10

Item Id: i112133**Item Type: Multiple Select**

Standards Description:

7.SP.C.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

Primary Standard: cc:7.SP.C.5

Points Possible: 2

Which statements about probability are true?

Select **all** that apply.

A. An event with a probability of $\frac{47}{60}$ is likely to occur.

Correct.

B. An event with a probability of 0.9 is not likely to occur.

Student identified an event that is likely to occur as not likely to occur; may not understand probability as a number between 0 and 1.

C. An event with a probability of 1 is always going to occur.

Correct.

D. An event with a probability of $\frac{50}{350}$ is as likely as not to occur.

Student identified an unlikely event as one that is as likely to occur as not; may have only used the numerator as a percent and thought the probability was $\frac{50}{100}$ or 50%.

E. An event with a probability of 49% is neither likely nor unlikely to occur.

Correct.

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Item Id: i112445**Item Type: Selected Response**

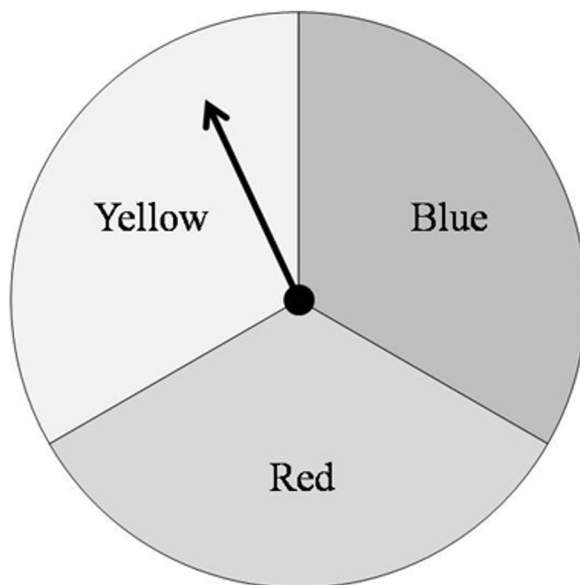
Standards Description:

7.SP.C.8.a Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

Primary Standard: cc:7.SP.C.8.a

Points Possible: 1

All three sections of the spinner below are equal in size. Andy spins the spinner three times.



What is the probability the spinner will land on a different color for each spin?

- A. $\frac{1}{27}$ Student found the probability of the spinner landing on specific colors each spin.
- B. $\frac{2}{9}$ Correct.
- C. $\frac{1}{3}$ Student did not recognize the situation as a compound event; found the probability of the spinner landing on a specific color with 1 spin.

D. $\frac{3}{3}$

Student chose a numerator of 3 to represent the 3 different colors on the spinner and a denominator of 3 to represent 3 events, OR student only represented the probability of the first event.

Item Id: i110173**Item Type: Constructed Response**

Standards Description:

7.SP.C.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

Students must determine how to represent the situation abstractly in order to determine the probability that Stephanie will be assigned to Spruce Cabin and a top bunk bed.

MP5 Use appropriate tools strategically.

Students may choose to use a tool such as an organized list, table, or tree diagram to find the probability that Stephanie will be assigned to Spruce Cabin and a top bunk bed.

Primary Standard: cc:7.SP.C.8

Points Possible: 2

Stephanie is going to summer camp. There are three cabins to which she could be assigned: Pine Cabin, Maple Cabin, or Spruce Cabin. She can be assigned either a top bunk bed or bottom bunk bed.

What is the probability she will be assigned to Spruce Cabin and a top bunk bed? Show or explain how you determined your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

PB

PT

SB

ST

MB

MT

P = Pine Cabin

S = Spruce Cabin

M = Maple Cabin

B = bottom bunk

T = top bunk

There is a probability of $\frac{1}{6}$ that Stephanie will be assigned to Spruce Cabin and a top bunk bed.

Evidence Statement(s):

1. Student found the probability of a compound event.
2. Student used an organized list, table, or tree diagram to show or explain how they determined their answer.

Common Misconception(s):

- Student confused how to find the total number of possible events and added the number of possible cabins (3) to the number of possible bunk assignments (2) to find 5 possible total events.
- Student found the probability of being assigned to Spruce Cabin or a top bunk bed ($\frac{4}{6}$).
- Student only found the probability of being assigned to Spruce Cabin ($\frac{1}{3}$), OR only found the probability of being assigned a top bunk bed ($\frac{1}{2}$).

Item Id: i113050**Item Type: Selected Response**

Standards Description:

7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

Primary Standard: cc:7.SP.A.1

Points Possible: 1

A gym manager conducts a survey to find out if members prefer morning or evening gym classes. She surveys the first 50 members to arrive at the gym each morning, and the results show that 70% of the members surveyed prefer morning gym classes. She concludes that about 70% of all members prefer morning gym classes.

Which statement **best** describes the gym manager's conclusion?

- | | |
|---|--|
| A. Her conclusion is valid because she surveyed a large number of people. | Student did not recognize that the sample was not representative of the population. |
| B. Her conclusion is valid because the people she surveyed were randomly selected. | Student did not recognize the sample is not random or representative of the population because all members did not have an equal chance of being surveyed. |
| C. Her conclusion is not valid because she should have surveyed every gym member. | Student thought the entire population needed to be surveyed; did not recognize that a random sample can provide sufficient data. |
| D. Her conclusion is not valid because the group she surveyed does not represent members who go to the gym throughout the day. | Correct. |

Item Id: i113268**Item Type: Math Short Answer**

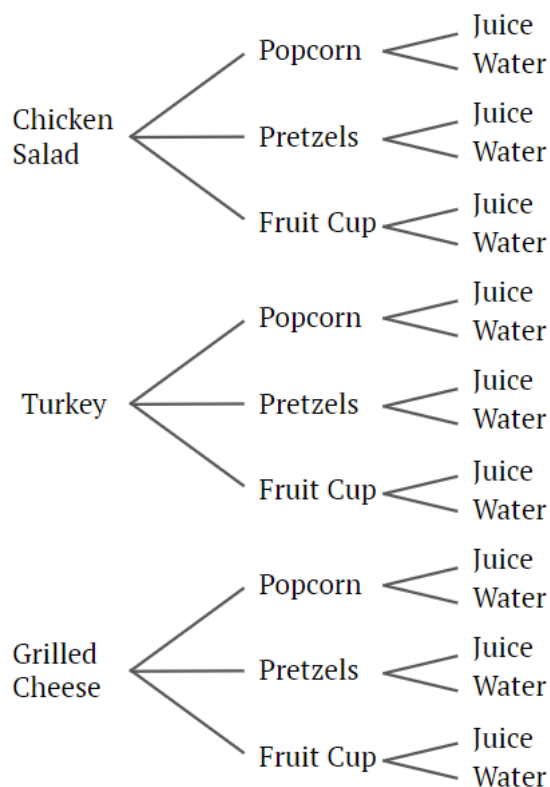
Standards Description:

7.SP.C.8.b Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.

Primary Standard: cc:7.SP.C.8.b

Points Possible: 1

The tree diagram below shows the possible combinations for lunch at a new restaurant. Each customer chooses a sandwich, a side, and a drink.



How many of the lunch combinations include popcorn **and** juice?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

|

Correct Answer:

3 lunch combinations

15

Item Id: i112607**Item Type: Multiple Select**

Standards Description:

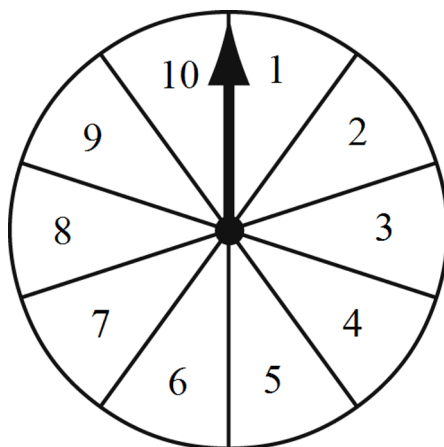
7.SP.C.7

Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

Primary Standard: cc:7.SP.C.7

Points Possible: 1

Gary is playing a game with a spinner that has 10 equal sections numbered 1 through 10, as shown below.



His first 10 spins are shown below.

8, 8, 2, 4, 3, 1, 9, 8, 3, 10

Which statements below are true?

Select **all** that apply.

A. The theoretical probability of spinning a 4 is $\frac{4}{10}$.

Student used the favorable outcome as the numerator instead of the number of favorable outcomes.

B. The theoretical probability of spinning a 3 is $\frac{2}{10}$.

Student used the observed relative frequency.

- C. If he spins 100 times, it is likely he will never spin a 6. Student used the observed relative frequency; did not realize after 100 spins it is very unlikely he will never land on a 6.
- D. The observed relative frequency of spinning a 10 is equal to the theoretical probability of spinning a 10.** Correct.
- E. As he takes more spins, it is likely the observed relative frequency of spinning an 8 will get closer to $\frac{1}{10}$.** Correct.

16

Item Id: i113026**Item Type: Constructed Response**

Standards Description:

7.SP.C Investigate chance processes and develop, use, and evaluate probability models.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

In this item, students need to reason abstractly about a chance event. Students must also describe a simulation that would have outcomes representative of the situation.

MP4 Model with mathematics.

In Part B, students use a probability model to determine a compound probability. Students must also compare the theoretical probability to the estimated probability.

16A

Primary Standard: cc:7.SP.C

Points Possible: 2

Ruth knows she has a 25% chance of having a child with blue eyes and a 75% chance of having a child with brown eyes.

Part A

Ruth considers making a spinner to simulate the probability of having three children with blue eyes. Describe what the spinner should look like and the steps she should take to perform the simulation.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

To simulate the probability of Ruth having 3 children with blue eyes, her spinner would need to have 1 out of 4 equal sections representing blue eyes. She could label 1 section “B.”

The spinner would need 3 out of 4 equal sections representing brown eyes. She could label 3 sections “R.”

She should spin the spinner 3 times and record the results. That would be 1 trial. She should do multiple

trials to get an accurate estimate of the probability of having 3 children with blue eyes. She should record the trials in which she spins 3 “Bs” as the instances of having 3 children with blue eyes. She should divide the number of instances that occur of having 3 children with blue eyes by the total number of trials to determine the estimated probability.

Evidence Statement(s):

1. Student described a spinner representing a 25% chance of having a child with blue eyes and a 75% chance of having a child with brown eyes.
2. Student described how the spinner could be used to simulate the probability of having three children with blue eyes.

Common Misconception(s):

- Student may have described a spinner representing a 50% chance of having a child with blue eyes and a 50% chance of having a child with brown eyes since there are two outcomes.
- Student may not have understood spinning the spinner 3 times would make one trial; student may have said to spin the spinner a set number of times with one spin representing one trial.

16B

Primary Standard: cc:7.SP.C

Points Possible: 2

Part B

Ruth used a spinner to perform 10 trials to simulate the probability of having three children with blue eyes. She observed 1 outcome of having three children with blue eyes.

- Is Ruth’s estimated probability representative of the theoretical probability of having three children with blue eyes? Explain why or why not.
- Provide the estimated probability from Ruth’s simulation and the theoretical probability of having three children with blue eyes.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Estimated probability: $\frac{1}{10}$

Theoretical probability: $\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} = \frac{1}{64}$

The theoretical probability is much less than the estimated probability. Ruth only did 10 trials, so the estimated probability is greatly affected by each outcome. If she performs more trials, it is likely the estimated probability will be closer to the theoretical probability.

Evidence Statement(s):

1. Student explained that the estimated probability was not representative of the theoretical probability because Ruth performed a small number of trials.
2. Student determined the estimated probability and the theoretical probability of having three children with blue eyes in order to evaluate their agreement.

Common Misconception(s):

- Student thought the estimated probability was representative of the theoretical probability and did not recognize that with an increased number of trials, Ruth's estimated probability would become closer to the theoretical probability.
- Student miscalculated the theoretical probability as $\frac{1}{4}$, representing the theoretical probability of having one child with blue eyes.