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## Grade 7 Math
### Spring 2018 Item Release
#### Content Summary and Answer Key

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</thead>
</table>
| 1             | Multiple Choice | Analyze proportional relationships and use them to solve real-world and mathematical problems. | Recognize and represent proportional relationships between quantities. (7.RP.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. | C          | 1 point |
| 2             | Equation Item   | Investigate chance processes and develop, use, and evaluate probability models. | 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. (7.SP.7)  
a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. | ---        | 1 point |
| 16            | Multi-Interaction Item | Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. | 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. (7.NS.1) | ---        | 3 points |

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<tbody>
<tr>
<td>17</td>
<td>Multi-Select Item</td>
<td>Draw, construct, and describe geometrical figures and describe the relationships between them.</td>
<td>Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. (7.G.3)</td>
<td>A, B, E</td>
<td>1 point</td>
</tr>
<tr>
<td>20</td>
<td>Equation Item</td>
<td>Use properties of operations to generate equivalent expressions.</td>
<td>Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. (7.EE.1)</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>22</td>
<td>Equation Item</td>
<td>Analyze proportional relationships and use them to solve real-world and mathematical problems.</td>
<td>Recognize and represent proportional relationships between quantities. (7.RP.2) c. Represent proportional relationships by equations. For example, if total cost $t$ is proportional to the number $n$ of items purchased at a constant price $p$, the relationship between the total cost and the number of items can be expressed as $t = pn$.</td>
<td>---</td>
<td>2 points</td>
</tr>
<tr>
<td>23</td>
<td>Multiple Choice</td>
<td>Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</td>
<td>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. (7.NS.1) b. Understand $p + q$ as the number located a distance $</td>
<td>q</td>
<td>$ 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.</td>
</tr>
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<tr>
<td>27</td>
<td>Equation Item</td>
<td>Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</td>
<td>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. (7.G.6)</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>28</td>
<td>Equation Item</td>
<td>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</td>
<td>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. For example: if a woman making $25 an hour gets a 10% raise, she will make an additional $2.50, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9(\frac{3}{4}) inches long in the center of a door that is 27(\frac{1}{2}) inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. (7.EE.3)</td>
<td>---</td>
<td>1 point</td>
</tr>
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<tr>
<td>31</td>
<td>Equation Item</td>
<td>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</td>
<td>Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.4) b. Solve word problems leading to inequalities of the form px + q &gt; r or px + q &lt; 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. For example, as a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>32</td>
<td>Equation Item</td>
<td>Draw, construct, and describe geometrical figures and describe the relationships between them.</td>
<td>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. (7.G.1)</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>33</td>
<td>Multiple Choice</td>
<td>Use random sampling to draw inferences about a population.</td>
<td>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. (7.SP.1)</td>
<td>C</td>
<td>1 point</td>
</tr>
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### Question No.*  |  Item Type  |  Content Cluster  |  Content Standard  |  Answer Key  |  Points
---|---|---|---|---|---
35  |  Equation Item  |  Solve real-life and mathematical problems using numerical and algebraic expressions and equations.  |  Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.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. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?  |  ---  |  2 points
36  |  Equation Item  |  Investigate chance processes and develop, use, and evaluate probability models.  |  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. (7.SP.7)  
  b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?  |  ---  |  1 point

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</thead>
</table>
| 39            | Equation Item | Investigate chance processes and develop, use, and evaluate probability models. | Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. (7.SP.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. | --- | 1 point |
| 40            | Equation Item | Analyze proportional relationships and use them to solve real-world and mathematical problems. | Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $(\frac{1}{2})/(\frac{1}{4})$ miles per hour, equivalently 2 miles per hour. (7.RP.1) | --- | 1 point |
| 44            | Equation Item | Analyze proportional relationships and use them to solve real-world and mathematical problems. | Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. (7.RP.3) | --- | 1 point |

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Math
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Question 1

Question and Scoring Guidelines
Question 1

An energy company graphs the average number of rotations that a windmill makes each minute for 4 minutes.

Which statement describes what the point (1, 12) means in terms of rotations and minutes?

A. 1 rotation occurs every 12 minutes.
B. \( \frac{1}{12} \) of a rotation occurs every minute.
C. The windmill rotates 12 times in 1 minute.
D. The windmill rotates 12 times in 12 minutes.

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Recognize and represent proportional relationships between quantities. (7.RP.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.

Calculator Designation: Calculator neutral
**Scoring Guidelines**

**Rationale for Option A:** The student may reverse the variables in the graph.

**Rationale for Option B:** The student may reverse the variables in the graph.

**Rationale for Option C:** Key – The student correctly recognizes the proportional relationship in terms of the situation and selects the correct unit rate of 12 rotations per minute.

**Rationale for Option D:** The student may think that the y-coordinate represents the number of rotations and the number of minutes.

**Sample Response: 1 point**

An energy company graphs the average number of rotations that a windmill makes each minute for 4 minutes.

Which statement describes what the point (1, 12) means in terms of rotations and minutes?

- 1 rotation occurs every 12 minutes.
- \( \frac{1}{12} \) of a rotation occurs every minute.
- The windmill rotates 12 times in 1 minute.
- The windmill rotates 12 times in 12 minutes.
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Math
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Question 2

Question and Scoring Guidelines
Question 2

A factory produces 80,000 candies each day. They produce equal quantities of four flavors: cherry, lemon, orange, and strawberry. The candies are mixed together during packaging.

What is the probability that a randomly selected candy is orange?

Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: 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. (7.SP.7)

a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.

Calculator Designation: Calculator neutral
Scoring Guidelines

Exemplar Response:

• 0.25

Other Correct Responses:

• Any equivalent value

For this item, a full-credit response includes:

• A correct value (1 point).
Grade 7
Math
Spring 2018 Item Release

Question 2

Sample Responses
Sample Response: 1 point

A factory produces 80,000 candies each day. They produce equal quantities of four flavors: cherry, lemon, orange, and strawberry. The candies are mixed together during packaging.

What is the probability that a randomly selected candy is orange?

.25

Notes on Scoring

This response earns full credit (1 point). The student correctly calculates that there are 20,000 of each flavor candy. Then the student correctly divides 20,000 by 80,000.
A factory produces 80,000 candies each day. They produce equal quantities of four flavors: cherry, lemon, orange, and strawberry. The candies are mixed together during packaging.

What is the probability that a randomly selected candy is orange?

\[
\frac{1}{4}
\]

**Notes on Scoring**

This response earns full credit (1 point). The student correctly calculates that there are 20,000 of each flavor candy. Then the student correctly creates an equivalent fraction to \( \frac{20,000}{80,000} \) and responds with a probability of \( \frac{1}{4} \).
Sample Response: 0 points

A factory produces 80,000 candles each day. They produce equal quantities of four flavors: cherry, lemon, orange, and strawberry. The candles are mixed together during packaging.

What is the probability that a randomly selected candy is orange?

20000

Notes on Scoring

This response earns no credit (0 points). The student may only calculate how many of each flavor candy there are and forget to respond to the question, which is asking for the probability of choosing an orange candy.
A factory produces 80,000 candies each day. They produce equal quantities of four flavors: cherry, lemon, orange, and strawberry. The candies are mixed together during packaging.

What is the probability that a randomly selected candy is orange?

25

Notes on Scoring

This response earns no credit (0 points). The student may correctly calculate how many of each flavor candy there are and also correctly calculate the division of 20,000 by 80,000 to get 0.25, but incorrectly multiplies by 100 to get the percent of orange candies.
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Math
Spring 2018 Item Release

Question 16

Question and Scoring Guidelines
Question 16

Three numbers are plotted on a number line, as shown.

\[
\begin{array}{c}
p \quad m \quad 0 \quad n
\end{array}
\]

This item has three parts.

**Part A.** Which expression is equivalent to \( m - n \)?

- A \(-m + n\)
- B \(-m + (-n)\)
- C \(m - n\)
- D \(m - (-n)\)

**Part B.** For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

<table>
<thead>
<tr>
<th>Expression</th>
<th>to the left of ( m )</th>
<th>to the right of ( m )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( m + n )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( m - n )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( m + p )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( m - p )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Part C.** Create an expression that represents the distance on the number line between \( m \) and \( p \).
Points Possible: 3

**Content Cluster:** Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

**Content Standard:** 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. (7.NS.1)

**Calculator Designation:** Calculator neutral
## Scoring Guidelines

<table>
<thead>
<tr>
<th>Score Point</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 points</td>
<td>All bullets are necessary for full credit (3 points):</td>
</tr>
</tbody>
</table>

- The student selected the correct equivalent expression, providing evidence of the understanding that subtraction is equivalent to adding the additive inverse.
- The student correctly identified the relative location of each expression, providing evidence of the understanding that \( a + b \) is the number a distance \( |b| \) from \( a \), to the right when \( b \) is positive and the left when \( b \) is negative.
- The student created a correct expression for the distance, providing evidence of the understanding that the distance between any two points on the number line is the positive value of their difference.

Notes:

For Part C, any of the following expressions are accepted:

\[ m - p, -(p - m), |m - p|, |p - m|, |p| - |m| \]

**Exemplar:**

For example, the response includes:

A. \( m + (-n) \)

B. Row 1 – Right; 2 – Left; 3 – Left; 4 – Right

C. \(|m - p|\)
2 points Two bullets are necessary for partial credit (2 points):

• The student selected the correct equivalent expression, providing evidence of the understanding that subtraction is equivalent to adding the additive inverse.
• The student correctly identified the relative location of each expression, providing evidence of the understanding that $a + b$ is the number a distance $|b|$ from $a$, to the right when $b$ is positive and the left when $b$ is negative.
• The student created a correct expression for the distance, providing evidence of the understanding that the distance between any two points on the number line is the positive value of their difference.

1 point One bullet is necessary for partial credit (1 point):

• The student selected the correct equivalent expression, providing evidence of the understanding that subtraction is equivalent to adding the additive inverse.
• The student correctly identified the relative location of each expression, providing evidence of the understanding that $a + b$ is the number a distance $|b|$ from $a$, to the right when $b$ is positive and the left when $b$ is negative.
• The student created a correct expression for the distance, providing evidence of the understanding that the distance between any two points on the number line is the positive value of their difference.
Grade 7  
Math  
Spring 2018 Item Release  

Question 16  

Sample Responses
Sample Response: 3 points

Three numbers are plotted on a number line, as shown.

\[ p \quad m \quad 0 \quad n \]

This item has three parts.

**Part A.** Which expression is equivalent to \( m - n \)?

- **A** \( -m + n \)
- **B** \( -m + (-n) \)
- **C** \( m - n \)
- **D** \( m - (-n) \)

**Part B.** For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

<table>
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<tr>
<th></th>
<th>to the left of ( m )</th>
<th>to the right of ( m )</th>
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</thead>
<tbody>
<tr>
<td>( m + n )</td>
<td>✗</td>
<td>✔</td>
</tr>
<tr>
<td>( m - n )</td>
<td>✔</td>
<td>✗</td>
</tr>
<tr>
<td>( m + p )</td>
<td>✔</td>
<td>✗</td>
</tr>
<tr>
<td>( m - p )</td>
<td>✗</td>
<td>✔</td>
</tr>
</tbody>
</table>

**Part C.** Create an expression that represents the distance on the number line between \( m \) and \( p \).

\[ |m - p| \]
Notes on Scoring

This response earns full credit (3 points). Part A: The student correctly recognizes that subtracting the value of \( n \), which is positive, is the same as adding the opposite of \( n \). Part B: The student correctly identifies where the sums and differences would be in relation to \( m \) given a positive number \( n \) and a negative number \( p \). Part C: The student creates a correct expression to represent the distance between \( m \) and \( p \), using absolute value.
Sample Response: 3 points

Three numbers are plotted on a number line, as shown.

\[ p \quad m \quad 0 \quad n \]

This item has three parts.

**Part A.** Which expression is equivalent to \( m - n \)?

- \( A \) \( -m + n \)
- \( B \) \( -m + (-n) \)
- \( C \) \( m - n \)
- \( D \) \( m - (-n) \)

**Part B.** For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

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</tr>
<tr>
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<td>☑</td>
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</table>

**Part C.** Create an expression that represents the distance on the number line between \( m \) and \( p \).

\[ |p - m| \]
Notes on Scoring

This response earns full credit (3 points). Part A: The student correctly recognizes that subtracting the value of \( n \), which is positive, is the same as adding the opposite of \( n \). Part B: The student correctly identifies where the sums and differences would be in relation to \( m \), given a positive number \( n \) and a negative number \( p \). Part C: The student creates a correct expression to represent the distance between \( m \) and \( p \), using absolute value.
Sample Response: 2 points

Three numbers are plotted on a number line, as shown.

\[ p \quad m \quad 0 \quad n \]

This item has three parts.

**Part A.** Which expression is equivalent to \( m - n \)?

- \( \text{(A)} \quad -m + n \)
- \( \text{(B)} \quad -m + (-n) \)
- \( \text{(C)} \quad m - n \)
- \( \text{Correct Answer:} \quad m - (-n) \)

**Part B.** For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

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<tr>
<td>( m + n )</td>
<td>( \square )</td>
<td>( \checkmark )</td>
</tr>
<tr>
<td>( m - n )</td>
<td>( \checkmark )</td>
<td>( \square )</td>
</tr>
<tr>
<td>( m + p )</td>
<td>( \square )</td>
<td>( \checkmark )</td>
</tr>
<tr>
<td>( m - p )</td>
<td>( \square )</td>
<td>( \checkmark )</td>
</tr>
</tbody>
</table>

**Part C.** Create an expression that represents the distance on the number line between \( m \) and \( p \).

\[ |m - p| \]
Notes on Scoring

This response earns partial credit (2 points). Part A: The student correctly recognizes that subtracting the value of \( n \), which is positive, is the same as adding the opposite of \( n \). Part B: The student may think that the sum of two negative numbers, \( p \) and \( m \), results in a positive number and therefore is to the right of \( m \). Part C: The student creates a correct expression to represent the distance between \( m \) and \( p \), using absolute value.
Sample Response: 2 points

Three numbers are plotted on a number line, as shown.

\[ p \quad m \quad 0 \quad n \]

This item has three parts.

**Part A.** Which expression is equivalent to \( m - n \)?

- **A** \( -m + n \)
- **B** \( -m + (-n) \)
- **C** \( m - n \)
- **D** \( m - (-n) \)

**Part B.** For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

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<td>✓</td>
</tr>
<tr>
<td>( m - n )</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>( m + p )</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>( m - p )</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

**Part C.** Create an expression that represents the distance on the number line between \( m \) and \( p \).

\( m + p \)
Notes on Scoring

This response earns partial credit (2 points). Part A: The student correctly recognizes that subtracting the value of n, which is positive, is the same as adding the opposite of n. Part B: The student correctly identifies where the sums and differences would be in relation to m given a positive number n and a negative number p. Part C: The student may think that adding two negative numbers, m and p, gives the distance between the points.
Sample Response: 1 point

Three numbers are plotted on a number line, as shown.

\[ p \quad m \quad 0 \quad n \]

This item has three parts.

**Part A.** Which expression is equivalent to \( m - n \)?

- \( -m + n \)
- \( -m + (-n) \)
- \( m - n \)
- \( m - (-n) \)

**Part B.** For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

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<thead>
<tr>
<th>Expression</th>
<th>to the left of ( m )</th>
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<tr>
<td>( m + n )</td>
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<tr>
<td>( m - n )</td>
<td>( \checkmark )</td>
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<tr>
<td>( m + p )</td>
<td>( \checkmark )</td>
<td>( \square )</td>
</tr>
<tr>
<td>( m - p )</td>
<td>( \square )</td>
<td>( \checkmark )</td>
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</table>

**Part C.** Create an expression that represents the distance on the number line between \( m \) and \( p \).

\[ m + p \]
Notes on Scoring

This response earns partial credit (1 point). Part A: The student may think that switching the sign of each term results in an equivalent expression. Part B: The student correctly identifies where the sums and differences would be in relation to m given a positive number n and a negative number p. Part C: The student may confuse adding two negative numbers, m and p, with multiplying two negative numbers and think that the result of the addition will be a positive number.
Sample Response: 1 point

Three numbers are plotted on a number line, as shown.

\[ p \quad m \quad 0 \quad n \]

This item has three parts.

**Part A.** Which expression is equivalent to \( m - n \)?

- (A) \(-m + n\)
- (B) \(-m + (-n)\)
- (C) \(m - n\)
- (D) \(m - (-n)\)

**Part B.** For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

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<td>( m + p )</td>
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<tr>
<td>( m - p )</td>
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</table>

**Part C.** Create an expression that represents the distance on the number line between \( m \) and \( p \).

\[ m - p \]
Notes on Scoring

This response earns partial credit (1 point). Part A: The student may think that switching the sign of each term results in an equivalent expression. Part B: The student may think that adding two values always results in a larger number. Part C: The student creates a correct expression to represent the distance between $m$ and $p$, using absolute value.
Sample Response: 0 points

Three numbers are plotted on a number line, as shown.

\[ p \quad m \quad 0 \quad n \]

This item has three parts.

**Part A.** Which expression is equivalent to \( m - n \)?

- \(-m + n\)
- \(-m + (-n)\)
- \(m - n\)
- \(m - (-n)\)

**Part B.** For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

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<td>( m - p )</td>
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</tbody>
</table>

**Part C.** Create an expression that represents the distance on the number line between \( m \) and \( p \).

\[ m + p \]
Notes on Scoring

This response earns no credit (0 points). Part A: The student may think that switching the sign of each term results in an equivalent expression. Part B: The student may think that adding two values always results in a larger number. Part C: The student may confuse adding two negative numbers, $m$ and $p$, with multiplying two negative numbers and think that the result of the addition will be a positive number.
Sample Response: 0 points

Three numbers are plotted on a number line, as shown.

\[ \bullet \bullet \bullet 0 \]

This item has three parts.

Part A. Which expression is equivalent to \( m - n \)?

- \( A \) \( -m + n \)
- \( B \) \(-m + (-n)\)
- \( C \) \( m - n \)
- \( D \) \( m - (-n) \)

Part B. For each expression, select a box to identify whether the value of the expression is to the left or to the right of \( m \) on the number line.

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<td>( m + n )</td>
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<tr>
<td>( m - n )</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>( m + p )</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>( m - p )</td>
<td></td>
<td>✔️</td>
</tr>
</tbody>
</table>

Part C. Create an expression that represents the distance on the number line between \( m \) and \( p \).

\[ p - m \]
Notes on Scoring

This response earns no credit (0 points). Part A: The student may think that simply changing signs in front of each term, changing \( m \) to \( -m \) and changing \( -n \) to \( +(-n) \), results in an equivalent expression. Part B: The student may identify whether the value is to the left or to the right of zero (0) instead of to the left or to the right of \( m \). Part C: The student may think that subtracting the smaller “digit” from the larger “digit” will result in the distance, not taking into consideration that they are both negative numbers. This expression will result in a negative number, which cannot represent a distance.
Grade 7
Math
Spring 2018 Item Release

Question 17

Question and Scoring Guidelines
Question 17

Select all of the solids that could be sliced horizontally or vertically to create a triangular cross section.

☐  

☐  

☐  

☐  

☐  

Points Possible: 1

Content Cluster: Draw, construct, and describe geometrical figures and describe the relationships between them.

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

Calculator Designation: Calculator neutral
Scoring Guidelines

Rationale for First Option: **Key** - The student notes that a vertical slice of the square-based pyramid could be a triangle.

Rationale for Second Option: **Key** - The student notes that a vertical slice of the triangular prism could be a triangle.

Rationale for Third Option: The student may remember that slicing vertically can create a non-circular figure but doesn’t realize a triangle is not a possibility.

Rationale for Fourth Option: The student may realize that a diagonal slice from a corner to the base could create a triangle but misses that the directive specifically states a vertical or horizontal slice.

Rationale for Fifth Option: **Key** - The student notes that slicing the cone vertically could create a triangle.

**Sample Response: 1 point**

Select all of the solids that could be sliced horizontally or vertically to create a triangular cross section.

- [ ]
- [ ]
- [x]
- [ ]
- [ ]
Question 20

Create an expression equivalent to $2(3x - 1) - 3x + 4$ using the least number of terms.

Points Possible: 1

**Content Cluster:** Use properties of operations to generate equivalent expressions.

**Content Standard:** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. (7.EE.1)

**Calculator Designation:** Calculator neutral

**Scoring Guidelines**

**Exemplar Response:**

- $3x + 2$

**Other Correct Responses:**

- $2 + 3x$

For this item, a full-credit response includes:

- A correct expression (1 point).
Grade 7
Math
Spring 2018 Item Release

Question 20

Sample Responses
Sample Response: 1 point

Create an expression equivalent to $2(3x - 1) - 3x + 4$ using the least number of terms.

$3x + 2$

Notes on Scoring

This response earns full credit (1 point). The student correctly uses the order of operations and combines like terms to rewrite the expression with the least number of terms.
Sample Response: 1 point

Create an expression equivalent to $2(3x - 1) - 3x + 4$ using the least number of terms.

$2 + 3x$

Notes on Scoring

This response earns full credit (1 point). The student correctly uses the order of operations and combines like terms to rewrite the expression with the least number of terms.
Sample Response: 0 points

Create an expression equivalent to $2(3x - 1) - 3x + 4$ using the least number of terms.

$3x + 3$

Notes on Scoring

This response earns no credit (0 points). When distributing the 2 into the parentheses, the student may only multiply $3x$ by 2 and forget to multiply $-1$ by 2 as well.
Sample Response: 0 points

Create an expression equivalent to $2(3x - 1) - 3x + 4$ using the least number of terms.

6

Notes on Scoring

This response earns no credit (0 points). When distributing the 2, the student may multiply each term in the expression by 2 rather than just the terms in the parentheses.
Question 22

Kaya’s family spends $105 to rent a boat for 7 days. The total cost, $c$, of the boat rental is proportional to the number of days, $d$, the family rents the boat.

A. How much does it cost, in dollars, to rent the boat for one day?
B. Create an equation using $c$ and $d$ to represent the proportional relationship.

\[ A. \ \$ \ ]
\[ B. \ ]

Points Possible: 2

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Recognize and represent proportional relationships between quantities. (7.RP.2)

c. Represent proportional relationships by equations. For example, if total cost $t$ is proportional to the number $n$ of items purchased at a constant price $p$, the relationship between the total cost and the number of items can be expressed as $t = pn$.

Calculator Designation: Calculator
Scoring Guidelines

Exemplar Response:

• A. 15
• B. \( c = 15d \)

Other Correct Responses:

• A. Any equivalent value
• B. Any equivalent equation or
  • any equation in which the student uses the value from Part A as the slope of equation in Part B, if the slope is greater than 0 but less than or equal to 1000

For this item, a full-credit response includes:

• The correct cost (1 point)
  AND
• A correct equation (1 point).
Grade 7
Math
Spring 2018 Item Release

Question 22

Sample Responses
Sample Response: 2 points

Kaya’s family spends $105 to rent a boat for 7 days. The total cost, c, of the boat rental is proportional to the number of days, d, the family rents the boat.

A. How much does it cost, in dollars, to rent the boat for one day?
B. Create an equation using c and d to represent the proportional relationship.

A. \$15
B. \(c=15d\)

Notes on Scoring

This response earns full credit (2 points). Part A: The student correctly divides 105 by 7. Part B: The student creates a correct equation that says the cost, c, of renting the boat is equal to 15 (dollars per day) times the number of days, d, it is rented.
Sample Response: 2 points

Kaya’s family spends $105 to rent a boat for 7 days. The total cost, $c$, of the boat rental is proportional to the number of days, $d$, the family rents the boat.

A. How much does it cost, in dollars, to rent the boat for one day?
B. Create an equation using $c$ and $d$ to represent the proportional relationship.

\[
A. \quad $15.00 \\
B. \quad c = 15.00d
\]

Notes on Scoring

This response earns full credit (2 points). Part A: The student correctly divides 105 by 7. Part B: The student creates a correct equation that says the cost, $c$, of renting the boat is equal to 15.00 (dollars per day) times the number of days, $d$, it is rented.
Sample Response: 1 point

Kaya's family spends $105 to rent a boat for 7 days. The total cost, $c$, of the boat rental is proportional to the number of days, $d$, the family rents the boat.

A. How much does it cost, in dollars, to rent the boat for one day?

B. Create an equation using $c$ and $d$ to represent the proportional relationship.

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

B. $c = \frac{1}{15}d$

Notes on Scoring

This response earns partial credit (1 point). Part A: The student may calculate the unit rate as days per dollar instead of dollars per day. Part B: The student creates a correct equation based on the incorrect answer in part A.
Sample Response: 1 point

Kaya’s family spends $105 to rent a boat for 7 days. The total cost, \( c \), of the boat rental is proportional to the number of days, \( d \), the family rents the boat.

A. How much does it cost, in dollars, to rent the boat for one day?

B. Create an equation using \( c \) and \( d \) to represent the proportional relationship.

\[
\begin{align*}
A. \quad & \text{\$735} \\
B. \quad & c = 15d
\end{align*}
\]

Notes on Scoring

This response earns partial credit (1 point). Part A: The student may multiply 105 by 7 rather than divide. Part B: The student creates a correct equation that says the cost, \( c \), of renting the boat is equal to 15 (dollars per day) times the number of days, \( d \), it is rented.
Sample Response: 0 points

Kaya's family spends $105 to rent a boat for 7 days. The total cost, c, of the boat rental is proportional to the number of days, d, the family rents the boat.

A. How much does it cost, in dollars, to rent the boat for one day?

B. Create an equation using c and d to represent the proportional relationship.

A. \[ \frac{735}{7} = 105 \]

B. \[ c = 105d \]

Notes on Scoring

This response earns no credit (0 points). Part A: The student may multiply 105 by 7 rather than divide. Part B: The student may think $105 is the daily rate to rent the boat and creates an incorrect equation.
Sample Response: 0 points

Kaya's family spends $105 to rent a boat for 7 days. The total cost, c, of the boat rental is proportional to the number of days, d, the family rents the boat.

A. How much does it cost, in dollars, to rent the boat for one day?

B. Create an equation using c and d to represent the proportional relationship.

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

B. $\frac{1}{15}d$

Notes on Scoring

This response earns no credit (0 points). Part A: The student may divide 7 by 105 to find the unit rate of days per dollar instead of dollars per day. Part B: The student creates an expression rather than an equation.
Grade 7
Math
Spring 2018 Item Release

Question 23

Question and Scoring Guidelines
Question 23

A teacher selects two different numbers, p and q, and states that \( p + q = 0 \).

Which statement could be true about these two numbers?

A. Both numbers are positive.
B. Both numbers are negative.
C. One number is zero and the other is positive.
D. One number is positive and the other is negative.

Points Possible: 1

Content Cluster: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Content Standard: 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. (7.NS.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.

Calculator Designation: Calculator neutral
**Scoring Guidelines**

**Rationale for Option A:** The student may not realize that a variable (e.g., \( q \)) can stand for a negative number.

**Rationale for Option B:** The student may realize that one of the numbers needs to be negative but does not realize that they cannot both be negative.

**Rationale for Option C:** The student may confuse multiplication with addition.

**Rationale for Option D: Key** - The student correctly identifies that the sum of a number and its additive inverse equals zero.

**Sample Response: 1 point**

A teacher selects two different numbers, \( p \) and \( q \), and states that \( p + q = 0 \).

Which statement could be true about these two numbers?

A. Both numbers are positive.
B. Both numbers are negative.
C. One number is zero and the other is positive.

D. One number is positive and the other is negative.
Grade 7
Math
Spring 2018 Item Release

Question 27

Question and Scoring Guidelines
Question 27

A cube has a surface area of 150 square inches \( \text{in.}^2 \).

What is the area, in square inches, of one face of the cube?

Points Possible: 1

Content Cluster: Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Content Standard: 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. (7.G.6)

Calculator Designation: Calculator
Scoring Guidelines

Exemplar Response:

• 25 in.$^2$

Other Correct Responses:

• N/A

For this item, a full-credit response includes:

• The correct value (1 point).
Grade 7
Math
Spring 2018 Item Release

Question 27

Sample Responses
Sample Response: 1 point

A cube has a surface area of 150 square inches ($in.^2$).

What is the area, in square inches, of one face of the cube?

![Input field with 25 in.²]

Notes on Scoring

This response earns full credit (1 point). The student correctly recognizes that there are 6 faces on a cube and correctly divides 150 by 6 to get the surface area of one face.
Sample Response: 0 points

A cube has a surface area of 150 square inches \((\text{in.}^2)\).

What is the area, in square inches, of one face of the cube?

5 \(\text{in.}^2\)

Notes on Scoring

This response earns no credit (0 points). The student may calculate the length of one side of the cube rather than the area of one face.
Sample Response: 0 points

A cube has a surface area of 150 square inches \((\text{in.}^2)\).

What is the area, in square inches, of one face of the cube?

\[ 37.5 \text{ in.}^2 \]

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Notes on Scoring

This response earns no credit (0 points). The student may think that a cube has 4 sides and divides 150 by 4.
Grade 7
Math
Spring 2018 Item Release

Question 28

Question and Scoring Guidelines
Question 28

The distance of one lap around a school track is \(\frac{1}{4}\) mile. Sherrie walks 5 laps around the track.

How many more laps must Sherrie walk to reach a total distance of 3.5 miles?

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**Points Possible:** 1

**Content Cluster:** Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

**Content Standard:** 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. For example: if a woman making $25 an hour gets a 10% raise, she will make an additional \(\frac{1}{10}\) of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9\(\frac{3}{4}\) inches long in the center of a door that is 27\(\frac{1}{2}\) inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. (7.EE.3)

**Calculator Designation:** Calculator
Scoring Guidelines

Exemplar Response:

• 9 laps

Other Correct Responses:

• Any equivalent value

For this item, a full-credit response includes:

• The correct value (1 point).
Grade 7
Math
Spring 2018 Item Release

Question 28

Sample Responses
Sample Response: 1 point

The distance of one lap around a school track is $\frac{1}{4}$ mile. Sherrie walks 5 laps around the track.

How many more laps must Sherrie walk to reach a total distance of 3.5 miles?

9 laps

Notes on Scoring

This response earns full credit (1 point). The student correctly divides 3.5 by $\frac{1}{4}$ and finds that there are 14 laps in 3.5 miles. Then, the student correctly subtracts 5 from 14 to find how many more laps Sherrie must walk.
Sample Response: 0 points

The distance of one lap around a school track is $\frac{1}{4}$ mile. Sherrie walks 5 laps around the track.

How many more laps must Sherrie walk to reach a total distance of 3.5 miles?

14 laps

Notes on Scoring

This response earns no credit (0 points). The student may calculate the number of laps in 3.5 miles but does not account for the fact that Sherrie has already walked 5 laps and that the question asks for how many more laps she must walk.
Sample Response: 0 points

The distance of one lap around a school track is $\frac{1}{4}$ mile. Sherrie walks 5 laps around the track.

How many more laps must Sherrie walk to reach a total distance of 3.5 miles?

1.25 laps

Notes on Scoring

This response earns no credit (0 points). The student may only calculate how many miles Sherrie has already walked in her 5 laps.
Question 31

Mary goes to the bakery with $35. She purchases 2 loaves of bread for $3 each and a cake for $15. She plans to spend the remainder of her money on cookies that cost $1.25 each.

What is the greatest number of cookies that Mary can buy?

Points Possible: 1

Content Cluster: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Content Standard: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.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. For example, as a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

Calculator Designation: Calculator
Scoring Guidelines

Exemplar Response:

- 11 cookies

Other Correct Responses:

- N/A

For this item, a full-credit response includes:

- The correct value (1 point)
Grade 7
Math
Spring 2018 Item Release

Question 31

Sample Responses
Sample Response: 1 point

Mary goes to the bakery with $35. She purchases 2 loaves of bread for $3 each and a cake for $15. She plans to spend the remainder of her money on cookies that cost $1.25 each.

What is the greatest number of cookies that Mary can buy?

11 cookies

Notes on Scoring

This response earns full credit (1 point). The student correctly subtracts $6 for 2 loaves of bread and $15 for a cake from $35 to get $14. Then, the student correctly divides $14 by $1.25 and determines that 11 cookies can be bought.
Sample Response: 0 points

Mary goes to the bakery with $35. She purchases 2 loaves of bread for $3 each and a cake for $15. She plans to spend the remainder of her money on cookies that cost $1.25 each.

What is the greatest number of cookies that Mary can buy?

13 cookies

Notes on Scoring

This response earns no credit (0 points). The student may only account for Mary buying one loaf of bread rather than two, leaving her with $17 to spend on cookies. Then, the student divides $17 by $1.25 and determines that 13 cookies can be bought.
Sample Response: 0 points

Mary goes to the bakery with $35. She purchases 2 loaves of bread for $3 each and a cake for $15. She plans to spend the remainder of her money on cookies that cost $1.25 each.

What is the greatest number of cookies that Mary can buy?

11.2 cookies

Notes on Scoring

This response earns no credit (0 points). The student does not put the answer in the context of the item, not recognizing that 11.2 should be rounded down because you can’t buy part of a cookie.
Grade 7
Math
Spring 2018 Item Release

Question 32

Question and Scoring Guidelines
Question 32

The figure on the left represents a scale drawing of the figure on the right.

What is the scale?

1 inch : _____ yards

Points Possible: 1

Content Cluster: Draw, construct, and describe geometrical figures and describe the relationships between them.

Content Standard: 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. (7.G.1)

Calculator Designation: Calculator
Scoring Guidelines

Exemplar Response:

- 1 inch : 2.5 yards

Other Correct Responses:

- Any equivalent value

For this item, a full-credit response includes:

- A correct value (1 point).
Sample Response: 1 point

The figure on the left represents a scale drawing of the figure on the right.

2 in.  5 yd

What is the scale?

1 \text{ inch} : \frac{2.5}{\text{ yards}}

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Notes on Scoring

This response earns full credit (1 point). The student correctly determines that, to dilate the left figure to be the same size as the right figure, each side length, each inch, in the left figure needs to be multiplied by 2.5 yards.
Sample Response: 0 points

The figure on the left represents a scale drawing of the figure on the right.

What is the scale?

1 inch : .4 yards

Notes on Scoring

This response earns no credit (0 points). The student may determine the scale as if the right figure is the scale drawing and therefore divides 2 by 5.
Sample Response: 0 points

The figure on the left represents a scale drawing of the figure on the right.

What is the scale?

1 inch : \( \frac{1}{36} \) yards

Notes on Scoring

This response earns no credit (0 points). The student may disregard the values in the graphic and calculate the actual conversion from inches to yards.
Grade 7 Math
Spring 2018 Item Release
Question 33

Question and Scoring Guidelines
Question 33

Chris wants to determine the most popular sport of the students at his school.

Which sample should he survey?

A  a group of his friends
B  a group of students on the soccer team
C  a group of randomly selected students from each grade at his school
D  a group of randomly selected students from each sports team at his school

Points Possible: 1

Content Cluster: Use random sampling to draw inferences about a population.

Content Standard: 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. (7.SP.1)

Calculator Designation: Calculator neutral
**Scoring Guidelines**

**Rationale for Option A:** The student may forget that the group needs to be representative of the population.

**Rationale for Option B:** The student may forget that the group needs to be representative of the population.

**Rationale for Option C:** **Key** - The student selects a group that was large and a good representation of the population.

**Rationale for Option D:** The student may not realize that only surveying students on sports teams, even if randomly selected, is still biased.

**Sample Response: 1 point**

Chris wants to determine the most popular sport of the students at his school.

Which sample should he survey?

- **A** a group of his friends
- **B** a group of students on the soccer team
- **D** a group of randomly selected students from each grade at his school
- **G** a group of randomly selected students from each sports team at his school
Grade 7
Math
Spring 2018 Item Release

Question 35

Question and Scoring Guidelines
Question 35

Keith purchases a cell phone plan, which includes a cell phone and cell phone service. He makes a deposit of $100 for the cell phone and then pays $43 per month for the cell phone service.

A. Create an equation to model the total amount of money, \( y \), in dollars, Keith spends on the cell phone and plan after \( x \) months.

B. How much money does Keith spend per year for cell phone service?

\[
A. \ y = \quad \quad \quad \\
B. \ \$ \quad 
\]

Points Possible: 2

**Content Cluster:** Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

**Content Standard:** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.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. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

**Calculator Designation:** Calculator
Scoring Guidelines

Exemplar Response:

- \( y = 45x + 100 \)
- $640

Other Correct Responses:

- Any equivalent equation
- 540
- Any correct value based on an incorrect equation

For this item, a full-credit response includes:

- A correct equation (1 point)
  AND
- A correct value (1 point).
Sample Response: 2 points

Keith purchases a cell phone plan, which includes a cell phone and cell phone service. He makes a deposit of $100 for the cell phone and then pays $45 per month for the cell phone service.

A. Create an equation to model the total amount of money, $y$, in dollars, Keith spends on the cell phone and plan after $x$ months.

B. How much money does Keith spend per year for cell phone service?

$A. y = 45x + 100$

$B. \$ 640$

Notes on Scoring

This response earns full credit (2 points). Part A: The student creates a correct equation that shows the total amount of money is equal to 45 times the number of months passed, ($x$), plus the $100 deposit. Part B: The student correctly represents 12 months in a year by substituting 12 for $x$ in their equation from part A and solves to get $y$ as $640$. 
Sample Response: 1 point

Keith purchases a cell phone plan, which includes a cell phone and cell phone service. He makes a deposit of $100 for the cell phone and then pays $45 per month for the cell phone service.

A. Create an equation to model the total amount of money, $y$, in dollars, Keith spends on the cell phone and plan after $x$ months.

$A. \quad y = \text{45}x$

B. How much money does Keith spend per year for cell phone service?

$B. \quad \$ \text{540}$

Notes on Scoring

This response earns partial credit (1 point). Part A: The student shows that the total amount of money is equal to 45 times the number of months but does not include the addition of the $100 deposit in the equation. Part B: The student represents 12 months in a year by substituting 12 for $x$ in their incorrect equation from part A and correctly solves to get $y$ as $540$. 

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Sample Response: 1 point

Keith purchases a cell phone plan, which includes a cell phone and cell phone service. He makes a deposit of $100 for the cell phone and then pays $45 per month for the cell phone service.

A. Create an equation to model the total amount of money, \( y \), in dollars, Keith spends on the cell phone and plan after \( x \) months.

B. How much money does Keith spend per year for cell phone service?

\[
A. \quad y = 45x + 100 \\
B. \quad \$145
\]

Notes on Scoring

This response earns partial credit (1 point). Part A: The student creates a correct equation that says the total amount of money is equal to 45 times the number of months plus the $100 deposit. Part B: The student only calculates the amount of money Keith spends in the first month.
Sample Response: 0 points

Keith purchases a cell phone plan, which includes a cell phone and cell phone service. He makes a deposit of $100 for the cell phone and then pays $45 per month for the cell phone service.

A. Create an equation to model the total amount of money, y, in dollars, Keith spends on the cell phone and plan after x months.

B. How much money does Keith spend per year for cell phone service?

$A. y = 45x$

$B. \$145$

Notes on Scoring

This response earns no credit (0 points). Part A: The student shows that the total amount of money is equal to 45 times the number of months but does not include the addition of the $100 deposit in the equation. Part B: The student only calculates the amount of money Keith spends in the first month.
**Sample Response: 0 points**

Keith purchases a cell phone plan, which includes a cell phone and cell phone service. He makes a deposit of $100 for the cell phone and then pays $45 per month for the cell phone service.

A. Create an equation to model the total amount of money, $y$, in dollars, Keith spends on the cell phone and plan after $x$ months.

B. How much money does Keith spend per year for cell phone service?

\[ A. \quad y = 45x \]

\[ B. \quad \$2340 \]

**Notes on Scoring**

This response earns no credit (0 points). Part A: The student shows that the total amount of money is equal to 45 times the number of months but does not include the addition of the $100 deposit in the equation. Part B: The student multiplies $45 by 52 weeks rather than by 12 months.
Question 36

A bag contains 25 cookies. There are 15 chocolate chip cookies, 7 peanut butter cookies, and the rest are oatmeal raisin cookies.

What is the probability of randomly choosing a chocolate chip or peanut butter cookie from the bag?

Points Possible: 1

Content Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Content Standard: 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. (7.SP.7)

b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?

Calculator Designation: Calculator neutral
Scoring Guidelines

Exemplar Response:

- \( \frac{22}{25} \)

Other Correct Responses:

- Any equivalent value

For this item, a full-credit response includes:

- A correct value (1 point).
Sample Response: 1 point

A bag contains 25 cookies. There are 15 chocolate chip cookies, 7 peanut butter cookies, and the rest are oatmeal raisin cookies.

What is the probability of randomly choosing a chocolate chip or peanut butter cookie from the bag?

\[
\begin{array}{c}
22 \\
25
\end{array}
\]

Notes on Scoring

This response earns full credit (1 point). The student correctly represents the probability as the total number of favorable outcomes, 22, out of the total number of outcomes, 25.
Sample Response: 1 point

A bag contains 25 cookies. There are 15 chocolate chip cookies, 7 peanut butter cookies, and the rest are oatmeal raisin cookies.

What is the probability of randomly choosing a chocolate chip or peanut butter cookie from the bag?

.88

Notes on Scoring

This response earns full credit (1 point). The student correctly calculates the probability as the total number of favorable outcomes, 22, divided by the total number of outcomes, 25, and responds with a correct value of 0.88.
**Sample Response: 0 points**

A bag contains 25 cookies. There are 15 chocolate chip cookies, 7 peanut butter cookies, and the rest are oatmeal raisin cookies.

What is the probability of randomly choosing a chocolate chip or peanut butter cookie from the bag?

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**Notes on Scoring**

This response earns no credit (0 points). The student may only represent the probability of choosing a chocolate chip cookie.
Sample Response: 0 points

A bag contains 25 cookies. There are 15 chocolate chip cookies, 7 peanut butter cookies, and the rest are oatmeal raisin cookies.

What is the probability of randomly choosing a chocolate chip or peanut butter cookie from the bag?

\[
\begin{array}{c}
25 \\
22
\end{array}
\]

Notes on Scoring

This response earns no credit (0 points). The student incorrectly represents the probability as the total number of outcomes out of the total number of favorable outcomes.
Question 39

Kayla rolls two fair number cubes each numbered 1 through 6. She needs to roll a sum of 9 or more to win a game. She rolls the number cubes one at a time. She rolls a 5 with the first number cube.

What is the probability that Kayla will win the game?

Points Possible: 1

**Content Cluster:** Investigate chance processes and develop, use, and evaluate probability models.

**Content Standard:** Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. (7.SP.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.

**Calculator Designation:** Calculator
Scoring Guidelines

Exemplar Response:

• 0.5

Other Correct Responses:

• Any equivalent value

For this item, a full-credit response includes:

• The correct probability (1 point).
Grade 7
Math
Spring 2018 Item Release

Question 39

Sample Responses
Sample Response: 1 point

Kayla rolls two fair number cubes each numbered 1 through 6. She needs to roll a sum of 9 or more to win a game. She rolls the number cubes one at a time. She rolls a 5 with the first number cube.

What is the probability that Kayla will win the game?

0.5

Notes on Scoring

This response earns full credit (1 point). The student correctly recognizes that the second roll should be a 4, 5, or 6 to roll a sum of 9 or more. The student correctly calculates the probability as the total number of favorable outcomes divided by the total number of outcomes: \( \frac{3}{6} = 0.5 \).
Sample Response: 1 point

Kayla rolls two fair number cubes each numbered 1 through 6. She needs to roll a sum of 9 or more to win a game. She rolls the number cubes one at a time. She rolls a 5 with the first number cube.

What is the probability that Kayla will win the game?

\[
\frac{1}{2}
\]

Notes on Scoring

This response earns full credit (1 point). The student correctly recognizes that the second roll should be a 4, 5, or 6 to roll a sum of 9 or more. The student correctly represents the probability as the total number of favorable outcomes out of the total number of outcomes: \(\frac{3}{6} = \frac{1}{2}\).
Sample Response: 0 points

Kayla rolls two fair number cubes each numbered 1 through 6. She needs to roll a sum of 9 or more to win a game. She rolls the number cubes one at a time. She rolls a 5 with the first number cube.

What is the probability that Kayla will win the game?

\[
\frac{1}{6}
\]

Notes on Scoring

This response earns no credit (0 points). The student represents the probability of getting exactly 9 instead of 9 or more.
Sample Response: 0 points

Kayla rolls two fair number cubes each numbered 1 through 6. She needs to roll a sum of 9 or more to win a game. She rolls the number cubes one at a time. She rolls a 5 with the first number cube.

What is the probability that Kayla will win the game?

\[
\frac{8}{36}
\]

Notes on Scoring

This response earns no credit (0 points). The student may forget that the first number cube was already rolled and represent the probability of getting a sum of 9 or more when Kayla hasn’t rolled either number cube yet.
Grade 7
Math
Spring 2018 Item Release

Question 40

Question and Scoring Guidelines
Question 40

A baker mixes 8 3/4 cups of white flour with 2 1/2 cups of rye flour for a bread recipe.

How many cups of white flour does the baker mix for every 1 cup of rye flour?

Points Possible: 1

Content Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Content Standard: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour. (7.RP.1)

Calculator Designation: Calculator
Scoring Guidelines

Exemplar Response:

• $3^{\frac{1}{2}}$

Other Correct Responses:

• Any equivalent value

For this item, a full-credit response includes:

• A correct value (1 point).
Sample Response: 1 point

A baker mixes $8\frac{3}{4}$ cups of white flour with $2\frac{1}{2}$ cups of rye flour for a bread recipe.

How many cups of white flour does the baker mix for every 1 cup of rye flour?

\[
\frac{1}{3\frac{1}{2}}
\]

Notes on Scoring

This response earns full credit (1 point). The student correctly divides $8\frac{3}{4}$ by $2\frac{1}{2}$ to calculate the ratio between the two ingredients. The unit rate is $3\frac{1}{2}$ cups of white flour for every 1 cup of rye flour.
Sample Response: 1 point

A baker mixes $\frac{8}{4}$ cups of white flour with $2\frac{1}{2}$ cups of rye flour for a bread recipe.

How many cups of white flour does the baker mix for every 1 cup of rye flour?

\[
\frac{7}{2}
\]

Notes on Scoring

This response earns full credit (1 point). The student correctly divides $8 \frac{3}{4}$ by $2 \frac{1}{2}$ to calculate the ratio between the two ingredients. The unit rate is $\frac{7}{2}$ cups of white flour for every 1 cup of rye flour.
A baker mixes $\frac{3}{4}$ cups of white flour with $\frac{1}{2}$ cups of rye flour for a bread recipe.

How many cups of white flour does the baker mix for every 1 cup of rye flour?

$\frac{11}{4}$

Notes on Scoring

This response earns no credit (0 points). The student may mistakenly add $\frac{3}{4}$ to $2\frac{1}{2}$. 
Sample Response: 0 points

A baker mixes $8 \frac{3}{4}$ cups of white flour with $2 \frac{1}{2}$ cups of rye flour for a bread recipe.

How many cups of white flour does the baker mix for every 1 cup of rye flour?

\[\frac{4}{35}\]

Notes on Scoring

This response earns no credit (0 points). The student may correctly convert $8 \frac{3}{4}$ to fourths to get $\frac{35}{4}$ and then respond with the inverse of that fraction.
Grade 7
Math
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Question 44

Question and Scoring Guidelines
**Question 44**

An experiment for a chemical reaction involves mixing 1 teaspoon of yeast with $\frac{1}{4}$ cup of hydrogen peroxide.

Delray wants to do the same experiment with larger amounts of the two ingredients. He uses $\frac{1}{2}$ cups of hydrogen peroxide and needs to keep the same ratio of yeast to hydrogen peroxide. Note that there are 48 teaspoons in 1 cup.

How much yeast, in **cups**, should Delray mix with this amount of hydrogen peroxide?

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**Points Possible:** 1

**Content Cluster:** Analyze proportional relationships and use them to solve real-world and mathematical problems.

**Content Standard:** Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. (7.RP.3)

**Calculator Designation:** Calculator
Scoring Guidelines

Exemplar Response:

- \( \frac{1}{8} \)

Other Correct Responses:

- Any equivalent value

For this item, a full-credit response includes:

- A correct value (1 point).
Grade 7
Math
Spring 2018 Item Release

Question 44

Sample Responses
Sample Response: 1 point

An experiment for a chemical reaction involves mixing 1 teaspoon of yeast with \( \frac{1}{2} \) cup of hydrogen peroxide. Delray wants to do the same experiment with larger amounts of the two ingredients. He uses \( 1 \frac{1}{2} \) cups of hydrogen peroxide and needs to keep the same ratio of yeast to hydrogen peroxide. Note that there are 48 teaspoons in 1 cup.

How much yeast, in cups, should Delray mix with this amount of hydrogen peroxide?

\[
\frac{1}{8} \quad \text{cup(s)}
\]

Notes on Scoring

This response earns full credit (1 point). The student correctly recognizes that there are six \( \frac{1}{4} \) cups in \( 1 \frac{1}{2} \) cups. The student correctly determines that since Delray needs 6 times as much hydrogen peroxide as is given in the experiment recipe, he also needs 6 times as much yeast to keep the ratio the same. The student multiplies 1 by 6 to find that 6 teaspoons of yeast are needed. Then, the student correctly converts 6 teaspoons into cups by recognizing that there are 48 teaspoons in a cup, setting up the ratio \( \frac{6}{48} \), and then calculates an equivalent fraction, \( \frac{1}{8} \).
Sample Response: 1 point

An experiment for a chemical reaction involves mixing 1 teaspoon of yeast with \( \frac{1}{4} \) cup of hydrogen peroxide.

Delray wants to do the same experiment with larger amounts of the two ingredients. He uses 1 \( \frac{1}{2} \) cups of hydrogen peroxide and needs to keep the same ratio of yeast to hydrogen peroxide. Note that there are 48 teaspoons in 1 cup.

How much yeast, in cups, should Delray mix with this amount of hydrogen peroxide?

\[ 0.125 \text{ cup(s)} \]

Notes on Scoring

This response earns full credit (1 point). The student may convert the mixed numbers to decimals and set up an equation: \( \frac{1}{0.25} = \frac{x}{1.5} \). The student multiplies both sides by 1.5 to isolate \( x \) on the right side and then calculates the left side to get 6 teaspoons = \( x \). The student correctly looks at the situation and realizes that the response needs to be in cups rather than teaspoons and therefore divides 6 by 48 to get 0.125 cups.
Sample Response: 0 points

An experiment for a chemical reaction involves mixing 1 teaspoon of yeast with $\frac{1}{4}$ cup of hydrogen peroxide.

Delray wants to do the same experiment with larger amounts of the two ingredients. He uses $1 \frac{1}{2}$ cups of hydrogen peroxide and needs to keep the same ratio of yeast to hydrogen peroxide. Note that there are 48 teaspoons in 1 cup.

How much yeast, in cups, should Delray mix with this amount of hydrogen peroxide?

| 6 |

Notes on Scoring

This response earns no credit (0 points). The student may recognize that there are six quarter cups in $1 \frac{1}{2}$ cups and correctly determines that since Delray needs 6 times as much hydrogen peroxide as is given in the experiment recipe, he also needs 6 times as much yeast to keep the ratio the same. However, the student forgets to convert teaspoons to cups.
Sample Response: 0 points

An experiment for a chemical reaction involves mixing 1 teaspoon of yeast with $\frac{1}{4}$ cup of hydrogen peroxide.

Delray wants to do the same experiment with larger amounts of the two ingredients. He uses $1\frac{1}{2}$ cups of hydrogen peroxide and needs to keep the same ratio of yeast to hydrogen peroxide. Note that there are 48 teaspoons in 1 cup.

How much yeast, in cups, should Delray mix with this amount of hydrogen peroxide?

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288 cup(s)

Notes on Scoring

This response earns no credit (0 points). The student may correctly calculate that Delray needs 6 teaspoons of yeast but incorrectly converts the teaspoons to cups by multiplying by 48 instead of dividing.