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<tr>
<td>2</td>
<td>Equation Item</td>
<td>Understand congruence and similarity using physical models, transparencies, or geometry software.</td>
<td>Verify experimentally the properties of rotations, reflections, and translations: (8.G.1) b. Angles are taken to angles of the same measure.</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>6</td>
<td>Multiple Choice</td>
<td>Define, evaluate, and compare functions.</td>
<td>Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change. (8.F.2)</td>
<td>B</td>
<td>1 point</td>
</tr>
<tr>
<td>7</td>
<td>Equation Item</td>
<td>Understand and apply the Pythagorean Theorem.</td>
<td>Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (8.G.7)</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>13</td>
<td>Multiple Choice</td>
<td>Work with radicals and integer exponents.</td>
<td>Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as $3 \times 10^8$; and the population of the world as $7 \times 10^9$; and determine that the world population is more than 20 times larger. (8.EE.3)</td>
<td>A</td>
<td>1 point</td>
</tr>
</tbody>
</table>

* The question number matches the item number in the Item Level Report in the Online Reporting System. The items are numbered sequentially in the practice site.
### Grade 8 Math
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Content Summary and Answer Key

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>14</td>
<td>Equation Item</td>
<td>Understand congruence and similarity using physical models, transparencies, or geometry software.</td>
<td>Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. (8.G.3)</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>15</td>
<td>Multiple Choice</td>
<td>Understand the connections between proportional relationships, lines, and linear equations.</td>
<td>Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. (8.EE.5)</td>
<td>C</td>
<td>1 point</td>
</tr>
<tr>
<td>20</td>
<td>Equation Item</td>
<td>Investigate patterns of association in bivariate data.</td>
<td>Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores? (8.SP.4)</td>
<td>---</td>
<td>2 points</td>
</tr>
</tbody>
</table>

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<tr>
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<tbody>
<tr>
<td>21</td>
<td>Equation Item</td>
<td>Understand and apply the Pythagorean Theorem.</td>
<td>Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (8.G.7)</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>23</td>
<td>Graphic Response</td>
<td>Know that there are numbers that are not rational, and approximate them by rational numbers.</td>
<td>Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., ( \pi^2 )). For example, by truncating the decimal expansion of ( \sqrt{2} ), show that ( \sqrt{2} ) is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. (8.NS.2)</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>25</td>
<td>Equation Item</td>
<td>Work with radicals and integer exponents.</td>
<td>Use square root and cube root symbols to represent solutions to equations of the form ( x^2 = p ) and ( x^3 = p ), where ( p ) is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that ( \sqrt{2} ) is irrational. (8.EE.2)</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>26</td>
<td>Equation Item</td>
<td>Understand congruence and similarity using physical models, transparencies, or geometry software.</td>
<td>Verify experimentally the properties of rotations, reflections, and translations: (8.G.1) a. Lines are taken to lines, and line segments to line segments of the same length.</td>
<td>---</td>
<td>1 point</td>
</tr>
</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>Multiple Choice</td>
<td>Analyze and solve linear equations and pairs of simultaneous linear equations.</td>
<td>Solve linear equations in one variable. (8.EE.7) a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form ( x = a ), ( a = a ), or ( a = b ) results (where ( a ) and ( b ) are different numbers).</td>
<td>A</td>
<td>1 point</td>
</tr>
<tr>
<td>29</td>
<td>Multiple Choice</td>
<td>Understand congruence and similarity using physical models, transparencies, or geometry software.</td>
<td>Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. (8.G.3)</td>
<td>A</td>
<td>1 point</td>
</tr>
<tr>
<td>31</td>
<td>Graphic Response</td>
<td>Use functions to model relationships between quantities.</td>
<td>Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two ((x, y)) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. (8.F.4)</td>
<td>---</td>
<td>2 points</td>
</tr>
<tr>
<td>35</td>
<td>Table Item</td>
<td>Analyze and solve linear equations and pairs of simultaneous linear equations.</td>
<td>Analyze and solve pairs of simultaneous linear equations. (8.EE.8) b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, ( 3x + 2y = 5 ) and ( 3x + 2y = 6 ) have no solution because ( 3x + 2y ) cannot simultaneously be 5 and 6.</td>
<td>---</td>
<td>1 point</td>
</tr>
</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>Equation Item</td>
<td>Understand and apply the Pythagorean Theorem.</td>
<td>Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. (8.G.8)</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>42</td>
<td>Multiple Choice</td>
<td>Use functions to model relationships between quantities.</td>
<td>Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. (8.F.5)</td>
<td>B</td>
<td>1 point</td>
</tr>
<tr>
<td>46</td>
<td>Multi-Select</td>
<td>Define, evaluate, and compare functions.</td>
<td>Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (8.F.1)</td>
<td>B, C, D</td>
<td>1 point</td>
</tr>
<tr>
<td>49</td>
<td>Multiple Choice</td>
<td>Work with radicals and integer exponents.</td>
<td>Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, (3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27). (8.EE.1)</td>
<td>B</td>
<td>1 point</td>
</tr>
<tr>
<td>50</td>
<td>Multiple Choice</td>
<td>Use functions to model relationships between quantities.</td>
<td>Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. (8.F.5)</td>
<td>C</td>
<td>1 point</td>
</tr>
</tbody>
</table>

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Math
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Question 2

Question and Scoring Guidelines
Question 2

Pentagon A is rotated 180° about its center and then translated to create pentagon B.

What is the value of $x$?

Points Possible: 1

Content Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

Content Standard: Verify experimentally the properties of rotations, reflections, and translations: (8.G.1)

b. Angles are taken to angles of the same measure.
Scoring Guidelines

Exemplar Response:

- 110

Other Correct Responses:

- any equivalent value

For this item, a full-credit response includes

- the correct value (1 point)
Grade 8
Math
Spring 2018 Item Release

Question 2

Sample Responses
Sample Response: 1 point

Pentagon A is rotated 180° about its center and then translated to create pentagon B.

What is the value of $x$?

110

Notes on Scoring

This response earns full credit (1 point). The student correctly reasons that after the pentagon is rotated 180 degrees and translated, the value of $x$ must be 110 degrees.
Sample Response: 0 points

Pentagon A is rotated $180^\circ$ about its center and then translated to create pentagon B.

What is the value of $x$?

120

Notes on Scoring

This response earns no credit (0 points). The student may confuse how many degrees the pentagon is rotated and think that the value of $x$ is 120 degrees.
Sample Response: 0 points

Pentagon A is rotated 180° about its center and then translated to create pentagon B.

What is the value of \( x \)?

100

Notes on Scoring

This response earns no credit (0 points). The student may confuse how many degrees the pentagon is rotated and think that the value of \( x \) is 100 degrees.
Grade 8
Math
Spring 2018 Item Release

Question 6

Question and Scoring Guidelines
Two plumbers charge an initial fee and an hourly rate.

The equation $y = 100 + 30x$ models plumber A’s fee, where $y$ is the total charge, in dollars, and $x$ is the number of hours worked.

The table shown represents plumber B’s total charge for different numbers of hours.

<table>
<thead>
<tr>
<th>Plumber B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>Total Charges ($)</td>
</tr>
<tr>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>2</td>
<td>160</td>
</tr>
<tr>
<td>3</td>
<td>215</td>
</tr>
</tbody>
</table>

Which statement about the plumbers’ charges is true?

- The two plumbers have equal hourly rates.
- Plumber A has a greater initial fee.
- Plumber A has a greater hourly rate.
- The two plumbers have equal initial fees.

**Points Possible: 1**

**Content Cluster:** Define, evaluate, and compare functions.

**Content Standard:** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change. (8.F.2)
Scoring Guidelines

Rationale for Option A: The student may not correctly identify the initial fees of the two plumbers.

Rationale for Option B: Key – The student correctly identifies that $100 is the initial fee for plumber A and correctly calculates that the hourly rate for plumber B is $55 per hour and the initial fee is $50.

Rationale for Option C: The student may not correctly identify the hourly rate of the plumbers.

Rationale for Option D: The student may think that both plumbers have an initial fee of $100.

Sample Response: 1 point

Two plumbers charge an initial fee and an hourly rate.

The equation $y = 100 + 30x$ models plumber A’s fee, where $y$ is the total charge, in dollars, and $x$ is the number of hours worked.

The table shown represents plumber B’s total charge for different numbers of hours.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Total Charges ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>2</td>
<td>160</td>
</tr>
<tr>
<td>3</td>
<td>215</td>
</tr>
</tbody>
</table>

Which statement about the plumbers’ charges is true?

- A. The two plumbers have equal hourly rates.
- B. Plumber A has a greater initial fee.
- C. Plumber A has a greater hourly rate.
- D. The two plumbers have equal initial fees.
Grade 8
Math
Spring 2018 Item Release

Question 7

Question and Scoring Guidelines
**Question 7**

A cone has a slant height of 25 inches and a radius of 7 inches as shown.

What is the height, $h$, in inches, of the cone?

$$h = \underline{\hspace{2cm}} \text{ inches}$$

**Points Possible:** 1

**Content Cluster:** Understand and apply the Pythagorean Theorem.

**Content Standard:** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (8.G.7)
Scoring Guidelines

Exemplar Response:

• 24

Other Correct Responses:

• any equivalent value

For this item, a full-credit response includes

• the correct value (1 point)
Grade 8
Math
Spring 2018 Item Release

Question 7

Sample Responses
Sample Response: 1 point

A cone has a slant height of 25 inches and a radius of 7 inches as shown.

What is the height, \( h \), in inches, of the cone?

\[
h = 24 \\
\text{inches}
\]

Notes on Scoring

This response earns full credit (1 point). The student correctly substitutes \( a = 7 \) and \( c = 25 \) into the Pythagorean Theorem, \( a^2 + b^2 = c^2 \), and correctly calculates the unknown height.
Sample Response: 1 point

A cone has a slant height of 25 inches and a radius of 7 inches as shown.

What is the height, $h$, in inches, of the cone?

$$h = \sqrt{576}$$

Notes on Scoring

This response earns full credit (1 point). The student correctly substitutes $a = 7$ and $c = 25$ into the Pythagorean Theorem, $a^2 + b^2 = c^2$, and correctly calculates the unknown height, leaving it in radical form.
Sample Response: 0 points

A cone has a slant height of 25 inches and a radius of 7 inches as shown.

What is the height, \( h \), in inches, of the cone?

\[
h = 26 \text{ inches}
\]

Notes on Scoring

This response earns no credit (0 points). The student may substitute \( a = 7 \) and incorrectly substitute \( b = 25 \) into the Pythagorean Theorem, \( a^2 + b^2 = c^2 \), to calculate the unknown height.
Sample Response: 0 points

A cone has a slant height of 25 inches and a radius of 7 inches as shown.

What is the height, h, in inches, of the cone?

\[ h = 18 \text{ inches} \]

Notes on Scoring

This response earns no credit (0 points). The student may incorrectly think that the Pythagorean Theorem is \( a + b = c \) and may simply subtract 7 from 25.
Grade 8
Math
Spring 2018 Item Release
Question 13
Question and Scoring Guidelines
**Question 13**

Which expression is equivalent to 0.00007?

- A. $7 \times 10^{-5}$
- B. $7 \times 10^{-4}$
- C. $7 \times 10^4$
- D. $7 \times 10^5$

**Points Possible:** 1

**Content Cluster:** Work with radicals and integer exponents.

**Content Standard:** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as $3 \times 10^8$; and the population of the world as $7 \times 10^9$; and determine that the world population is more than 20 times larger. (8.EE.3)
Scoring Guidelines

Rationale for Option A: **Key** - The student correctly determines the scientific notation form of the given number, understanding that the first non-zero digit in the given number is in the hundred-thousandths place, five decimal places to the right of the decimal point.

Rationale for Option B: The student may count the zeros to the right of the decimal point instead of counting the decimal places, including the first non-zero digit, to determine the exponent.

Rationale for Option C: The student may count the zeros to the right of the decimal point instead of counting the decimal places, including the first non-zero digit, to determine the exponent and also does not remember to use a negative exponent for a number which is less than one.

Rationale for Option D: The student may correctly count all of the decimal places but does not remember to use a negative exponent for a number which is less than one.

Sample Response: 1 point

Which expression is equivalent to 0.00007?

- $7 \times 10^{-5}$
- $7 \times 10^{-4}$
- $7 \times 10^{4}$
- $7 \times 10^{5}$
Grade 8 Math
Spring 2018 Item Release

Question 14

Question and Scoring Guidelines
Question 14

Triangle QRS is located on the coordinate plane, where vertex Q is located at the point \((a, b)\).

The triangle is reflected across the x-axis and then translated 2 units to the right to create triangle TUV.

Create an expression for the x-coordinate of T.

Points Possible: 1

**Content Cluster:** Understand congruence and similarity using physical models, transparencies, or geometry software.

**Content Standard:** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. (8.G.3)
Scoring Guidelines

Exemplar Response

• a + 2

Other Correct Responses:

• any equivalent expression

For this item, a full-credit response includes

• the correct coordinate (1 point).
Grade 8
Math
Spring 2018 Item Release

Question 14

Sample Responses
Sample Response: 1 point

Triangle QRS is located on the coordinate plane, where vertex Q is located at the point \((a, b)\).

The triangle is reflected across the \(x\)-axis and then translated 2 units to the right to create triangle TUV.

Create an expression for the \(x\)-coordinate of T.

\[ a + 2 \]

Notes on Scoring

This response earns full credit (1 point). The student recognizes that reflecting the point across the \(x\)-axis will not result in a change in the \(x\)-coordinate; however, because the triangle is translated 2 units to the right, the \(x\)-coordinate must be 2 more than it originally was, \(a + 2\).
Sample Response: 1 point

Triangle QRS is located on the coordinate plane, where vertex Q is located at the point \((a, b)\).

The triangle is reflected across the x-axis and then translated 2 units to the right to create triangle TUV.

Create an expression for the x-coordinate of T.

\[2 + a\]

Notes on Scoring

This response earns full credit (1 point). The student recognizes that reflecting the point across the x-axis will not result in a change in the x-coordinate; however, because the triangle is translated 2 units to the right, the x-coordinate must be 2 more than it originally was, \(2 + a\).
Sample Response: 0 points

Triangle QRS is located on the coordinate plane, where vertex Q is located at the point \((a, b)\). The triangle is reflected across the \(x\)-axis and then translated 2 units to the right to create triangle TUV.

Create an expression for the \(x\)-coordinate of T.

\[-a + 2\]

Notes on Scoring

This response earns no credit (0 points). The student may visualize that the triangle is reflected across the \(y\)-axis instead of the \(x\)-axis, and that therefore the \(x\)-coordinate will change sign to \(-a\). The student recognizes that if the triangle is translated 2 units to the right, the \(x\)-coordinate must increase by 2.
Sample Response: 0 points

Triangle QRS is located on the coordinate plane, where vertex Q is located at the point \((a, b)\).

The triangle is reflected across the \(x\)-axis and then translated 2 units to the right to create triangle TUV.

Create an expression for the \(x\)-coordinate of T.

\[ a - 2 \]

Notes on Scoring

This response earns no credit (0 points). The student recognizes that reflecting the point across the \(x\)-axis will not result in a change in the \(x\)-coordinate; however, the student may only pay attention to the word “translated” and not notice “to the right”, so the student instead represents a translation of the triangle to the left.
Question 15

Marisol, Timothy, and Zorian each have a machine that purifies water. The two tables show how much purified water Marisol’s and Timothy’s machines have produced at certain times after pouring water into the machine.

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Amount of Water (ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Amount of Water (ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>54</td>
</tr>
<tr>
<td>9</td>
<td>81</td>
</tr>
</tbody>
</table>

Zorian’s machine produces purified water at a constant rate that is faster than the rate for Marisol’s machine and slower than the rate for Timothy’s machine.

Which equation could represent the amount of purified water, \( y \), in ounces, that Zorian’s system produces after \( x \) hours?

- \( y = 15x \)
- \( y = 9x \)
- \( y = 8x \)
- \( y = 6x \)

Points Possible: 1

**Content Cluster:** Understand the connections between proportional relationships, lines, and linear equations.

**Content Standard:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. (8.EE.5)
**Scoring Guidelines**

**Rationale for Option A:** The student may calculate the sum of the two rates of change.

**Rationale for Option B:** The student may select the equation that represents Timothy’s rate.

**Rationale for Option C:** Key - The student correctly identifies an equation that can model the amount of water that Zorian’s machine produces, where the equation has a rate faster than 6 ounces per hour but slower than 9 ounces per hour.

**Rationale for Option D:** The student may select the equation that represents Marisol’s rate.

**Sample Response: 1 point**

Marisol, Timothy, and Zorian each have a machine that purifies water. The two tables show how much purified water Marisol’s and Timothy’s machines have produced at certain times after pouring water into the machine.

<table>
<thead>
<tr>
<th>Marisol’s Machine</th>
<th>Timothy’s Machine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time (hours)</strong></td>
<td><strong>Amount of Water (ounces)</strong></td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>48</td>
</tr>
</tbody>
</table>

Zorian’s machine produces purified water at a constant rate that is faster than the rate for Marisol’s machine and slower than the rate for Timothy’s machine.

Which equation could represent the amount of purified water, \( y \), in ounces, that Zorian’s system produces after \( x \) hours?

- \( y = 15x \)
- \( y = 9x \)
- \( y = 8x \)
- \( y = 6x \)
Grade 8
Math
Spring 2018 Item Release

Question 20

Question and Scoring Guidelines
Question 20

A company surveys 200 shoppers to find out what type of bottled water they prefer. The partial two-way table shown gives the results of the survey as relative frequencies.

<table>
<thead>
<tr>
<th>Bottled Water</th>
<th>Purified Water</th>
<th>Mineral Water</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>0.28</td>
<td>0.13</td>
<td>0.41</td>
</tr>
<tr>
<td>Women</td>
<td>0.14</td>
<td>?</td>
<td>0.59</td>
</tr>
<tr>
<td>Total</td>
<td>0.42</td>
<td>0.58</td>
<td>1.00</td>
</tr>
</tbody>
</table>

A. What is the missing value in the table?

B. Based on the results in the table, how many shoppers are men who prefer mineral water?

\[ A. \quad \hspace{5cm} B. \quad \]

Points Possible: 2

Content Cluster: Investigate patterns of association in bivariate data.

Content Standard: Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores? (8.SP.4)
Scoring Guidelines

Exemplar Response

- A. 0.45
  B. 26

Other Correct Responses:

- any equivalent values

For this item, a full-credit response includes

- the correct value for Part A (1 point)
  AND
- the correct value for Part B (1 point).
Grade 8
Math
Spring 2018 Item Release

Question 20

Sample Responses
Sample Response: 2 points

A company surveys 200 shoppers to find out what type of bottled water they prefer. The partial two-way table shown gives the results of the survey as relative frequencies.

<table>
<thead>
<tr>
<th>Bottled Water</th>
<th>Purified Water</th>
<th>Mineral Water</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>0.28</td>
<td>0.13</td>
<td>0.41</td>
</tr>
<tr>
<td>Women</td>
<td>0.14</td>
<td>?</td>
<td>0.59</td>
</tr>
<tr>
<td>Total</td>
<td>0.42</td>
<td>0.58</td>
<td>1</td>
</tr>
</tbody>
</table>

A. What is the missing value in the table?

B. Based on the results in the table, how many shoppers are men who prefer mineral water?

A. 0.45
B. 26

Notes on Scoring

This response earns full credit (2 points). Part A: The student correctly subtracts 0.14 from 0.59 or 0.13 from 0.58 to get 0.45. Part B: The student correctly multiplies the total number of shoppers (200) by the relative frequency of men that prefer mineral water (0.13).
Sample Response: 1 point

A company surveys 200 shoppers to find out what type of bottled water they prefer. The partial two-way table shown gives the results of the survey as relative frequencies.

<table>
<thead>
<tr>
<th>Bottled Water</th>
<th>Purified Water</th>
<th>Mineral Water</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>0.28</td>
<td>0.13</td>
<td>0.41</td>
</tr>
<tr>
<td>Women</td>
<td>0.14</td>
<td>?</td>
<td>0.59</td>
</tr>
<tr>
<td>Total</td>
<td>0.42</td>
<td>0.58</td>
<td>1</td>
</tr>
</tbody>
</table>

A. What is the missing value in the table?

B. Based on the results in the table, how many shoppers are men who prefer mineral water?

A. 0.45

B. 82

Notes on Scoring

This response earns partial credit (1 point). Part A: The student correctly subtracts 0.14 from 0.59 or 0.13 from 0.58 to get 0.45. Part B: The student may choose the wrong relative frequency and instead determine the total number of men who were surveyed.
Sample Response: 1 point

A company surveys 200 shoppers to find out what type of bottled water they prefer. The partial two-way table shown gives the results of the survey as relative frequencies.

<table>
<thead>
<tr>
<th>Bottled Water</th>
<th>Purified Water</th>
<th>Mineral Water</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>0.28</td>
<td>0.13</td>
<td>0.41</td>
</tr>
<tr>
<td>Women</td>
<td>0.14</td>
<td>?</td>
<td>0.59</td>
</tr>
<tr>
<td>Total</td>
<td>0.42</td>
<td>0.58</td>
<td>1</td>
</tr>
</tbody>
</table>

A. What is the missing value in the table?

B. Based on the results in the table, how many shoppers are men who prefer mineral water?

A. 0.45  
B. 56

Notes on Scoring

This response earns partial credit (1 point). Part A: The student correctly subtracts 0.14 from 0.59 or 0.13 from 0.58 to get 0.45. Part B: The student may choose the wrong relative frequency and instead determine the number of men who prefer purified water.
Sample Response: 0 points

A company surveys 200 shoppers to find out what type of bottled water they prefer. The partial two-way table shown gives the results of the survey as relative frequencies.

<table>
<thead>
<tr>
<th>Bottled Water</th>
<th>Purified Water</th>
<th>Mineral Water</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
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<td>0.14</td>
<td>?</td>
<td>0.59</td>
</tr>
<tr>
<td>Total</td>
<td>0.42</td>
<td>0.58</td>
<td>1</td>
</tr>
</tbody>
</table>

A. What is the missing value in the table?

B. Based on the results in the table, how many shoppers are men who prefer mineral water?

A. 0.87

B. 174

Notes on Scoring

This response earns no credit (0 points). Part A: The student may subtract 0.13 from the total (1) to determine the missing value. Part B: The student may use the incorrect answer from Part A to calculate the answer to Part B. However, Part B asks for how many men prefer mineral water, which is a relative frequency of 0.13 already given in the table.
Sample Response: 0 points

A company surveys 200 shoppers to find out what type of bottled water they prefer. The partial two-way table shown gives the results of the survey as relative frequencies.

<table>
<thead>
<tr>
<th>Bottled Water</th>
<th>Purified Water</th>
<th>Mineral Water</th>
<th>Total</th>
</tr>
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</tr>
<tr>
<td>Total</td>
<td>0.42</td>
<td>0.58</td>
<td>1</td>
</tr>
</tbody>
</table>

A. What is the missing value in the table?

B. Based on the results in the table, how many shoppers are men who prefer mineral water?

A. 0.86
B. 172

Notes on Scoring

This response earns no credit (0 points). Part A: The student may subtract 0.14 from the total (1) to determine the missing value. Part B: The student may use the incorrect answer from Part A to calculate the answer to Part B. However, Part B asks for how many men prefer mineral water, which is a relative frequency of 0.13 already given in the table.
Grade 8
Math
Spring 2018 Item Release

Question 21

Question and Scoring Guidelines
Question 21

A right triangle has a hypotenuse of $\sqrt{50}$.

What are possible lengths of the two legs of this triangle?

Points Possible: 1

Content Cluster: Understand and apply the Pythagorean Theorem.

Content Standard: Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (8.G.7)
Scoring Guidelines

Exemplar Response:

• 5
  5

Other Correct Responses:

• 1
  7
  • any two values such that the sum of their squares equals 50

For this item, a full-credit response includes

• two correct values (1 point).
Grade 8
Math
Spring 2018 Item Release
Question 21
Sample Responses
Sample Response: 1 point

A right triangle has a hypotenuse of $\sqrt{50}$.

What are possible lengths of the two legs of this triangle?

5

5

Notes on Scoring

This response earns full credit (1 point). The student correctly uses the Pythagorean Theorem and finds that choosing both leg lengths to be 5 will result in a hypotenuse of $\sqrt{50}$ by solving $5^2 + 5^2 = c^2$. 
Sample Response: 1 point

A right triangle has a hypotenuse of $\sqrt{50}$.

What are possible lengths of the two legs of this triangle?

7
1

Notes on Scoring

This response earns full credit (1 point). The student correctly uses the Pythagorean Theorem and finds that choosing leg lengths of 7 and 1 will result in a hypotenuse of $\sqrt{50}$ by solving $7^2 + 1^2 = c^2$. 
Sample Response: 0 points

A right triangle has a hypotenuse of $\sqrt{50}$.

What are possible lengths of the two legs of this triangle?

25

25

Notes on Scoring

This response earns no credit (0 points). The student may use the Pythagorean Theorem to calculate the length of the legs but does not take the square root of the two values.
Sample Response: 0 points

A right triangle has a hypotenuse of $\sqrt{50}$.

What are possible lengths of the two legs of this triangle?

49

1

Notes on Scoring

This response earns no credit (0 points). The student may use the Pythagorean Theorem to calculate the length of the legs but does not take the square root of the two values.
Grade 8
Math
Spring 2018 Item Release

Question 23

Question and Scoring Guidelines
Question 23

Approximate the value of $\sqrt{23}$ and place it on the number line.

Points Possible: 1

Content Cluster: Know that there are numbers that are not rational, and approximate them by rational numbers.

Content Standard: Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $\pi^2$). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. (8.NS.2)
Scoring Guidelines

Exemplar Response:

\[ \sqrt{23} \]

Other Correct Responses:

- any placement of \( \sqrt{23} \) between 4.5 and 5, exclusive

For this item, a full-credit response includes

- a correct placement (1 point).
Grade 8 Math
Spring 2018 Item Release

Question 23

Sample Responses
Sample Response: 1 point

Approximate the value of \( \sqrt{23} \) and place it on the number line.

Notes on Scoring

This response earns full credit (1 point). The student correctly places the square root of 23 at approximately 4.8.
Sample Response: 1 point

Approximate the value of $\sqrt{23}$ and place it on the number line.

Notes on Scoring

This response earns full credit (1 point). The student correctly places the square root of 23 at approximately 4.7.
Sample Response: 0 points

Approximate the value of $\sqrt{23}$ and place it on the number line.

\[ \sqrt{23} \]

Notes on Scoring

This response earns no credit (0 points). The student places the square root of 23 at 4.5 which is not scored as correct because 23 is closer to 25 than to 16, so $\sqrt{23}$ should be closer to $\sqrt{25} = 5$ than to $\sqrt{16} = 4$. 
Sample Response: 0 points

Approximate the value of $\sqrt{23}$ and place it on the number line.

Notes on Scoring

This response earns no credit (0 points). The student places the square root of 23 at 5.0 which is not scored as a correct answer. The student may know that the radical is much closer to $\sqrt{25}$ than to $\sqrt{16}$ and therefore the student places it on 5, the closest whole number approximation, but misses that it should be approximated more closely as between 4.5 and 5.
Question 25

An equation is given.

\[ x^3 = 27 \]

What is the value of \( x \)?

\[ x = \]

Points Possible: 1

**Content Cluster:** Work with radicals and integer exponents.

**Content Standard:** Use square root and cube root symbols to represent solutions to equations of the form \( x^2 = p \) and \( x^3 = p \), where \( p \) is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that \( \sqrt{2} \) is irrational. (8.EE.2)
Scoring Guidelines

Exemplar Response:

• \( x = 3 \)

Other Correct Responses:

• any equivalent value

For this item, a full-credit response includes:

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

An equation is given.

\[ x^3 = 27 \]

What is the value of \( x \)?

\[ x = 3 \]

Notes on Scoring

This response earns full credit (1 point). The student correctly determines the cube root of 27 to be 3, because \( 3 \cdot 3 \cdot 3 = 27 \).
Sample Response: 0 points

An equation is given.

\[ x^3 = 27 \]

What is the value of \( x \)?

\[ x = 9 \]

Notes on Scoring

This response earns no credit (0 points). The student may mistakenly divide 27 by 3 instead of finding the cube root of 27.
Sample Response: 0 points

An equation is given.

\[ x^3 = 27 \]

What is the value of \( x \)?

\[ x = 19683 \]

Notes on Scoring

This response earns no credit (0 points). The student may think that \( x^3 = 27 \) means that three 27s need to be multiplied, \( 27 \cdot 27 \cdot 27 \).
Grade 8 Math Spring 2018 Item Release

Question 26

Question and Scoring Guidelines
Question 26

An architect designs floor plans for two houses. The floor plans for the houses are shown.

House B is a reflection of House A.

What is the value of x?

\[ \text{feet} \]

Points Possible: 1

**Content Cluster:** Understand congruence and similarity using physical models, transparencies, or geometry software.

**Content Standard:** Verify experimentally the properties of rotations, reflections, and translations: (8.G.1)
a. Lines are taken to lines, and line segments to line segments of the same length.
Scoring Guidelines

Exemplar Response:

• 39

Other Correct Responses:

• any equivalent value

For this item, a full-credit response includes:

• the correct length (1 point).
Grade 8
Math
Spring 2018 Item Release
Question 26
Sample Responses
Sample Response: 1 point

An architect designs floor plans for two houses. The floor plans for the houses are shown.

House B is a reflection of House A.

What is the value of x?

39 feet

Notes on Scoring

This response earns full credit (1 point). The student correctly recognizes that the value of x is 39 ft. When House A is reflected, the side that is on the left will end up as the right side of House B.
Sample Response: 0 points

An architect designs floor plans for two houses. The floor plans for the houses are shown.

House B is a reflection of House A.

What is the value of $x$?

$-39$ feet

Notes on Scoring

This response earns no credit (0 points). The student may think that when a side of a figure is reflected, the sign of its length changes, not realizing that the measure of a length cannot be negative.
Sample Response: 0 points

An architect designs floor plans for two houses. The floor plans for the houses are shown.

House B is a reflection of House A.

What is the value of $x$?

38 feet

Notes on Scoring

This response earns no credit (0 points). The student may think that the house is rotated 90 degrees counterclockwise and therefore the student reasons that the value of $x$ must be 38 ft.
Grade 8
Math
Spring 2018 Item Release

Question 27

Question and Scoring Guidelines
Question 27

Which equation has exactly one solution?

A. $7x = 7$
B. $7x = 7x$
C. $x + 1 = x + 1$
D. $x + 1 = x + 2$

Points Possible: 1

Content Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations.

Content Standard: Solve linear equations in one variable. (8.EE.7)
a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where $a$ and $b$ are different numbers).
**Scoring Guidelines**

**Rationale for Option A:** **Key** - The student correctly identifies the equation with one solution.

**Rationale for Option B:** The student chooses an equation with infinitely many solutions.

**Rationale for Option C:** The student chooses an equation with infinitely many solutions.

**Rationale for Option D:** The student chooses an equation with no solution.

**Sample Response: 1 point**

Which equation has exactly one solution?

- A) $7x = 7$
- B) $7x = 7x$
- C) $x + 1 = x + 1$
- D) $x + 1 = x + 2$
Question 29

A figure is shown.

The figure is reflected across line $l$.

Which figure is the result of this transformation?

Points Possible: 1

Content Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

Content Standard: Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. (8.G.3)
Scoring Guidelines

Rationale for Option A: **Key** - The student correctly determines the new orientation of the figure after a reflection across line l.

Rationale for Option B: The student may think a reflection will produce the same result as a 90-degree counterclockwise rotation.

Rationale for Option C: The student may think a reflection will produce the same result as a 90-degree clockwise rotation.

Rationale for Option D: The student may confuse reflection with translation and think that the orientation of the figure will not change.
Sample Response: 1 point

A figure is shown.

The figure is reflected across line $l$.

Which figure is the result of this transformation?
Grade 8 Math
Spring 2018 Item Release

Question 31

Question and Scoring Guidelines
Question 31

Some values for two linear functions, A and B, are shown.

<table>
<thead>
<tr>
<th>Function A</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>y</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function B</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>y</td>
<td></td>
</tr>
<tr>
<td>−1</td>
<td>−1.5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10.5</td>
<td></td>
</tr>
</tbody>
</table>

Function C is a linear function with the given characteristics.

- The y-intercept of C is between the y-intercepts of A and B.

- The rate of change of C is greater than the rate of change for A and less than the rate of change for B.

Use the Add Arrow tool to draw a possible graph of Function C.
Points Possible: 2

Content Cluster: Use functions to model relationships between quantities.

Content Standard: Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two \((x, y)\) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. (8.F.4)
Scoring Guidelines

Exemplar Response:

Other Correct Responses:

• any linear function whose slope \( m > 2 \) and whose \( y \)-intercept is \( 2.5 < b < 6 \)

For this item, a full-credit response includes:

• a graph with a correct \( y \)-intercept (1 point)
  AND
• a correct slope (1 point).
Grade 8
Math
Spring 2018 Item Release

Question 31

Sample Responses
Sample Response: 2 points

Notes on Scoring

This response earns full credit (2 points). The student correctly graphs a line with a slope of 3, which is between 2 and 4, and with a y-intercept of 5, which is between 2.5 and 6.
Sample Response: 2 points

Notes on Scoring

This response earns full credit (2 points). The student correctly graphs a line with a slope of 3, which is between 2 and 4, and with a y-intercept of 3, which is between 2.5 and 6.
Sample Response: 1 point

Notes on Scoring

This response earns partial credit (1 point). The student graphs a line with a correct y-intercept of 5, which is between 2.5 and 6, but with an incorrect slope of 2, which is the same as Function A and not between 2 and 4.
Sample Response: 1 point

Notes on Scoring

This response earns partial credit (1 point). The student graphs a line with a correct slope of 3, which is between 2 and 4, but with an incorrect y-intercept of 7, which is not between 2.5 and 6.
Sample Response: 0 points

Notes on Scoring

This response earns no credit (0 points). The student graphs a line with an incorrect slope of 1, which is not between 2 and 4, and with an incorrect y-intercept of 1, which is not between 2.5 and 6.
Sample Response: 0 points

Notes on Scoring
This response earns no credit (0 points). The student may identify the slope and y-intercept for Function A and graph this line, not realizing that the item asks for Function C to be graphed.
Grade 8 Math
Spring 2018 Item Release

Question 35

Question and Scoring Guidelines
Question 35

A system of equations is shown.

\[
\begin{align*}
    x + y &= 7 \\
    2x - y &= -1
\end{align*}
\]

What is the solution to the system of equations?

\[(\underline{\quad}, \underline{\quad})\]

**Points Possible:** 1

**Content Cluster:** Analyze and solve linear equations and pairs of simultaneous linear equations.

**Content Standard:** Analyze and solve pairs of simultaneous linear equations. (8.EE.8)

b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.
Scoring Guidelines

Exemplar Response:
• (2, 5)

Other Correct Responses:
• N/A

For this item, a full-credit response includes:
• a correct ordered pair (1 point).
Grade 8
Math
Spring 2018 Item Release

Question 35

Sample Responses
Sample Response: 1 point

A system of equations is shown.

\[
\begin{align*}
  x + y &= 7 \\
  2x - y &= -1
\end{align*}
\]

What is the solution to the system of equations?

(2, 5)

Notes on Scoring

This response earns full credit (1 point). The student may use elimination to add the two equations correctly to get \(3x = 6\) and then divide both sides of the equation by 3 to get \(x = 2\). Then the student correctly substitutes \(x = 2\) into one of the original equations to get \(y = 5\).
Sample Response: 1 point

A system of equations is shown.

\begin{align*}
  x + y &= 7 \\
  2x - y &= -1
\end{align*}

What is the solution to the system of equations?

\((2.0, 5.0)\)

Notes on Scoring

This response earns full credit (1 point). The student may solve the system of equations using substitution as follows to correctly get \(x = 2.0\) and \(y = 5.0\).

\begin{align*}
  x + y &= 7 \\
  x &= (7 - y) \\
  2(7 - y) - y &= -1 \\
  14 - 2y - y &= -1 \\
  14 - 3y &= -1 \\
  15 &= 3y \\
  5 &= y
\end{align*}

\begin{align*}
  x + 5 &= 7 \\
  x &= 7 - 5 \\
  x &= 2
\end{align*}
Sample Response: 0 points

A system of equations is shown.

\[
\begin{align*}
  x + y &= 7 \\
  2x - y &= -1
\end{align*}
\]

What is the solution to the system of equations?

(4, 3)

Notes on Scoring

This response earns no credit (0 points). The student may identify one possible solution to the first equation but not check to see if it also is a solution to the second equation.
Sample Response: 0 points

A system of equations is shown.
\[
\begin{align*}
x + y &= 7 \\
2x - y &= -1
\end{align*}
\]

What is the solution to the system of equations?

( -8 , 15 )

Notes on Scoring

This response earns no credit (0 points). The student may incorrectly solve the system as follows:

\[
\begin{align*}
x + y &= 7 \\
y &= (x - 7) \\
(\text{should be } (7-x))
\end{align*}
\]

\[
\begin{align*}
2x - y &= -1 \\
2x - (x - 7) &= -1 \\
2x - x + 7 &= -1 \\
x + 7 &= -1 \\
x &= -8
\end{align*}
\]

\[
\begin{align*}
x + y &= 7 \\
-8 + y &= 7 \\
y &= 7 + 8 \\
y &= 15
\end{align*}
\]

115 (2018)
Question 41

Point A is shown on the coordinate grid.

The distance between point A and point B is 5 units. The x-coordinate of point B is -2.

What is one possible y-coordinate of point B?

Points Possible: 1

Content Cluster: Understand and apply the Pythagorean Theorem.

Content Standard: Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. (8.G.8)
Scoring Guidelines

Exemplar Response:
- 4

Other Correct Responses:
- -4

For this item, a full-credit response includes:
- a correct value (1 point).
Sample Response: 1 point

The distance between point A and point B is 5 units. The x-coordinate of point B is -2.

What is one possible y-coordinate of point B?

4

Notes on Scoring

This response earns full credit (1 point). The student recognizes that this is a Pythagorean triple (3-4-5). From point A to (-2, 0) is 3 units and the hypotenuse is 5 units (given) and therefore the student knows that the missing vertex must be 4 units from (-2, 0), perpendicular to the x-axis, and chooses (-2, 4) as the position of point B.
Sample Response: 1 point

Point A is shown on the coordinate grid.

The distance between point A and point B is 5 units. The x-coordinate of point B is -2.

What is one possible y-coordinate of point B?

\[ -4 \]

Notes on Scoring

This response earns full credit (1 point). The student recognizes that this is a Pythagorean triple (3-4-5). From point A to (-2, 0) is 3 units and the hypotenuse is 5 units (given) and therefore the student knows that the missing vertex must be 4 units from (-2, 0), perpendicular to the x-axis, and chooses to respond correctly with (-2, -4) as the position for point B.
Sample Response: 0 points

Point A is shown on the coordinate grid.

The distance between point A and point B is 5 units. The x-coordinate of point B is –2.

What is one possible y-coordinate of point B?

0

Notes on Scoring

This response earns no credit (0 points). The student may disregard the information that the x-coordinate of point B is –2 and may just count 5 units to the right of point A to represent the distance and incorrectly determine that point B is located at (0, 0).
Sample Response: 0 points

Point A is shown on the coordinate grid.

The distance between point A and point B is 5 units. The x-coordinate of point B is \(-2\).

What is one possible y-coordinate of point B?

5

Notes on Scoring

This response earns no credit (0 points). The student may count 5 units straight up from \(-2\) on the x-axis to represent the distance, incorrectly locating point B at \((-2, 5)\). This position will create a distance between points A and B, the hypotenuse of the imagined right triangle, of about 5.83 units.
Question 42

Which graph shows a function that is increasing at a constant rate?

(A) ![Graph A]

(B) ![Graph B]

(C) ![Graph C]

(D) ![Graph D]

Points Possible: 1

Content Cluster: Use functions to model relationships between quantities.

Content Standard: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. (8.F.5)
Scoring Guidelines

Rationale for Option A: The student may see a portion of the graph that is constantly increasing, ignoring that a portion of it also is constantly decreasing.

Rationale for Option B: **Key** - The student identifies the linear graph with a positive slope.

Rationale for Option C: The student may think that the graph is increasing at a constant rate since both end behaviors point up.

Rationale for Option D: The student may select the graph that is constant, rather than constantly increasing.

**Sample Response: 1 point**
Grade 8
Math
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Question 46

Question and Scoring Guidelines
Question 46

Some points of a function are plotted as shown.
Select all of the points that could also be part of this function.

- (1, 3)
- (4, 4)
- (6, 0)
- (7, 2)
- (9, 7)

Points Possible: 1

Content Cluster: Define, evaluate, and compare functions.

Content Standard: Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (8.F.1)

Scoring Guidelines

Rationale for First Option: The student may select a point that does not share its y-coordinate with any other point, but that is not a condition for a function.

Rationale for Second Option: Key – The student correctly identifies a point that does not share its x-coordinate with any given points.

Rationale for Third Option: Key – The student correctly identifies a point that does not share its x-coordinate with any given points.

Rationale for Fourth Option: Key – The student correctly identifies a point that does not share its x-coordinate with any given points.

Rationale for Fifth Option: The student may select a point that does not share its y-coordinate with any other point, but that is not a condition for a function.
Sample Response: 1 point

Some points of a function are plotted as shown.

Select all of the points that could also be part of this function.

- (1, 3)
- (4, 4)
- (6, 0)
- (7, 2)
- (9, 7)
Question 49

Which expression is equivalent to \((5^2)^4 \cdot 5^5\)?

- A. \(5^{11}\)
- B. \(5^{13}\)
- C. \(5^{30}\)
- D. \(5^{40}\)

**Points Possible:** 1

**Content Cluster:** Work with radicals and integer exponents.

**Content Standard:** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, \(3^2 \times 3^{-5} = 3^3 = 1/3^3 = 1/27\). (8.EE.1)
Scoring Guidelines

Rationale for Option A: The student may add the exponents 2 and 4 in the first factor instead of multiplying them to get $5^6$ rather than $5^8$, and then multiplies correctly by adding the exponents of $5^6$ and $5^5$ to get $5^{11}$.

Rationale for Option B: Key - The student multiplies the exponents 2 and 4 in the first factor to get $5^8$ and then multiplies correctly by adding the exponents of $5^8$ and $5^5$ to get $5^{13}$.

Rationale for Option C: The student may add the exponents 2 and 4 in the first factor instead of multiplying to get $5^6$ rather than $5^8$, and then may multiply the exponents of the two factors, $5^6$ and $5^5$, instead of adding them, getting $5^{30}$.

Rationale for Option D: The student may multiply all of the exponents together rather than multiplying the first two and then adding the third.

Sample Response: 1 point
Grade 8
Math
Spring 2018 Item Release

Question 50

Question and Scoring Guidelines
Question 50

Diedra has a new coin bank. For the first five days, she deposits the same amount of money into the coin bank. After that, she does not deposit any more money into the bank.

Which graph could represent the amount of money in Diedra’s bank?

![Graphs A, B, C, and D]

Points Possible: 1

**Content Cluster:** Use functions to model relationships between quantities.

**Content Standard:** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. (8.F.5)
Scoring Guidelines

Rationale for Option A: The student may select a graph that increases at a constant rate for the first five days but does not consider that the second five days should have no increase.

Rationale for Option B: The student may select a graph that increases for a period, but not at a constant rate and then the student may misunderstand that the graph is supposed to stay constant, not decrease, during the second five days.

Rationale for Option C: Key – The student selects a graph that increases at a constant rate for five days and then stays the same for the second five days since no more money is being deposited.

Rationale for Option D: The student may select a graph that increases constantly for the first five days but then misunderstand that it is supposed to stop increasing entirely, rather than slow down the rate of increase, during the second five days.

Sample Response: 1 point
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