Ohio | Department of Education

Ohio's State Tests

ITEM RELEASE

SPRING 2016

GRADE 4 MATHEMATICS

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Grade 4 Math
Spring 2016 Item Release
Content Summary and Answer Key

Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
1	Graphic Response	Generalize place value understanding for multi-digit whole numbers.	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. *(4.NBT.2)*	---	1 point
2	Multi-Select Item	Use place value understanding and properties of operations to perform multi-digit arithmetic.	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. *(4.NBT.5)*	A, C, D	1 point
3	Equation Item	Extend understanding of fraction equivalence and ordering.	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. *(4.NF.2)*	---	1 point

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Content Summary and Answer Key

Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
4	Multi-Select Item	Use the four operations with whole numbers to solve problems.	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. *(4.OA.2)*	B, E	1 point
5	Graphic Response	Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. *(4.G.1)*	---	1 point
6	Multiple Choice	Extend understanding of fraction equivalence and ordering.	Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. *(4.NF.1)*	C	1 point

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Content Summary and Answer Key

Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
7	Multi-Select Item	Use place value understanding and properties of operations to perform multi-digit arithmetic.	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. *(4.NBT.6)*	C, E	1 point
8	Equation Item	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ... *(4.MD.1)*	---	1 point
9	Multiple Choice	Extend understanding of fraction equivalence and ordering.	Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. *(4.NF.1)*	D	1 point

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Content Summary and Answer Key

Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
10	Equation Item	Geometric measurement: understand concepts of angle and measure angles.	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. *(4.MD.6)*	---	1 point
11	Equation Item	Use the four operations with whole numbers to solve problems.	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *(4.OA.3)*	---	2 points
12	Equation Item	Use the four operations with whole numbers to solve problems.	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *(4.OA.3)*	---	1 point

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Question 1

Question and Scoring Guidelines

Question 1

A list of numbers is shown.

Drag the numbers to the boxes to order them from greatest to least.

234

468

987

321

Greatest

**Least**

Points Possible: 1

Content Cluster: Generalize place value understanding for multi-digit whole numbers.

Content Standard: Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. *(4.NBT.2)*

Scoring Guidelines

<u>Exemplar Response</u>

Greatest

987

468

321

234

Least

<u>Other Correct Responses</u>

- N/A
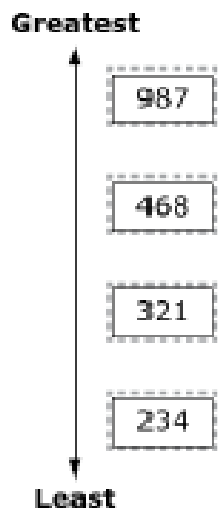
For this item, a full-credit response includes:

- The correct ordering (1 point).

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Question 1

Sample Responses

Sample Response: 1 point

A list of numbers is shown.

Drag the numbers to the boxes to order them from greatest to least.

Greatest

987

468

321

234

Least

Notes on Scoring

This response earns full credit (1 point) because the student correctly ordered the numbers from greatest to least.

Sample Response: 0 points

A list of numbers is shown.

Drag the numbers to the boxes to order them from greatest to least.

Greatest

234

321

468

987

Least

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly order the numbers from greatest to least. The student placed the numbers in order from least to greatest.

Sample Response: 0 points

A list of numbers is shown.

Drag the numbers to the boxes to order them from greatest to least.

Greatest

321

468

987

234

Least

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly order the numbers from greatest to least.

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Question 2

Question and Scoring Guidelines

Question 2

Select all the expressions that are equal to 1680.

☐ 70×24

☐ 40×46

☐ 56×30

☐ 42×40

☐ 33×50

Points Possible: 1

Content Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic.

Content Standard: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. *(4.NBT.5)*

Scoring Guidelines

Rationale for First Option: **Key** – The student selected an expression with the product of 1680.

Rationale for Second Option: This is incorrect. The student may have incorrectly multiplied the tens column.

Rationale for Third Option: **Key** – The student selected an expression with the product of 1680.

Rationale for Fourth Option: **Key** – The student selected an expression with the product of 1680.

Rationale for Fifth Option: This is incorrect. The student may have incorrectly multiplied the ones column by the tens column.

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Question 2

Sample Responses

Sample Response: 1 point

Select all the expressions that are equal to 1680.

- ☑ 70×24
- ☐ 40×46
- ☑ 56×30
- ☑ 42×40
- ☐ 33×50

Notes on Scoring

This response earns full credit (1 point) because the student correctly selected all of the expressions that are equal to 1680.

$$70 \times 24 = 1,680$$
$$56 \times 30 = 1,680$$
$$42 \times 40 = 1,680$$

Sample Response: 0 points

Select all the expressions that are equal to 1680.

☑ 70×24

☐ 40×46

☑ 56×30

☐ 42×40

☑ 33×50

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the expressions that are equal to 1680.

$$70 \times 24 = 1{,}680$$
$$56 \times 30 = 1{,}680$$
$$33 \times 50 = 1{,}650$$

Sample Response: 0 points

Select all the expressions that are equal to 1680.

- ☑ 70×24
- ☑ 40×46
- ☑ 56×30
- ☐ 42×40
- ☐ 33×50

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the expressions that are equal to 1680.

$$70 × 24 = 1,680$$
$$40 × 46 = 1,840$$
$$56 × 30 = 1,680$$

Sample Response: 0 points

Select all the expressions that are equal to 1680.

☑ 70×24

☐ 40×46

☑ 56×30

☑ 42×40

☑ 33×50

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the expressions that are equal to 1680.

70 × 24 = 1,680
56 × 30 = 1,680
42 × 40 = 1,680
33 × 50 = 1,650

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Question 3

Question and Scoring Guidelines

Question 3

Mr. Garcia asks his students to find a fraction that meets these conditions.

- The fraction is greater than $\frac{1}{2}$.
- The fraction is less than $\frac{4}{5}$.

Create a fraction that meets Mr. Garcia's conditions.

1	2	3
4	5	6
7	8	9
0	.	$\frac{\square}{\square}$

Points Possible: 1

Content Cluster: Extend understanding of fraction equivalence and ordering.

Content Standard: Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. *(4.NF.2)*

Scoring Guidelines

<u>Exemplar Response</u>

- $\frac{7}{10}$

<u>Other Correct Responses</u>
- Any fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$

For this item, a full-credit response includes:

- A correct fraction (1 point).

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Question 3

Sample Responses

Sample Response: 1 point

Mr. Garcia asks his students to find a fraction that meets these conditions.

- The fraction is greater than $\dfrac{1}{2}$.
- The fraction is less than $\dfrac{4}{5}$.

Create a fraction that meets Mr. Garcia's conditions.

$$\dfrac{7}{10}$$

| ← | → | ↶ | ↷ | ⌫ |

1	2	3
4	5	6
7	8	9
0	.	▯/▯

Notes on Scoring

This response earns full credit (1 point) because the student correctly created a fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$.

- The student may have identified a common denominator and used it to create a fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$.

$$\frac{1}{2} \times \frac{5}{5} = \frac{5}{10} \qquad \text{and} \qquad \frac{4}{5} \times \frac{2}{2} = \frac{8}{10}$$

$$\frac{5}{10} < \frac{7}{10} \qquad \text{and} \qquad \frac{7}{10} < \frac{8}{10}$$

Sample Response: 1 point

Mr. Garcia asks his students to find a fraction that meets these conditions.

- The fraction is greater than $\frac{1}{2}$.
- The fraction is less than $\frac{4}{5}$.

Create a fraction that meets Mr. Garcia's conditions.

$$\frac{6}{10}$$

1	2	3
4	5	6
7	8	9
0	.	▯/▯

Notes on Scoring

This response earns full credit (1 point) because the student correctly created a fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$.

- The student may have identified a common denominator and used it to create a fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$.

$$\frac{1}{2} \times \frac{5}{5} = \frac{5}{10} \qquad \text{and} \qquad \frac{4}{5} \times \frac{2}{2} = \frac{8}{10}$$

$$\frac{5}{10} < \frac{6}{10} \qquad \text{and} \qquad \frac{6}{10} < \frac{8}{10}$$

Sample Response: 1 point

Mr. Garcia asks his students to find a fraction that meets these conditions.

- The fraction is greater than $\dfrac{1}{2}$.
- The fraction is less than $\dfrac{4}{5}$.

Create a fraction that meets Mr. Garcia's conditions.

$$\dfrac{3}{5}$$

| ← | → | ↶ | ↷ | ⌫ |

1	2	3
4	5	6
7	8	9
0	.	▯/▯

Notes on Scoring

This response earns full credit (1 point) because the student correctly created a fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$.

- The student may have identified a common denominator and used it to create a fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$, then reduced it to lowest terms.

$$\frac{1}{2} \times \frac{5}{5} = \frac{5}{10} \qquad \text{and} \qquad \frac{4}{5} \times \frac{2}{2} = \frac{8}{10}$$

$$\frac{5}{10} < \frac{6}{10} \qquad \text{and} \qquad \frac{6}{10} < \frac{8}{10}$$

$$\frac{6}{10} = \frac{6 \div 2}{10 \div 2} = \frac{3}{5}$$

24

Sample Response: 0 points

Mr. Garcia asks his students to find a fraction that meets these conditions.

- The fraction is greater than $\frac{1}{2}$.
- The fraction is less than $\frac{4}{5}$.

Create a fraction that meets Mr. Garcia's conditions.

$$\frac{5}{10}$$

(← → ↶ ↷ ⊗)

1	2	3
4	5	6
7	8	9
0	.	▤

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly create a fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$.

- The student may have identified a common denominator but created a fraction equal to $\frac{1}{2}$ and less than $\frac{4}{5}$.

$$\frac{1}{2} \times \frac{5}{5} = \frac{5}{10} \qquad \text{and} \qquad \frac{4}{5} \times \frac{2}{2} = \frac{8}{10}$$

$$\frac{5}{10} = \frac{5}{10} \qquad \text{and} \qquad \frac{5}{10} < \frac{8}{10}$$

Sample Response: 0 points

Mr. Garcia asks his students to find a fraction that meets these conditions.

- The fraction is greater than $\frac{1}{2}$.
- The fraction is less than $\frac{4}{5}$.

Create a fraction that meets Mr. Garcia's conditions.

$$\frac{9}{10}$$

| ← | → | ↩ | ↪ | ⊠ |

1	2	3
4	5	6
7	8	9
0	.	▢/▢

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly create a fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$.

- The student may have identified a common denominator but created a fraction greater than $\frac{1}{2}$ and greater than $\frac{4}{5}$.

$$\frac{1}{2} \times \frac{5}{5} = \frac{5}{10} \qquad \text{and} \qquad \frac{4}{5} \times \frac{2}{2} = \frac{8}{10}$$

$$\frac{5}{10} < \frac{9}{10} \qquad \text{and} \qquad \frac{9}{10} > \frac{8}{10}$$

Sample Response: 0 points

Mr. Garcia asks his students to find a fraction that meets these conditions.

- The fraction is greater than $\frac{1}{2}$.
- The fraction is less than $\frac{4}{5}$.

Create a fraction that meets Mr. Garcia's conditions.

$$\frac{1}{3}$$

1	2	3
4	5	6
7	8	9
0	.	▯/▯

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly create a fraction greater than $\frac{1}{2}$ and less than $\frac{4}{5}$.

- The student may have identified a common denominator and created equivalent fractions.

$$\frac{1}{2} \times \frac{5}{5} = \frac{5}{10} \qquad \text{and} \qquad \frac{4}{5} \times \frac{2}{2} = \frac{8}{10}$$

$$\frac{5}{10} > \frac{1}{3} \qquad \text{and} \qquad \frac{1}{3} < \frac{8}{10}$$

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Question 4

Question and Scoring Guidelines

Question 4

A theater has 152 seats. The seats are divided into 8 rows. Each row has n seats.

Select all the equations that can be used to solve for n seats.

☐ $152 - n = 8$

☐ $152 \div n = 8$

☐ $152 \times 8 = n$

☐ $n + 8 = 152$

☐ $n \times 8 = 152$

Points Possible: 1

Content Cluster: Use the four operations with whole numbers to solve problems.

Content Standard: Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. *(4.OA.2)*

Scoring Guidelines

Rationale for First Option: This is incorrect. The student may have thought the situation called for subtraction to solve for the unknown value.

Rationale for Second Option: **Key** – The student correctly determined an equation that can be used to solve for the unknown value.

Rationale for Third Option: This is incorrect. The student may have thought that the situation required multiplying to solve for the unknown value.

Rationale for Fourth Option: This is incorrect. The student may have thought the situation required addition to solve for the unknown value.

Rationale for Fifth Option: **Key** – The student correctly determined an equation that can be used to solve for the unknown value.

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Question 4

Sample Responses

Sample Response: 1 point

A theater has 152 seats. The seats are divided into 8 rows. Each row has n seats.

Select all the equations that can be used to solve for n seats.

☐ $152 - n = 8$

☑ $152 \div n = 8$

☐ $152 \times 8 = n$

☐ $n + 8 = 152$

☑ $n \times 8 = 152$

Notes on Scoring

This response earns full credit (1 point) because the student correctly selected all of the equations that can be used to solve for n seats.
- The student selected the two correct equations to find the number of unknown seats.

$$n \times 8 = 152$$
$$152 \div n = 8$$

Sample Response: 0 points

A theater has 152 seats. The seats are divided into 8 rows. Each row has n seats.

Select all the equations that can be used to solve for n seats.

- ☑ $152 - n = 8$
- ☑ $152 \div n = 8$
- ☑ $152 \times 8 = n$
- ☑ $n + 8 = 152$
- ☑ $n \times 8 = 152$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the equations that can be used to solve for n seats.

- The student selected all of the equations instead of only selecting the equations with correct multiplicative comparisons to find the unknown seats.

Sample Response: 0 points

A theater has 152 seats. The seats are divided into 8 rows. Each row has n seats.

Select all the equations that can be used to solve for n seats.

- ☐ $152 - n = 8$
- ☑ $152 \div n = 8$
- ☐ $152 \times 8 = n$
- ☐ $n + 8 = 152$
- ☐ $n \times 8 = 152$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the equations that can be used to solve for *n* seats.

- The student only selected one out of two correct equations to find the number of unknown seats.

$$152 \div n = 8$$
$$n \times 8 = 152$$

Sample Response: 0 points

A theater has 152 seats. The seats are divided into 8 rows. Each row has n seats.

Select all the equations that can be used to solve for n seats.

- ☑ $152 - n = 8$
- ☐ $152 \div n = 8$
- ☑ $152 \times 8 = n$
- ☐ $n + 8 = 152$
- ☑ $n \times 8 = 152$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the equations that can be used to solve for n seats.

- The student selected two incorrect equations and thus did not identify the two correct equations to find the number of unknown seats.
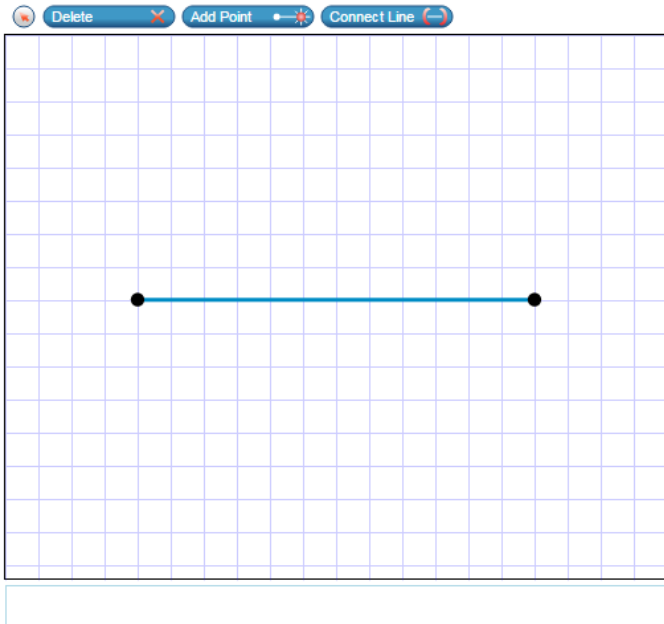
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Question 5

Question and Scoring Guidelines

Question 5

A line segment is shown.

Use the Connect Line tool to draw a line segment perpendicular to the one shown.

Delete ✕   Add Point ●—※   Connect Line (—)

Points Possible: 1

Content Cluster: Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Content Standard: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. *(4.G.1)*

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Scoring Guidelines

<u>Exemplar Response</u>
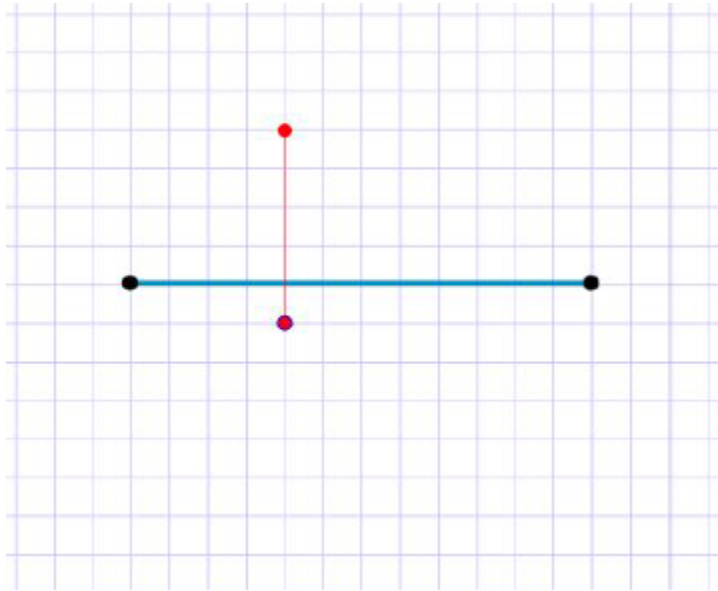
<u>Other Correct Responses</u>

- Any line segment perpendicular to the given line; intersection with the given line segment is not required.

For this item, a full-credit response includes:

- A correct line segment (1 point).

NOTE: Drawing multiple correct line segments is acceptable. The student will not be penalized for redrawing the horizontal line. The student may draw in a one-square right angle symbol without penalty.

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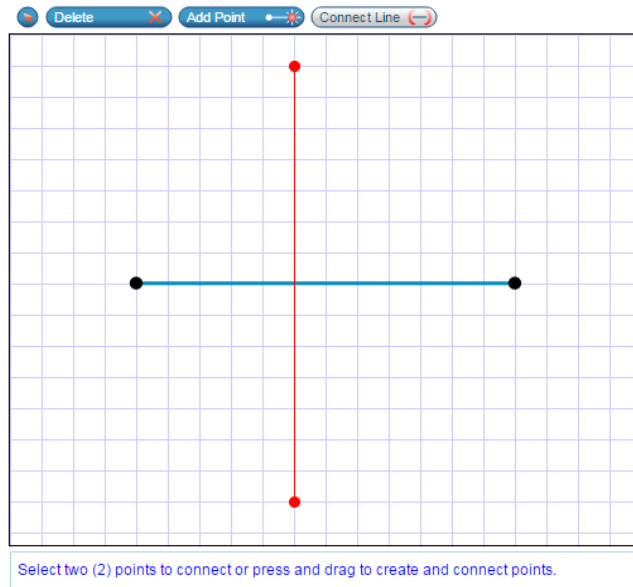# Spring 2016 Item Release

Question 5

Sample Responses

Sample Response: 1 point

A line segment is shown.

Use the Connect Line tool to draw a line segment perpendicular to the one shown.

Delete ✕   Add Point ●—✳   Connect Line (→)

Select two (2) points to connect or press and drag to create and connect points.
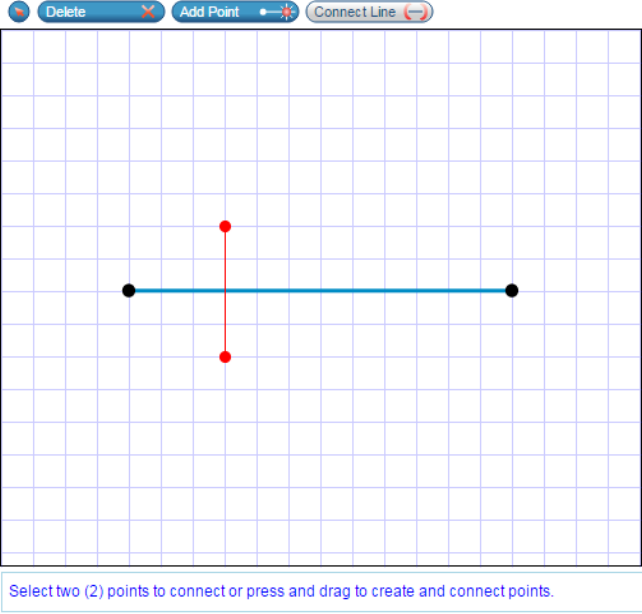
Notes on Scoring

This response earns full credit (1 point) because the student correctly drew a line segment perpendicular to the line segment shown.

Sample Response: 1 point

A line segment is shown.

Use the Connect Line tool to draw a line segment perpendicular to the one shown.

Delete ✕   Add Point ●—※   Connect Line (→)

Select two (2) points to connect or press and drag to create and connect points.
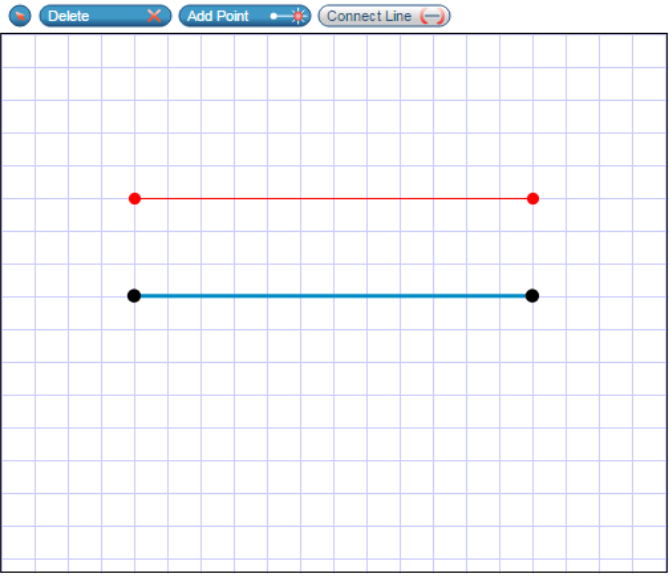

Notes on Scoring

This response earns full credit (1 point) because the student correctly drew a line segment perpendicular to the line segment shown.

Sample Response: 0 points

A line segment is shown.

Use the Connect Line tool to draw a line segment perpendicular to the one shown.

| ▶ | Delete ✕ | Add Point ●—✳ | Connect Line ⊖ |

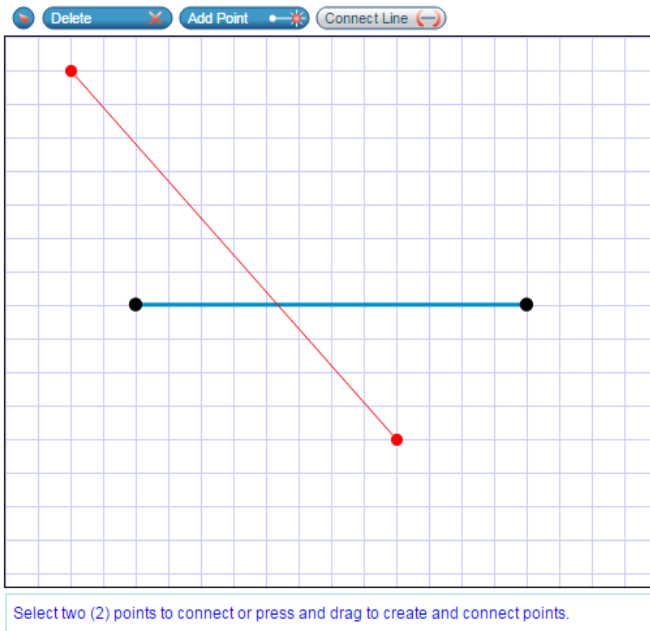Select two (2) points to connect or press and drag to create and connect points.

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly draw a line segment perpendicular to the line segment shown. The student drew a line segment parallel to the line segment shown.

Sample Response: 0 points

A line segment is shown.

Use the Connect Line tool to draw a line segment perpendicular to the one shown.

Delete ✕ Add Point ●✳ Connect Line ⟶

Select two (2) points to connect or press and drag to create and connect points.
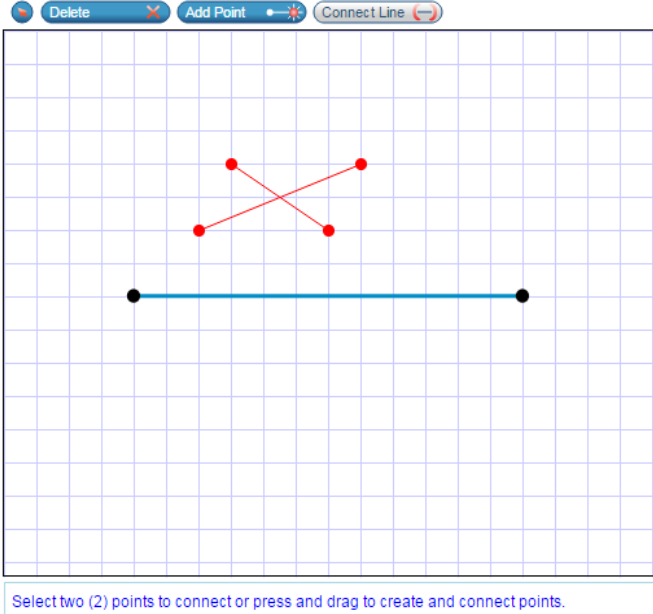
Notes on Scoring

This response earns no credit (0 points) because the student did not correctly draw a line segment perpendicular to the line segment shown.

Sample Response: 0 points

A line segment is shown.

Use the Connect Line tool to draw a line segment perpendicular to the one shown.

Delete ✕   Add Point ●—※   Connect Line (⟶)

Select two (2) points to connect or press and drag to create and connect points.

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly draw a line segment perpendicular to the line segment shown.
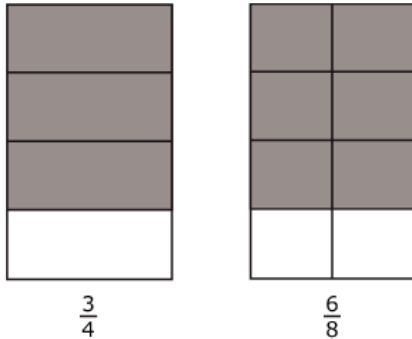
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Question 6

Question and Scoring Guidelines

Question 6

Two models are shown. Each model has been shaded gray to represent a fraction.

$$\frac{3}{4}$$

$$\frac{6}{8}$$

Which statement is true about the fractions $\frac{3}{4}$ and $\frac{6}{8}$?

Ⓐ   They are equivalent because each model is divided into equal parts.

Ⓑ   They are not equivalent because the number of shaded parts in each model is different.

Ⓒ   They are equivalent because the size of the areas shaded gray in both models is the same.

Ⓓ   They are not equivalent because the models are divided into different numbers of equal parts.

Points Possible: 1

Content Cluster: Extend understanding of fraction equivalence and ordering.

Content Standard: Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. *(4.NF.1)*

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have thought that any model divided into equal parts is equivalent to any other model divided into equal parts.

Rationale for Option B: This is incorrect. The student may have thought that the models are not equivalent because they show different numbers of shaded parts.

Rationale for Option C: **Key** – The student recognized that the models show the same shaded fraction of the whole.
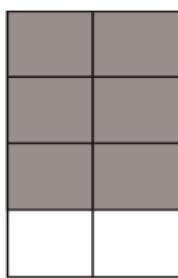
Rationale for Option D: This is incorrect. The student may have thought that for models to be equivalent, they have to be divided into the same number of equal parts.

Sample Response: 1 point

Two models are shown. Each model has been shaded gray to represent a fraction.

$\frac{3}{4}$ $\frac{6}{8}$

Which statement is true about the fractions $\frac{3}{4}$ and $\frac{6}{8}$?

Ⓐ They are equivalent because each model is divided into equal parts.

Ⓑ They are not equivalent because the number of shaded parts in each model is different.

● They are equivalent because the size of the areas shaded gray in both models is the same.

Ⓓ They are not equivalent because the models are divided into different numbers of equal parts.

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Question 7

Question and Scoring Guidelines

Question 7

Select all the expressions that have a value of 50.

- ☐ $600 \div 5$
- ☐ $500 \div 1$
- ☐ $400 \div 8$
- ☐ $300 \div 7$
- ☐ $200 \div 4$

Points Possible: 1

Content Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic.

Content Standard: Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. *(4.NBT.6)*

Scoring Guidelines

<u>Rationale for First Option:</u> This is incorrect. The student may have incorrectly skip counted.

<u>Rationale for Second Option:</u> This is incorrect. The student may have disregarded that the 1 should be a 10 in order for the expression to be equal to 50.

<u>Rationale for Third Option:</u> **Key** – The student divided 400 by 8 and found a quotient of 50.

<u>Rationale for Fourth Option:</u> This is incorrect. The student may have thought 300 divided by 7 was 50.

<u>Rationale for Fifth Option:</u> **Key** – The student divided 200 by 4 and found a quotient of 50.

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Question 7

Sample Responses

Sample Response: 1 point

Select all the expressions that have a value of 50.

- ☐ $600 \div 5$
- ☐ $500 \div 1$
- ☑ $400 \div 8$
- ☐ $300 \div 7$
- ☑ $200 \div 4$

Notes on Scoring

This response earns full credit (1 point) because the student correctly selected all of the expressions that have a value of 50.

$$400 \div 8 = 50$$
$$200 \div 4 = 50$$

Sample Response: 0 points

Select all the expressions that have a value of 50.

- ☐ $600 \div 5$
- ☑ $500 \div 1$
- ☑ $400 \div 8$
- ☑ $300 \div 7$
- ☐ $200 \div 4$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the expressions that have a value of 50. The student selected two expressions that do not have a value of 50.

$$500 \div 1 = 500$$
$$300 \div 7 \approx 42.857 \text{ (rounded to nearest thousandth)}$$

Sample Response: 0 points

Select all the expressions that have a value of 50.

- ☑ 600 ÷ 5
- ☐ 500 ÷ 1
- ☑ 400 ÷ 8
- ☐ 300 ÷ 7
- ☑ 200 ÷ 4

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the expressions that have a value of 50. The student selected one expression that does not have a value of 50.

$$600 ÷ 5 = 120$$

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Question 8

Question and Scoring Guidelines

Question 8

Joe measures his height. He is 5 feet tall.

What is Joe's height in inches?

←	→	↶	↷	⌫

1	2	3
4	5	6
7	8	9
0	.	▯/▯

Points Possible: 1

Content Cluster: Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

Content Standard: Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ... *(4.MD.1)*

Scoring Guidelines

<u>Exemplar Response</u>

- 60

<u>Other Correct Responses</u>

- Any equivalent value

For this item, a full-credit response includes:

- A correct height (1 point).

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Question 8

Sample Responses

Sample Response: 1 point

Joe measures his height. He is 5 feet tall.

What is Joe's height in inches?

60

| ← | → | ↶ | ↷ | ⌫ |

1	2	3
4	5	6
7	8	9
0	.	▯/▯

Notes on Scoring

This response earns full credit (1 point) because the student correctly identified Joe's height in inches.

5 × 12 = 60 inches

Sample Response: 0 points

Joe measures his height. He is 5 feet tall.

What is Joe's height in inches?

50

1	2	3
4	5	6
7	8	9
0	.	

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify Joe's height in inches.
- The student may have used 10 inches per foot instead of 12.

5 × 10 = 50 inches

Sample Response: 0 points

Joe measures his height. He is 5 feet tall.

What is Joe's height in inches?

72

1	2	3
4	5	6
7	8	9
0	.	$\frac{\square}{\square}$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify Joe's height in inches.
- The student may have found Joe's height in inches if Joe were 6 feet tall instead of 5 feet tall.

$$6 \times 12 = 72 \text{ inches}$$

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Question 9

Question and Scoring Guidelines

Question 9

How can you use multiplication to find a fraction that is equivalent to $\frac{3}{5}$?

(A) Multiply $\frac{3}{5}$ by itself.

(B) Multiply the numerator by 3.

(C) Multiply the numerator by 5 and the denominator by 3.

(D) Multiply both the numerator and the denominator by the same number.

Points Possible: 1

Content Cluster: Extend understanding of fraction equivalence and ordering.

Content Standard: Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. *(4.NF.1)*

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have confused the idea of multiplying a fraction by itself with the idea of multiplying it by a fraction that is equal to 1.

Rationale for Option B: This is incorrect. The student may have only considered the numerator of the fraction.

Rationale for Option C: This is incorrect. The student may have considered multiplying by the reciprocal.

Rationale for Option D: **Key** – The student correctly explained how to generate an equivalent fraction.

Sample Response: 1 point

How can you use multiplication to find a fraction that is equivalent to $\frac{3}{5}$?

Ⓐ   Multiply $\frac{3}{5}$ by itself.

Ⓑ   Multiply the numerator by 3.

Ⓒ   Multiply the numerator by 5 and the denominator by 3.

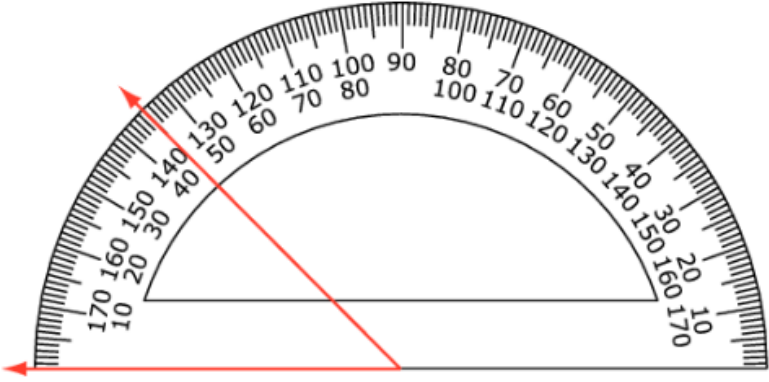●   Multiply both the numerator and the denominator by the same number.

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Question 10

Question and Scoring Guidelines

Question 10

An angle is shown.

What is the measure, in degrees, of the angle?

1	2	3
4	5	6
7	8	9
0	.	

Points Possible: 1

Content Cluster: Geometric measurement: understand concepts of angle and measure angles.

Content Standard: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. *(4.MD.6)*

Scoring Guidelines

<u>Exemplar Response</u>

- 45

<u>Other Correct Responses</u>

- N/A

For this item, a full-credit response includes:
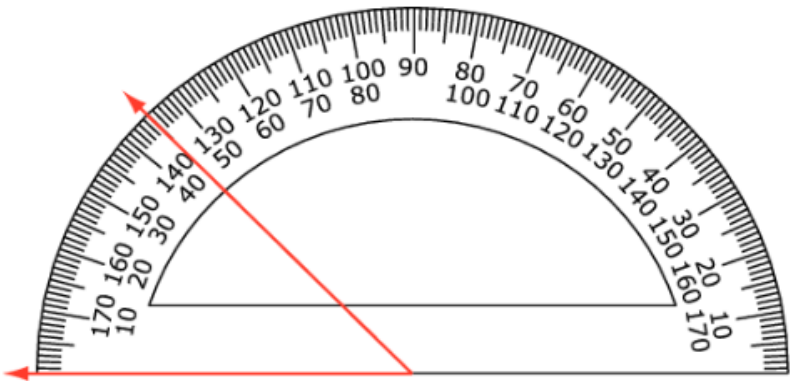
- The correct angle measure (1 point).

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Question 10

Sample Responses

Sample Response: 1 point

An angle is shown.

What is the measure, in degrees, of the angle?

45
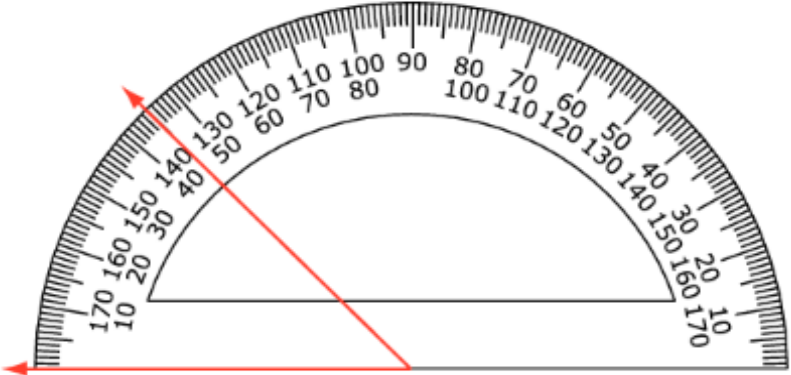
1	2	3
4	5	6
7	8	9
0	.	

Notes on Scoring

This response earns full credit (1 point) because the student correctly identified the measure of the angle in degrees.

Sample Response: 0 points

An angle is shown.

What is the measure, in degrees, of the angle?

135

1	2	3
4	5	6
7	8	9
0	.	▯/▯

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify the measure of the angle in degrees. The student may have measured the angle using the incorrect scale on the protractor.

Sample Response: 0 points

An angle is shown.

What is the measure, in degrees, of the angle?

144

1	2	3
4	5	6
7	8	9
0	.	

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify the measure of the angle in degrees. The student may have measured the angle using the incorrect scale on the protractor.

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Question 11

Question and Scoring Guidelines

Question 11

Jill has two hamsters. Each hamster drinks 3 ounces of water each day.

On Monday, she fills a water bottle that holds 16 ounces of water.

How many ounces of water are left in the bottle at the end of the day on Tuesday? Enter the number of ounces in the first answer space.

How many ounces of water will the hamsters drink by the end of 5 days? Enter the number of ounces in the second answer space.

1	2	3
4	5	6
7	8	9
0	.	

Points Possible: 2

Content Cluster: Use the four operations with whole numbers to solve problems.

Content Standard: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *(4.OA.3)*

Scoring Guidelines

<u>Exemplar Response</u>

- 4 (first answer space)
  30 (second answer space)

<u>Other Correct Responses</u>

- N/A

For this item, a full-credit response includes:

- A correct first response (1 point);

  AND

- A correct second response (1 point).

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Question 11

Sample Responses

Sample Response: 2 points

Jill has two hamsters. Each hamster drinks 3 ounces of water each day.

On Monday, she fills a water bottle that holds 16 ounces of water.

How many ounces of water are left in the bottle at the end of the day on Tuesday? Enter the number of ounces in the first answer space.

How many ounces of water will the hamsters drink by the end of 5 days? Enter the number of ounces in the second answer space.

4

30

1	2	3
4	5	6
7	8	9
0	.	□/□

Notes on Scoring

This response earns full credit (2 points) because the student correctly answered both parts of the question.

Top answer: $2 \times 3 \times 2 = 12$ ounces
$16 - 12 =$ **4 ounces**

Bottom answer: $2 \times 3 \times 5 =$ **30 ounces**

Sample Response: 1 point

Jill has two hamsters. Each hamster drinks 3 ounces of water each day.

On Monday, she fills a water bottle that holds 16 ounces of water.

How many ounces of water are left in the bottle at the end of the day on Tuesday? Enter the number of ounces in the first answer space.

How many ounces of water will the hamsters drink by the end of 5 days? Enter the number of ounces in the second answer space.

4

28

1	2	3
4	5	6
7	8	9
0	.	⊟

Notes on Scoring

This response earns partial credit (1 point) because the student correctly answered one part of the question.
- The top answer is correct,
- The bottom answer is incorrect.

Top answer: $2 \times 3 \times 2 = 12$ ounces
               $16 - 12 = \textbf{4 ounces}$

Bottom answer: $2 \times 2 \times 7 = 28$ ounces

Sample Response: 1 point

Jill has two hamsters. Each hamster drinks 3 ounces of water each day.

On Monday, she fills a water bottle that holds 16 ounces of water.

How many ounces of water are left in the bottle at the end of the day on Tuesday? Enter the number of ounces in the first answer space.

How many ounces of water will the hamsters drink by the end of 5 days? Enter the number of ounces in the second answer space.

6

30

1	2	3
4	5	6
7	8	9
0	.	□/□

Notes on Scoring

This response earns partial credit (1 point) because the student correctly answered one part of the question.
- The top answer is incorrect. The student may have found the amount of water the hamsters drank in a day instead of how much water was left after 2 days.
- The bottom answer is correct.

Top answer: 2 × 3 = 6 ounces

Bottom answer: 2 × 3 × 5 = **30 ounces**

Sample Response: 0 points

Jill has two hamsters. Each hamster drinks 3 ounces of water each day.

On Monday, she fills a water bottle that holds 16 ounces of water.

How many ounces of water are left in the bottle at the end of the day on Tuesday? Enter the number of ounces in the first answer space.

How many ounces of water will the hamsters drink by the end of 5 days? Enter the number of ounces in the second answer space.

3

32

1	2	3
4	5	6
7	8	9
0	.	□/□

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly answer both parts of the question.
- The top answer is incorrect. The student may have found the amount of water 1 hamster drank in a day instead of how much water was left after 2 days.
- The bottom answer is also incorrect. The student may have added 2 extra ounces to the amount of water the hamsters drank in 5 days.

Top answer: 3 ounces

Bottom answer: (2 × 3 × 5) + 2 = 32 ounces

Sample Response: 0 points

Jill has two hamsters. Each hamster drinks 3 ounces of water each day.

On Monday, she fills a water bottle that holds 16 ounces of water.

How many ounces of water are left in the bottle at the end of the day on Tuesday? Enter the number of ounces in the first answer space.

How many ounces of water will the hamsters drink by the end of 5 days? Enter the number of ounces in the second answer space.

3

16

1	2	3
4	5	6
7	8	9
0	.	▯/▯

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly answer both parts of the question.

- The top answer is incorrect. The student may have found the amount of water 1 hamster drank in a day instead of how much water was left after 2 days.
- The bottom answer is also incorrect. The student may have incorrectly set up the equation.

Top answer: 3 ounces

Bottom answer: $(2 \times 5) + (3 \times 2) = 16$ ounces

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Question 12

Question and Scoring Guidelines

Question 12

Tina is buying lunch. She pays for 2 drinks and 2 pieces of pizza with a $10 bill. The price for a piece of pizza is $3. She receives $1 in change.

What was the price of the 2 drinks?

1	2	3
4	5	6
7	8	9
0	.	□/□

Points Possible: 1

Content Cluster: Use the four operations with whole numbers to solve problems.

Content Standard: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *(4.OA.3)*

Scoring Guidelines

Exemplar Response

- 3

Other Correct Responses

- N/A

For this item, a full-credit response includes:

- The correct value (1 point).

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Question 12

Sample Responses

Sample Response: 1 point

Tina is buying lunch. She pays for 2 drinks and 2 pieces of pizza with a $10 bill. The price for a piece of pizza is $3. She receives $1 in change.

What was the price of the 2 drinks?

3

1	2	3
4	5	6
7	8	9
0	.	$\frac{\square}{\square}$

Notes on Scoring

This response earns full credit (1 point) because the student correctly identified the price of the 2 drinks.
- The student set up and solved a multistep problem.
  $10 = 2 \times 3 + 1 + \square$
  $10 = 6 + 1 + \square$
  $10 = 7 + \square$
  $10 - 7 = 7 - 7 + \square$
  $3 = 0 + \square$
  $3 = \square$

Sample Response: 0 points

Tina is buying lunch. She pays for 2 drinks and 2 pieces of pizza with a $10 bill. The price for a piece of pizza is $3. She receives $1 in change.

What was the price of the 2 drinks?

2

1	2	3
4	5	6
7	8	9
0	.	▯/▯

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify the price of the 2 drinks.
- The student may have set up and solved a multistep problem incorrectly.
  $10 = 2 \times (3 + 1) + \square$
  $10 = 2 \times 4 + \square$
  $10 = 8 + \square$
  $10 - 8 = 8 - 8 + \square$
  $2 = 0 + \square$
  $2 = \square$

Sample Response: 0 points

Tina is buying lunch. She pays for 2 drinks and 2 pieces of pizza with a $10 bill. The price for a piece of pizza is $3. She receives $1 in change.

What was the price of the 2 drinks?

5

1	2	3
4	5	6
7	8	9
0	.	$\frac{\Box}{\Box}$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify the price of the 2 drinks.
- The student may have set up and solved a multistep problem incorrectly.
  $10 = (2 + 3) × 1 + □
  $10 = 5 × 1 + □
  $10 = 5 + □
  $10 – 5 = 5 – 5 + □
  $5 = 0 + □
  $5 = □