Ohio’s State Tests

ITEM RELEASE

SPRING 2019

GRADE 4

MATHEMATICS
# Table of Contents

Content Summary and Answer Key ........................................................................................................... iii

Depth of Knowledge (DOK) ...................................................................................................................... ix

Question 2: Question and Scoring Guidelines ......................................................................................... 1
Question 2: Sample Responses .................................................................................................................. 4

Question 6: Question and Scoring Guidelines ......................................................................................... 8
Question 6: Sample Responses .................................................................................................................. 11

Question 8: Question and Scoring Guidelines ......................................................................................... 16
Question 8: Sample Response ................................................................................................................... 18

Question 10: Question and Scoring Guidelines ......................................................................................... 19
Question 10: Sample Response ................................................................................................................ 22

Question 11: Question and Scoring Guidelines ......................................................................................... 23
Question 11: Sample Responses ............................................................................................................... 26

Question 16: Question and Scoring Guidelines ......................................................................................... 31
Question 16: Sample Responses ............................................................................................................... 34

Question 17: Question and Scoring Guidelines ......................................................................................... 39
Question 17: Sample Response ................................................................................................................ 41

Question 18: Question and Scoring Guidelines ......................................................................................... 42
Question 18: Sample Responses ............................................................................................................... 45

Question 21: Question and Scoring Guidelines ......................................................................................... 50
Question 21: Sample Response ................................................................................................................ 52

Question 24: Question and Scoring Guidelines ......................................................................................... 53
Question 24: Sample Response ................................................................................................................ 55

Question 33: Question and Scoring Guidelines ......................................................................................... 56
Question 33: Sample Responses ............................................................................................................... 59

Question 34: Question and Scoring Guidelines ......................................................................................... 63
Question 34: Sample Response ................................................................................................................ 65
## Grade 4 Math
### Spring 2019 Item Release
#### Content Summary and Answer Key

<table>
<thead>
<tr>
<th>Question No.*</th>
<th>Item Type</th>
<th>Content Cluster</th>
<th>Content Standard</th>
<th>Depth of Knowledge</th>
<th>Answer Key</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Matching Item</td>
<td>Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</td>
<td>Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4.G.1)</td>
<td>Level 1</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>6</td>
<td>Equation Item</td>
<td>Geometric measurement: understand concepts of angle and measure angles.</td>
<td>Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. (4.MD.7)</td>
<td>Level 2</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>8</td>
<td>Multiple Choice Item</td>
<td>Gain familiarity with factors and multiples.</td>
<td>Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite. (4.OA.4)</td>
<td>Level 2</td>
<td>A</td>
<td>1 point</td>
</tr>
<tr>
<td>10</td>
<td>Multi Select Item</td>
<td>Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</td>
<td>Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size. (4.G.2)</td>
<td>Level 2</td>
<td>B, C, D</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 4 Math
## Spring 2019 Item Release
### Content Summary and Answer Key

<table>
<thead>
<tr>
<th>Question No.*</th>
<th>Item Type</th>
<th>Content Cluster</th>
<th>Content Standard</th>
<th>Depth of Knowledge</th>
<th>Answer Key</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Grid Item</td>
<td>Geometric measurement: understand concepts of angle and measure angles.</td>
<td>Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. <em>(4.MD.6)</em></td>
<td>Level 2</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>16</td>
<td>Gap Match Item</td>
<td>Extend understanding of fraction equivalence and ordering limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.</td>
<td>Explain why a fraction ( \frac{a}{b} ) is equivalent to a fraction ( \frac{(n \times a)}{(n \times 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. <em>(4.NF.1)</em></td>
<td>Level 2</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>17</td>
<td>Multiple Choice Item</td>
<td>Use the four operations with whole numbers to solve problems.</td>
<td>Interpret a multiplication equation as a comparison, e.g., interpret ( 35 = 5 \times 7 ) as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. <em>(4.OA.1)</em></td>
<td>Level 2</td>
<td>C</td>
<td>1 point</td>
</tr>
<tr>
<td>18</td>
<td>Equation Item</td>
<td>Use place value understanding and properties of operations to perform multi-digit arithmetic with whole numbers less than or equal to 1,000,000.</td>
<td>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. <em>(4.NBT.6)</em></td>
<td>Level 3</td>
<td>---</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 4 Math
## Spring 2019 Item Release
### Content Summary and Answer Key

<table>
<thead>
<tr>
<th>Question No.*</th>
<th>Item Type</th>
<th>Content Cluster</th>
<th>Content Standard</th>
<th>Depth of Knowledge</th>
<th>Answer Key</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Multiple Choice Item</td>
<td>Understand decimal notation for fractions, and compare decimal fractions limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.</td>
<td>Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express $\frac{3}{10}$ as $\frac{30}{100}$, and add $\frac{3}{10} + \frac{4}{100} = \frac{34}{100}$. In general, students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators, but addition and subtraction with unlike denominators is not a requirement at this grade. (4.NF.5)</td>
<td>Level 2</td>
<td>A</td>
<td>1 point</td>
</tr>
<tr>
<td>24</td>
<td>Multiple Choice Item</td>
<td>Represent and interpret data.</td>
<td>Display and interpret data in graphs (picture graphs, bar graphs, and line plots) to solve problems using numbers and operations for this grade. (4.MD.4)</td>
<td>Level 1</td>
<td>B</td>
<td>1 point</td>
</tr>
<tr>
<td>33</td>
<td>Table Item</td>
<td>Generate and analyze patterns.</td>
<td>Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule Add 3 and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way. (4.OA.5)</td>
<td>Level 3</td>
<td>---</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 4 Math

**Spring 2019 Item Release**

**Content Summary and Answer Key**

<table>
<thead>
<tr>
<th>Question No.*</th>
<th>Item Type</th>
<th>Content Cluster</th>
<th>Content Standard</th>
<th>Depth of Knowledge</th>
<th>Answer Key</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>Multi Select Item</td>
<td>Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. (Fractions need not be simplified.)</td>
<td>Understand a fraction ( \frac{a}{b} ) with ( a &gt; 1 ) as a sum of fractions ( \frac{1}{b} ). Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: ( \frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}; \frac{3}{8} = \frac{1}{8} + \frac{2}{8}; \frac{2}{8} = \frac{1}{8} + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}. ) (4.NF.3b)</td>
<td>Level 2</td>
<td>C, D</td>
<td>1 point</td>
</tr>
<tr>
<td>37</td>
<td>Equation Item</td>
<td>Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. (Fractions need not be simplified.)</td>
<td>Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat ( \frac{3}{8} ) of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie? (4.NF.4c)</td>
<td>Level 2</td>
<td>---</td>
<td>2 points</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.*
### Question No.* | Item Type | Content Cluster | Content Standard | Depth of Knowledge | Answer Key | Points |
---|---|---|---|---|---|---|
38 | Grid Item | Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. | Solve real-world problems involving money, time, and metric measurement. (4.MD.2) | Level 3 | --- | 1 point |
39 | Equation Item | Generalize place value understanding for multi-digit whole numbers less than or equal to 1,000,000. | Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right by applying concepts of place value, multiplication, or division. (4.NBT.1) | Level 1 | --- | 1 point |
40 | Multiple Choice 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) | Level 2 | D | 1 point |

*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.
<table>
<thead>
<tr>
<th>Question No.*</th>
<th>Item Type</th>
<th>Content Cluster</th>
<th>Content Standard</th>
<th>Depth of Knowledge</th>
<th>Answer Key</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>Multiple Choice Item</td>
<td>Extend understanding of fraction equivalence and ordering limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.</td>
<td>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 $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $&gt;$, $=$, or $&lt;$, and justify the conclusions, e.g., by using a visual fraction model. (4.NF.2)</td>
<td>Level 3</td>
<td>B</td>
<td>1 point</td>
</tr>
<tr>
<td>45</td>
<td>Equation Item</td>
<td>Use place value understanding and properties of operations to perform multi-digit arithmetic with whole numbers less than or equal to 1,000,000.</td>
<td>Fluently add and subtract multi-digit whole numbers using a standard algorithm. (4.NBT.4)</td>
<td>Level 1</td>
<td>---</td>
<td>1 point</td>
</tr>
<tr>
<td>46</td>
<td>Multiple Choice Item</td>
<td>Understand decimal notation for fractions, and compare decimal fractions limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.</td>
<td>Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as $\frac{62}{100}$; describe a length as 0.62 meters; locate 0.62 on a number line diagram. (4.NF.6)</td>
<td>Level 1</td>
<td>C</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.
Depth of Knowledge (DOK)

DOK refers to the complexity of thinking required to complete a task in a given item. Items with a DOK 1 designation focus on the recall of information, such as definitions and terms, and simple procedures. Items with a DOK 2 designation require students to make decisions, solve routine problems, perform calculations, or recognize patterns. Items with a DOK 3 designation feature higher-order cognitive tasks. These DOK 3 tasks include but are not limited to: critiquing a statement and forming a conclusion; explaining, justifying, or proving a statement; or approaching abstract, complex, open-ended, and non-routine problems. Each grade’s blueprint contains information about the number of points of opportunity students will encounter at each DOK level.

Table 1: Math Descriptors – Applying Depth of Knowledge Levels for Mathematics (Webb, 2002) & NAEP 2002 Mathematics Levels of Complexity
(M. Petit, Center for Assessment 2003, K. Hess, Center for Assessment, updated 2006)

<table>
<thead>
<tr>
<th>Level 1 Recall</th>
<th>Level 2 Skills/Concepts</th>
<th>Level 3 Strategic Thinking</th>
<th>Level 4 Extended Thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Recall, observe, or recognize a fact, definition, term, or property</td>
<td>a. Classify plane and three-dimensional figures</td>
<td>a. Interpret information from a complex graph</td>
<td>a. Relate mathematical concepts to other content areas</td>
</tr>
<tr>
<td>b. Apply/compute a well-known algorithm (e.g., sum, quotient)</td>
<td>b. Interpret information from a simple graph</td>
<td>b. Explain thinking when more than one response is possible</td>
<td>b. Relate mathematical concepts to real-world applications in new situations</td>
</tr>
<tr>
<td>c. Apply a formula</td>
<td>c. Use models to represent mathematical concepts</td>
<td>c. Make and/or justify conjectures</td>
<td>c. Apply a mathematical model to illuminate a problem, situation</td>
</tr>
<tr>
<td>d. Determine the area or perimeter of rectangles or triangles given a drawing and labels</td>
<td>d. <strong>Solve a routine problem</strong> requiring multiple steps/decision points, or the application of multiple concepts</td>
<td>d. Use evidence to develop logical arguments for a concept</td>
<td>d. Conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results</td>
</tr>
<tr>
<td>e. Identify a plane or three-dimensional figure</td>
<td>e. Compare and/or contrast figures or statements</td>
<td>e. Use concepts to solve non-routine problems</td>
<td>e. Design a mathematical model to inform and solve a practical or abstract situation</td>
</tr>
<tr>
<td>f. Measure</td>
<td>f. Construct 2-dimensional patterns for 3-dimensional models, such as cylinders and cones</td>
<td>f. Perform procedures with multiple steps and multiple decision points</td>
<td>f. Develop generalizations of the results obtained and the strategies used and apply them to new problem situations</td>
</tr>
<tr>
<td>g. Perform a specified or routine procedure (e.g., apply rules for rounding)</td>
<td>g. Provide justifications for steps in a solution process</td>
<td>g. Generalize a pattern</td>
<td>g.</td>
</tr>
<tr>
<td><strong>Level 1</strong></td>
<td><strong>Level 2</strong></td>
<td><strong>Level 3</strong></td>
<td><strong>Level 4</strong></td>
</tr>
<tr>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Recall</strong></td>
<td><strong>Skills/Concepts</strong></td>
<td><strong>Strategic Thinking</strong></td>
<td><strong>Extended Thinking</strong></td>
</tr>
<tr>
<td>k. Recall, identify, or make conversions between and among representations or numbers (fractions, decimals, and percents), or within and between customary and metric measures</td>
<td>i.Retrieve information from a table, graph, or figure and use it to solve a problem requiring multiple steps</td>
<td>k. Solve a multiple-step problem and provide support with a mathematical explanation that justifies the answer</td>
<td>g. Apply one approach among many to solve problems</td>
</tr>
<tr>
<td>l. Locate numbers on a number line, or points on a coordinate grid</td>
<td>j. Translate between tables, graphs, words and symbolic notation</td>
<td>h. Apply understanding in a novel way, providing an argument/justification for the application</td>
<td></td>
</tr>
<tr>
<td>m. Solve linear equations</td>
<td>k. Make direct translations between problem situations and symbolic notation</td>
<td>l. Solve 2-step linear equations/inequalities in one variable over the rational numbers, interpret solution(s) in the original context, and verify reasonableness of results</td>
<td></td>
</tr>
<tr>
<td>n. Represent math relationships in words, pictures, or symbols</td>
<td>i. Select a procedure according to criteria and perform it</td>
<td>m. Translate between a problem situation and symbolic notation that is not a direct translation</td>
<td></td>
</tr>
<tr>
<td>o. Read, write, and compare decimals in scientific notation</td>
<td>m. Specify and explain relationships between facts, terms, properties, or operations</td>
<td>n. Formulate an original problem, given a situation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n. Compare, classify, organize, estimate, or order data</td>
<td>o. Analyze the similarities and differences between procedures</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>p. Draw conclusion from observations or data, citing evidence</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Level 4 involves such things as complex restructuring of data or establishing and evaluating criteria to solve problems.

*Updated 2006 © Marge Petit & Karin K. Hess, National Center for Assessment, Dover, NH*  
*Permission to reproduce is given when authorship is fully cited khess@nciea.org*
Grade 4 Math
Spring 2019 Item Release

Question 2

Question and Scoring Guidelines
Question 2

Select the name that describes each angle.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>obtuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>right</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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)

Depth of Knowledge: Level 1
n. Represent math relationships in words, pictures, or symbols
Scoring Guidelines

Exemplar Response

Other Correct Responses

• N/A

For the item, a full-credit response includes

• the correct table (1 point).
Grade 4 Math
Spring 2019 Item Release

Question 2

Sample Responses
Sample Response: 1 point

Select the name that describes each angle.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>acute</td>
<td>obtuse</td>
<td>right</td>
</tr>
<tr>
<td>□</td>
<td>□</td>
<td>☑</td>
</tr>
<tr>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

Notes on Scoring

This response earns full credit (1 point) because it identifies the correct description of each angle.
Sample Response: 0 points

Select the name that describes each angle.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>obtuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>right</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect description for two of the angles.
- The student may confuse the measurement of an acute angle with the measurement of an obtuse angle.
Sample Response: 0 points

Select the name that describes each angle.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>obtuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>right</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect description for two of the angles.

- The student may confuse the measure of a right angle with an acute angle and the measure of an acute angle with a right angle.
Grade 4 Math  
Spring 2019 Item Release  

Question 6  

Question and Scoring Guidelines
Question 6

A diagram is shown.

What is the measure, in degrees, of the missing angle? Enter the number in the box.

degrees

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: Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. *(4.MD.7)*

Depth of Knowledge: Level 2  
i. Retrieve information from a table, graph, or figure and use it solve a problem requiring multiple steps

**Scoring Guidelines**

**Exemplar Response**

- 25

**Other Correct Responses**

- any equivalent value

For the item, a full-credit response includes

- a correct value (1 point).
Grade 4 Math Spring 2019 Item Release

Question 6

Sample Responses
Sample Response: 1 point

A diagram is shown.

What is the measure, in degrees, of the missing angle? Enter the number in the box.

25 degrees

1 2 3
4 5 6
7 8 9
0 .

12 (2019)
Notes on Scoring

This response earns full credit (1 point) because it identifies the correct measure, in degrees, of the missing angle.

- The student may recognize the sum of the $65^\circ$ angle and the unknown angle is $90^\circ$ and use subtraction to find the measure of the missing angle.

\[
90^\circ - 65^\circ = ?
\]
\[
? = 25^\circ
\]
Sample Response: 0 points

A diagram is shown.

What is the measure, in degrees, of the missing angle? Enter the number in the box.

115 degrees

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect measure, in degrees, of the missing angle.

- The student may think the sum of the 65° angle and the unknown angle is 180° and use subtraction to find an equivalent value to the measure of the missing angle.

180° - 65° = ?
? = 115°
90° - 65° ≠ 115°
Sample Response: 0 points

A diagram is shown.

What is the measure, in degrees, of the missing angle? Enter the number in the box.

35

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect measure, in degrees, of the missing angle.

- The student may think the sum of the 65° angle and the unknown angle is 100° and use subtraction to find an equivalent value to the measure of the missing angle.

100° – 65° = ?
?
= 35°
90° – 65° ≠ 35°
Question 8

Eliza writes a number.

- The number is between 20 and 30.
- It has exactly 4 factors.
- One of the factors is 7.

What is Eliza’s number?

A  21
B  26
C  28
D  35

Points Possible: 1

Content Cluster: Gain familiarity with factors and multiples.

Content Standard: Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite. (4.OA.4)

Depth of Knowledge: Level 2
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
l. Select a procedure according to criteria and perform it
Scoring Guidelines

Rationale for Option A: **Key** – The student recognizes 21 is between 20 and 30 and has exactly four factors (1, 3, 7, 21), and one of the factors is 7.

Rationale for Option B: This is incorrect. The student may recognize the number 26 is between 20 and 30 and has exactly four factors (1, 2, 13, 26) but overlook that 7 is not one of the factors.

Rationale for Option C: This is incorrect. The student may recognize the number 28 is between 20 and 30 and one of the factors is 7 but overlook that the number has six factors (1, 2, 4, 7, 14, 28).

Rationale for Option D: This is incorrect. The student may recognize the number 35 has exactly four factors (1, 5, 7, 35) and one of the factors is 7 but overlook that the number is not between 20 and 30.

Sample Response: 1 point

Eliza writes a number.
- The number is between 20 and 30.
- It has exactly 4 factors.
- One of the factors is 7.

What is Eliza’s number?

- 21
- 26
- 28
- 35
Grade 4 Math
Spring 2019 Item Release

Question 10

Question and Scoring Guidelines
Question 10

Select the three polygons that have at least one set of parallel sides.

Points Possible: 1

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

Content Standard: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size. (4.G.2)

Depth of Knowledge: Level 2

e. Compare and/or contrast figures or statements
Scoring Guidelines

Rationale for the First Option: This is incorrect. The student may confuse parallel and perpendicular or equal length sides.

Rationale for the Second Option: **Key** – The student selects a correct polygon with a pair of parallel sides.

Rationale for the Third Option: **Key** – The student selects a correct polygon with a pair of parallel sides.

Rationale for the Fourth Option: **Key** – The student selects a correct polygon with a pair of parallel sides.

Rationale for the Fifth Option: This is incorrect. The student may confuse parallel and equal length sides.
Sample Response: 1 point

Select the **three** polygons that have at least one set of parallel sides.
Grade 4 Math
Spring 2019 Item Release

Question 11

Question and Scoring Guidelines
Question 11

One ray of angle R is shown.

Use the Add Arrow tool to complete angle R so that it measures 135°.

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)

Depth of Knowledge: Level 2

   c. Use models to represent mathematical concepts
Scoring Guidelines

Exemplar Response

![Protractor Image]

Other Correct Responses

- N/A

For the item, a full-credit response includes

- a correct model (1 point).
Grade 4 Math
Spring 2019 Item Release
Question 11
Sample Responses
Sample Response: 1 point

One ray of angle R is shown.

Use the Add Arrow tool to complete angle R so that it measures 135°.

Notes on Scoring

This response earns full credit (1 point) because it identifies the correct ray that makes a 135-degree angle.

- The student uses the correct scale on the protractor to draw a ray that creates a 135-degree angle.
Sample Response: 1 point

One ray of angle R is shown.

Use the Add Arrow tool to complete angle R so that it measures 135°.

Notes on Scoring

This response earns full credit (1 point) because it identifies the correct ray that makes a 135-degree angle.

- The student uses the correct scale on the protractor to draw a ray that creates a 135-degree angle.
Sample Response: 0 points

One ray of angle R is shown.

Use the Add Arrow tool to complete angle R so that it measures 135°.

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect ray to make a 135-degree angle.
- The student may incorrectly use the outer scale on the protractor and create an angle of 45 degrees instead of 135 degrees.
Sample Response: 0 points

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect ray to make a 135-degree angle.
- The student may use the correct scale on the protractor but draw a ray that creates an angle greater than 135-dgrees.
Grade 4 Math
Spring 2019 Item Release

Question 16

Question and Scoring Guidelines
Question 16

Create a fraction that is equivalent to \( \frac{2}{3} \).

- Place a number in each box to make a fraction equivalent to \( \frac{2}{3} \).
- There may be more than one correct answer.

| 4 | 5 | 6 | 8 | 10 | 12 | 100 |

Points Possible: 1

Content Cluster: Extend understanding of fraction equivalence and ordering limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

Content Standard: Explain why a fraction \( \frac{a}{b} \) is equivalent to a fraction \( \frac{n \times a}{n \times b} \) 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)

Depth of Knowledge: Level 2

h. Extend a pattern
Scoring Guidelines

Exemplar Response

• \( \frac{4}{6} \)

Other Correct Responses

• \( \frac{8}{12} \)

For the item, a full-credit response includes

• a correct fraction (1 point).
Grade 4 Math
Spring 2019 Item Release

Question 16

Sample Responses
Sample Response: 1 point

Create a fraction that is equivalent to $\frac{2}{3}$.

- Place a number in each box to make a fraction equivalent to $\frac{2}{3}$.
- There may be more than one correct answer.

\[
\begin{array}{c}
4 \\
6
\end{array}
\]

Notes on Scoring

This response earns full credit (1 point) because it identifies a correct fraction that is equivalent to $\frac{2}{3}$.

- The student may use a model to create a fraction equivalent to $\frac{2}{3}$.

\[
4 \times \frac{1}{6} = \frac{4}{6} = \frac{2}{3} = \frac{4}{6}
\]
Sample Response: 1 point

Create a fraction that is equivalent to $\frac{2}{3}$.

- Place a number in each box to make a fraction equivalent to $\frac{2}{3}$.
- There may be more than one correct answer.

\[
\begin{array}{c}
8 \\
12
\end{array}
\]

Notes on Scoring

This response earns full credit (1 point) because it identifies a correct fraction that is equivalent to $\frac{2}{3}$.

- The student may use a model to create a fraction equivalent to $\frac{2}{3}$.

\[
\begin{array}{c}
\frac{2}{3} \\
\frac{8}{12}
\end{array}
\]
Sample Response: 0 points

Create a fraction that is equivalent to $\frac{2}{3}$.

- Place a number in each box to make a fraction equivalent to $\frac{2}{3}$.
- There may be more than one correct answer.

\[
\begin{array}{c}
5 \\
6
\end{array}
\]

Notes on Scoring

This response earns no credit (0 points) because it identifies a fraction that is not equivalent to $\frac{2}{3}$.

- The student may think he/she needs to add the same non-zero number to the numerator and denominator to get an equivalent fraction.

\[
\frac{2}{3} + \frac{3}{3} \neq \frac{5}{6}
\]

\[
\frac{2}{3} \neq \frac{5}{6}
\]
Sample Response: 0 points

Create a fraction that is equivalent to \( \frac{2}{3} \).

- Place a number in each box to make a fraction equivalent to \( \frac{2}{3} \).
- There may be more than one correct answer.

\[
\begin{array}{c}
4 \\
5
\end{array}
\]

Notes on Scoring

This response earns no credit (0 points) because it identifies a fraction that is not equivalent to \( \frac{2}{3} \).

- The student may think he/she needs to add the same non-zero number to the numerator and denominator to get an equivalent fraction.

\[
\frac{2}{3} + \frac{2}{2} \neq \frac{4}{5}
\]

\[
\frac{2}{3} \neq \frac{4}{5}
\]
Question 17

An equation is shown.

$40 = 5 \times 8$

Which statement can be used to represent the equation?

- (A) 40 is 5 more than 8.
- (B) 8 more than 5 is 40.
- (C) 40 is 8 times as many as 5.
- (D) 8 is 5 times as many as 40.

Points Possible: 1

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

Content Standard: Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4.OA.1)

Depth of Knowledge: Level 2

j. Translate between tables, graphs, words and symbolic notation.
Scoring Guidelines

Rationale for Option A: This is incorrect. The student may think the relationship is an additive comparison and add the factors 5 and 8.

Rationale for Option B: This is incorrect. The student may add the factors.

Rationale for Option C: Key – The student correctly identifies the multiplicative comparison statement that represents the equation.

Rationale for Option D: This is incorrect. The student may realize the statement is a multiplicative comparison and not recognize 40 as the product of 8 and 5.

Sample Response: 1 point

An equation is shown.

40 = 5 \times 8

Which statement can be used to represent the equation?

A  40 is 5 more than 8.
B  8 more than 5 is 40.
C  40 is 8 times as many as 5.
D  8 is 5 times as many as 40.
Grade 4 Math
Spring 2019 Item Release

Question 18

Question and Scoring Guidelines
Question 18

Ms. Thompson sets up chairs in rows for a school concert.

- She uses 328 chairs.
- She sets up at least 2 rows of chairs but not more than 10 rows of chairs.
- Each row has an equal number of chairs.

A. How many rows of chairs does Ms. Thompson set up? Enter the number in the first box.

B. How many chairs are in each row? Enter the number in the second box.

A. [Blank]

B. [Blank]

1 2 3
4 5 6
7 8 9
0 .
Points Possible: 1

Content Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic with whole numbers less than or equal to 1,000,000.

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)

Depth of Knowledge: Level 3
e. Use concepts to solve non-routine problems
f. Perform a procedure with multiple steps and multiple decision points

Scoring Guidelines

Exemplar Response

- A. 4, B. 82

Other Correct Responses

- A. 2, B. 164
- A. 8, B. 41

For the item, a full-credit response includes

- two correct values (1 point).
Grade 4 Math
Spring 2019 Item Release

Question 18

Sample Responses
Sample Response: 1 point

Ms. Thompson sets up chairs in rows for a school concert.

- She uses 328 chairs.
- She sets up at least 2 rows of chairs but not more than 10 rows of chairs.
- Each row has an equal number of chairs.

A. How many rows of chairs does Ms. Thompson set up? Enter the number in the first box.
B. How many chairs are in each row? Enter the number in the second box.

A. 2
B. 164

Notes on Scoring

This response earns full credit (1 point) because it identifies a correct number of rows and chairs in each row.
- The student may divide 328 by 2 using an area model.

\[
\begin{array}{ccc}
1 & 2 & 3 \\
4 & 5 & 6 \\
7 & 8 & 9 \\
0 & & \\
\end{array}
\]

\[
\begin{array}{cc}
160 & + 4 \\
320 \div 2 = 160 & 8 \div 2 = 4 \\
328 \div 2 = 164 \\
2 \text{ rows with 164 chairs in each row}
\end{array}
\]
Sample Response: 1 point

Ms. Thompson sets up chairs in rows for a school concert.

- She uses 328 chairs.
- She sets up at least 2 rows of chairs but not more than 10 rows of chairs.
- Each row has an equal number of chairs.

A. How many rows of chairs does Ms. Thompson set up? Enter the number in the first box.

B. How many chairs are in each row? Enter the number in the second box.

A. 4
B. 82

Notes on Scoring

This response earns full credit (1 point) because it identifies a correct number of rows and chairs in each row.

- The student may use a strategy to identify related multiplication problems with a product of 328 and select 4 rows of chairs with 82 chairs in each row.

<table>
<thead>
<tr>
<th>Doubles</th>
<th>×</th>
<th>Halves</th>
<th>= 328</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>×</td>
<td>328</td>
<td>= 328</td>
</tr>
<tr>
<td>2</td>
<td>×</td>
<td>164</td>
<td>= 328</td>
</tr>
<tr>
<td>4</td>
<td>×</td>
<td>82</td>
<td>= 328</td>
</tr>
</tbody>
</table>

4 rows of chairs with 82 chairs in each row
Sample Response: 0 points

Ms. Thompson sets up chairs in rows for a school concert.

- She uses 328 chairs.
- She sets up at least 2 rows of chairs but not more than 10 rows of chairs.
- Each row has an equal number of chairs.

A. How many rows of chairs does Ms. Thompson set up? Enter the number in the first box.

B. How many chairs are in each row? Enter the number in the second box.

A. 2
B. 10

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect number of rows and chairs in each row.

- The student may think the numbers from the problem represent the number of rows and the number of chairs in each row.

328 ÷ 2 ≠ 10
Sample Response: 0 points

Ms. Thompson sets up chairs in rows for a school concert.

- She uses 328 chairs.
- She sets up at least 2 rows of chairs but not more than 10 rows of chairs.
- Each row has an equal number of chairs.

A. How many rows of chairs does Ms. Thompson set up? Enter the number in the first box.

B. How many chairs are in each row? Enter the number in the second box.

A. 20

B. 10

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect number of rows and chairs in each row.

- The student may not recognize the situation requires creating equal groups that contain the total number of chairs used and multiply 2 \times 10 to get 20 rows of chairs and think each row has 10 chairs.

328 \div 20 \neq 10
Question 21

An equation that uses fraction models is shown.

\[ \frac{23}{100} + \ ? = \frac{50}{90} \]

Which fraction makes the equation true?

A. \( \frac{23}{100} \)
B. \( \frac{23}{90} \)
C. \( \frac{50}{100} \)
D. \( \frac{50}{90} \)

Points Possible: 1

Content Cluster: Understand decimal notation for fractions, and compare decimal fractions limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

Content Standard: Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express \( \frac{3}{10} \) as \( \frac{30}{100} \), and add \( \frac{3}{10} + \frac{4}{100} = \frac{34}{100} \). In general, students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators, but addition and subtraction with unlike denominators is not a requirement at this grade. (4.NF.5)

Depth of Knowledge: Level 2

c. Use models to represent mathematical concepts
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
Scoring Guidelines

**Rationale for Option A:** **Key** – The student correctly identifies that the models represent $\frac{3}{10}$ and $\frac{53}{100}$, so the missing addend is $\frac{23}{100}$.

**Rationale for Option B:** This is incorrect. The student may identify that the models represent $\frac{3}{10}$ and $\frac{53}{100}$, and think $\frac{3}{10}$ is equivalent to $\frac{30}{10}$ before subtracting 30 from 53 and 10 from 100 to find the missing fraction.

**Rationale for Option C:** This is incorrect. The student may identify that the models represent $\frac{3}{100}$ and $\frac{53}{100}$ and only subtract the numerators to find the missing fraction.

**Rationale for Option D:** This is incorrect. The student may identify that the models represent $\frac{3}{10}$ and $\frac{53}{100}$ and subtract the numerators and the denominators to find the missing fraction.

**Sample Response: 1 point**

An equation that uses fraction models is shown.

\[
\begin{array}{c}
\text{+} \\
\text{?} \\
\end{array} \quad \begin{array}{c}
\text{=} \\
\end{array}
\]

Which fraction makes the equation true?

- (A) $\frac{23}{100}$
- (B) $\frac{23}{90}$
- (C) $\frac{50}{100}$
- (D) $\frac{50}{90}$
Grade 4 Math
Spring 2019 Item Release

Question 24

Question and Scoring Guidelines
Question 24

A teacher measures how far some students in his class can jump. His data are shown in the line plot.

```
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|     |     |     |     |     |     |     |     |     |     |
| 3   | 3 1/2| 4   | 4 1/2| 5   |     |     |     |     |     |
Distance (feet)
```

How many students jumped less than 4 feet?

(A) 2  
(B) 3  
(C) 4  
(D) 8

Points Possible: 1

Content Cluster: Represent and interpret data.

Content Standard: Display and interpret data in graphs (picture graphs, bar graphs, and line plots) to solve problems using numbers and operations for this grade. (4.MD.4)

Depth of Knowledge: Level 1  
j. Retrieve information from a table or graph
Scoring Guidelines

Rationale for Option A: This is incorrect. The student may identify the number of distances listed on the line plot as less than 4.

Rationale for Option B: **Key** – The student correctly counts the number of students that jumped less than 4 feet.

Rationale for Option C: This is incorrect. The student may count the number of students that jumped farther than 4 feet.

Rationale for Option D: This is incorrect. The student may count all of the values on the line plot.

Sample Response: 1 point

A teacher measures how far some students in his class can jump. His data are shown in the line plot.

How many students jumped less than 4 feet?

- A 2
- B 3
- C 4
- D 8
Grade 4 Math
Spring 2019 Item Release

Question 33

Question and Scoring Guidelines
Question 33

Four numbers in a number pattern are shown in the table. The pattern continues in the same way. Complete the table to show the missing numbers in the number pattern.

|   |   |   | 210, |   | 180, | 165, ...

Points Possible: 1

Content Cluster: Generate and analyze patterns.

Content Standard: Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule Add 3 and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way. (4.OA.5)

Depth of Knowledge: Level 3
e. Use concepts to solve non-routine problems
f. Perform a procedure with multiple steps and multiple decision points
Scoring Guidelines

Exemplar Response


Other Correct Responses

- N/A

For the item, a full-credit response includes

- the correct table (1 point).
Grade 4 Math
Spring 2019 Item Release

Question 33

Sample Responses
Sample Response: 1 point

Four numbers in a number pattern are shown in the table. The pattern continues in the same way. Complete the table to show the missing numbers in the number pattern.

| 255, | 240, | 225, | 210, | 195, | 180, | 165, |

Notes on Scoring

This response earns full credit (1 point) because it identifies the correct missing numbers in the number pattern.

- The student may subtract 165 from 180 to find a difference of 15 and complete the pattern by repeatedly adding 15 to each number starting at 165.
Sample Response: 0 points

Four numbers in a number pattern are shown in the table. The pattern continues in the same way.
Complete the table to show the missing numbers in the number pattern.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 255 | 240 | 215 | 210 | 195 | 180 | 165 | ...

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect missing number in the number pattern.
• The student may subtract 165 from 180 to find a difference of 15 and make a subtraction error subtracting 15 from 240.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 255 | 240 | 215 | 210 | 195 | 180 | 165 | ...

255 - 15 = 240   240 - 15 ≠ 215
180 + 15 = 195   165 + 15 = 180
Sample Response: 0 points

Four numbers in a number pattern are shown in the table. The pattern continues in the same way.

Complete the table to show the missing numbers in the number pattern.

| 255, 240, 225, 210, 205, 180, 165, ...

Notes on Scoring

This response earns no credit (0 points) because it identifies an incorrect missing number in the number pattern.

- The student may subtract 165 from 180 to find a difference of 15 and make an addition error adding 15 to 180.
Grade 4 Math
Spring 2019 Item Release

Question 34

Question and Scoring Guidelines
Question 34

Select the two expressions that have a sum of $\frac{7}{10}$

- $\frac{5}{5} + \frac{2}{5}$
- $\frac{10}{10} + \frac{3}{10}$
- $\frac{3}{10} + \frac{4}{10}$
- $\frac{2}{10} + \frac{2}{10} + \frac{2}{10} + \frac{1}{10}$
- $\frac{2}{2} + \frac{2}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$

Points Possible: 1

Content Cluster: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. (Fractions need not be simplified.)

Content Standard: Understand a fraction $\frac{a}{b}$ with $a > 1$ as a sum of fractions $\frac{1}{b}$.

Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples:

- $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$;
- $\frac{3}{8} = \frac{1}{8} + \frac{2}{8}$;
- $2\frac{1}{8} = 1 + 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}$. (4.NF.3b)

Depth of Knowledge: Level 2

d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
e. Compare and/or contrast figures or statements
Scoring Guidelines

Rationale for the First Option: This is incorrect. The student may incorrectly add the denominators.

Rationale for the Second Option: This is incorrect. The student may subtract instead of adding.

Rationale for the Third Option: Key – The student correctly identifies \(\frac{3}{10} + \frac{4}{10} = \frac{7}{10}\).

Rationale for the Fourth Option: Key – The student correctly identifies \(\frac{2}{10} + \frac{2}{10} + \frac{2}{10} + \frac{1}{10} = \frac{7}{10}\).

Rationale for the Fifth Option: This is incorrect. The student may incorrectly add the denominators.

Sample Response: 1 point

Select the two expressions that have a sum of \(\frac{7}{10}\).

- [ ] \(\frac{5}{5} + \frac{2}{5}\)
- [ ] \(\frac{10}{10} + \frac{3}{10}\)
- [ ] \(\frac{3}{10} + \frac{4}{10}\)
- [ ] \(\frac{2}{10} + \frac{2}{10} + \frac{2}{10} + \frac{1}{10}\)
- [ ] \(\frac{2}{2} + \frac{2}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}\)
Grade 4 Math
Spring 2019 Item Release

Question 37

Question and Scoring Guidelines
Question 37

Jenna plans to place 16 plates of ham and cheese on tables at a picnic. She estimates that each plate will have $\frac{5}{8}$ pound of ham and $\frac{1}{8}$ pound of cheese.

Based on Jenna’s estimate, how many pounds of ham and how many pounds of cheese does Jenna need? Enter a number in each box.

$$\text{pounds of ham}$$

$$\text{pounds of cheese}$$

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>0</td>
<td>.</td>
<td>$\frac{5}{8}$</td>
</tr>
</tbody>
</table>
Points Possible: 2

Content Cluster: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. (Fractions need not be simplified.)

Content Standard: Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat $\frac{3}{8}$ of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie? (4.NF.4c)

Depth of Knowledge: Level 2
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts

Scoring Guidelines

Exemplar Response

- 10 pounds of ham
  2 pounds of cheese

Other Correct Responses

- any equivalent values

For the item, a full-credit response includes

- the correct number of pounds of ham (1 point)
  AND
- the correct number of pounds of cheese (1 point).
Sample Response: 2 points

Jenna plans to place 16 plates of ham and cheese on tables at a picnic. She estimates that each plate will have $\frac{5}{8}$ pound of ham and $\frac{1}{8}$ pound of cheese.

Based on Jenna’s estimate, how many pounds of ham and how many pounds of cheese does Jenna need? Enter a number in each box.

10 pounds of ham
2 pounds of cheese

Notes on Scoring

This response earns full credit (2 points) because it identifies the correct number of pounds of ham and cheese Jenna needs.

- The student may multiply 16 by $\frac{5}{8}$ and 16 by $\frac{1}{8}$.

Pounds of ham:

$16 \times \frac{5}{8}$

$= \frac{16 \times 5}{8}$

$= \frac{80}{8}$

$= 10$ pounds of ham

Pounds of cheese:

$16 \times \frac{1}{8}$

$= \frac{16 \times 1}{8}$

$= \frac{16}{8}$

$= 2$ pounds of cheese
Sample Response: 2 points

Jenna plans to place 16 plates of ham and cheese on tables at a picnic. She estimates that each plate will have $\frac{5}{8}$ pound of ham and $\frac{1}{8}$ pound of cheese.

Based on Jenna’s estimate, how many pounds of ham and how many pounds of cheese does Jenna need? Enter a number in each box.

\[ \frac{80}{8} \quad \text{pounds of ham} \]
\[ \frac{16}{8} \quad \text{pounds of cheese} \]
Notes on Scoring

This response earns full credit (2 points) because it identifies the correct number of pounds of ham and cheese Jenna needs.

- The student may use properties of operations and a model to identify the amount of cheese and ham.

**Pounds of cheese:**

\[
16 = 8 + 8 \\
16 \times \frac{1}{8} = 8 \times \frac{1}{8} + 8 \times \frac{1}{8}
\]

\[
\begin{array}{cccccccc}
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
\hline
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0
\end{array} \quad = \quad \frac{8}{8} \times \frac{1}{8} = \frac{8}{8}
\]

\[
\begin{array}{cccccccc}
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
\hline
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0
\end{array} \quad = \quad \frac{8}{8} \times \frac{1}{8} = \frac{8}{8}
\]

\[
= \frac{6}{8} + \frac{9}{8} \\
= \frac{16}{8}
\]

\[
16 \times \frac{1}{8} = \frac{16}{8} \text{ pounds of cheese}
\]

**Pounds of ham:**

\[
16 \times \frac{5}{8} \\
= \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8}
\]

\[
= \frac{60}{8}
\]

\[
16 \times \frac{5}{8} = \frac{60}{8} \text{ pounds of ham}
\]
Sample Response: 1 point

Jenna plans to place 16 plates of ham and cheese on tables at a picnic. She estimates that each plate will have $\frac{5}{8}$ pound of ham and $\frac{1}{8}$ pound of cheese.

Based on Jenna’s estimate, how many pounds of ham and how many pounds of cheese does Jenna need? Enter a number in each box.

6  
2  

$pounds$ $of$ $ham$

$pounds$ $of$ $cheese$
Notes on Scoring

This response earns partial credit (1 point) because it identifies the correct number of pounds of cheese and incorrect number of pounds of ham Jenna needs.

- The student may use a model to identify the amount of cheese and only add the numerators of the two amounts to identify the total amount of ham.

\[
\begin{align*}
\text{Pounds of cheese} & \quad \text{Pounds of ham} \\
\begin{array}{cccccccc}
1 & 1 & 1 & 1 & 1 & 1 & 1 \\
8 & 8 & 8 & 8 & 8 & 8 & 8 \\
\end{array} & \quad & \begin{array}{cccccccc}
1 & 1 & 1 & 1 & 1 & 1 & 1 \\
8 & 8 & 8 & 8 & 8 & 8 & 8 \\
\end{array} \\
16 \times \frac{1}{8} = \frac{16}{8} & \quad \frac{5}{8} + \frac{1}{6} = 5 + 1 \\
= \frac{16}{8} & \quad = 6 \\
= \frac{2}{1} & \quad 16 \times \frac{5}{8} \neq 6 \\
= 2 \text{ pounds of cheese} & \\
\end{align*}
\]
Sample Response: 1 point

Jenna plans to place 16 plates of ham and cheese on tables at a picnic. She estimates that each plate will have $\frac{5}{8}$ pound of ham and $\frac{1}{8}$ pound of cheese.

Based on Jenna’s estimate, how many pounds of ham and how many pounds of cheese does Jenna need? Enter a number in each box.

8 \hspace{1cm} \text{pounds of ham}

2 \hspace{1cm} \text{pounds of cheese}
Notes on Scoring

This response earns partial credit (1 point) because it identifies the correct number of pounds of cheese and incorrect number of pounds of ham Jenna needs.

- The student may multiply both $\frac{5}{8}$ and $\frac{1}{8}$ by 16 before creating equivalent fractions to identify the amount of ham and cheese.

\[
\text{Pounds of ham:} \quad 16 \times \frac{5}{8} = \frac{16 \times 5}{8} = \frac{80}{8} = 8 - 8 = 8 \div 8 = \frac{3}{1} = 3 \text{ pounds of ham}
\]

\[
\text{Pounds of cheese:} \quad 16 \times \frac{1}{8} = \frac{16 \times 1}{8} = \frac{16}{8} = \frac{16 \div 8}{8 - 8} = \frac{2}{1} = 2 \text{ pounds of cheese}
\]
Sample Response: 0 points

Jenna plans to place 16 plates of ham and cheese on tables at a picnic. She estimates that each plate will have \( \frac{5}{8} \) pound of ham and \( \frac{1}{8} \) pound of cheese.

Based on Jenna’s estimate, how many pounds of ham and how many pounds of cheese does Jenna need? Enter a number in each box.

\[
\begin{align*}
\frac{5}{8} & \quad \text{pounds of ham} \\
\frac{1}{8} & \quad \text{pounds of cheese}
\end{align*}
\]

Notes on Scoring

This response earns no credit (0 points) because it identifies the incorrect number of pounds of ham and cheese Jenna needs.

- The student may miss that there will be a total of 16 plates with \( \frac{5}{8} \) pound of ham and \( \frac{1}{8} \) pound of cheese on each.

\[
16 \times \frac{5}{8} \neq \frac{5}{8} \quad \text{pounds of ham}
\]

AND

\[
16 \times \frac{1}{8} \neq \frac{1}{8} \quad \text{pounds of cheese}
\]
Sample Response: 0 points

Jenna plans to place 16 plates of ham and cheese on tables at a picnic. She estimates that each plate will have $\frac{5}{8}$ pound of ham and $\frac{1}{8}$ pound of cheese.

Based on Jenna’s estimate, how many pounds of ham and how many pounds of cheese does Jenna need? Enter a number in each box.

80

pounds of ham

16

pounds of cheese

Notes on Scoring

This response earns no credit (0 points) because it identifies the incorrect number of pounds of ham and cheese Jenna needs.

- The student may only identify the number of parts in a pound without making any connection back to the whole pound.

<table>
<thead>
<tr>
<th>Pounds of ham:</th>
<th>Pounds of cheese:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(16 \times \frac{5}{8}) (= 16 \times 5 \div 8) (\neq 80)</td>
<td>(16 \times \frac{1}{8}) (= 16 \times 1 \div 8) (\neq 16)</td>
</tr>
<tr>
<td>(16 \times \frac{5}{8} \neq 80) pounds of ham</td>
<td>(16 \times \frac{1}{8} \neq 16) pounds of cheese</td>
</tr>
</tbody>
</table>
Grade 4 Math
Spring 2019 Item Release

Question 38

Question and Scoring Guidelines
Haley goes to a soccer game that starts at 3:30 p.m. The teams play for $\frac{3}{4}$ hour, then take a break for $\frac{1}{4}$ hour. Then, they play again for $\frac{3}{4}$ hour.

Use the Add Arrow tool to draw the hour and minute hands on the clock to show the time when the game ends.

**Points Possible:** 1

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

**Content Standard:** Solve real-world problems involving money, time, and metric measurement. *(4.MD.2)*

**Depth of Knowledge:** Level 3
  e. Use concepts to solve non-routine problems
  f. Perform a procedure with multiple steps and multiple decision points
Scoring Guidelines

Exemplar Response

Other Correct Responses

- The hour hand should be at or past the 5 but before the 6.

For the item, a full-credit response includes

- the correct time (1 point).
Grade 4 Math
Spring 2019 Item Release

Question 38

Sample Responses
Sample Response: 1 point

Haley goes to a soccer game that starts at 3:30 p.m. The teams play for $\frac{3}{4}$ hour, then take a break for $\frac{1}{4}$ hour. Then, they play again for $\frac{3}{4}$ hour. Use the Add Arrow tool to draw the hour and minute hands on the clock to show the time when the game ends.

Notes on Scoring

This response earns full credit (1 point) because it identifies the correct time the soccer game ends.

- The student may use the clock model to add $\frac{3}{4}$ hour + $\frac{1}{4}$ hour + $\frac{3}{4}$ hour and place the hands on the clock at 5:15 p.m.

(continued on next page)
Notes on Scoring (continued)

Teams take a break for $\frac{1}{4}$ hour

Teams play again for $\frac{3}{4}$ hour

Soccer game ends at 5:15 p.m.

4:30 p.m.
Haley goes to a soccer game that starts at 3:30 p.m. The teams play for $\frac{3}{4}$ hour, then take a break for $\frac{1}{4}$ hour. Then, they play again for $\frac{3}{4}$ hour.

Use the Add Arrow tool to draw the hour and minute hands on the clock to show the time when the game ends.

Notes on Scoring

This response earns no credit (0 points) because it identifies the incorrect time the soccer game ends.

- The student may use the clock model to add $\frac{3}{4}$ hour $+$ $\frac{1}{4}$ hour $+$ $\frac{3}{4}$ hour to 3:30 p.m. before placing the hands on the clock at 5:15 p.m. However, the student may think the hour hand on an analog clock is longer than the minute hand.
Sample Response: 0 points

Haley goes to a soccer game that starts at 3:30 p.m. The teams play for $\frac{3}{4}$ hour, then take a break for $\frac{1}{4}$ hour. Then, they play again for $\frac{3}{4}$ hour.

Use the Add Arrow tool to draw the hour and minute hands on the clock to show the time when the game ends.

Notes on Scoring

This response earns no credit (0 points) because it identifies the incorrect time the soccer game ends.

- The student may use a number line to mistakenly subtract $\frac{3}{4}$ hour $- \frac{1}{4}$ hour $- \frac{3}{4}$ hour from 3:30 p.m. before placing the hands on the clock at 1:45 p.m.

2:45 p.m. $- 15$ minutes = 2:30 p.m.

2:30 p.m. $- 45$ minutes = 1:45 p.m.

3:30 p.m. $- 45$ minutes = 2:45 p.m.

3:30 p.m. $+ \frac{3}{4}$ hour $+ \frac{1}{4}$ hour $+ \frac{3}{4}$ hour $\neq$ 1:45 p.m.
Grade 4 Math
Spring 2019 Item Release

Question 39

Question and Scoring Guidelines
Question 39

A teacher wrote the number 380,000. A student wrote the number 38,000.

How many times larger is the 8 in the teacher’s number than the 8 in the student’s number?

Enter the number in the box.

Points Possible: 1

Content Cluster: Generalize place value understanding for multi-digit whole numbers less than or equal to 1,000,000.

Content Standard: Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right by applying concepts of place value, multiplication, or division. (4.NBT.1)

Depth of Knowledge: Level 1
a. Recall, observe, or recognize a fact, definition, term, or property
Scoring Guidelines

Exemplar Response

• 10

Other Correct Responses

• any equivalent value

For the item, a full-credit response includes

• the correct value (1 point).
Grade 4 Math
Spring 2019 Item Release

Question 39

Sample Responses
Sample Response: 1 point

A teacher wrote the number 380,000. A student wrote the number 38,000.

How many times larger is the 8 in the teacher’s number than the 8 in the student’s number? Enter the number in the box.

10

Notes on Scoring

This response earns full credit (1 point) because it correctly identifies how many times larger the value of the 8 in 380,000 is than the value of the 8 in 38,000.

- The student may create a place value chart to compare the value of the digits and recognize ten groups of eight thousand makes one group of eighty thousand.

<table>
<thead>
<tr>
<th>Ten Thousands</th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

$8 \times \Box = 80$

$80 ÷ 8 = 10$

$\Box = 10$

$8 \times 10 = 80$
Sample Response: 0 points

A teacher wrote the number 380,000. A student wrote the number 38,000.

How many times larger is the 8 in the teacher’s number than the 8 in the student’s number? Enter the number in the box.

10000

Notes on Scoring

This response earns no credit (0 points) because it incorrectly identifies how many times larger the value of the 8 in 380,000 is than the value of the 8 in 38,000.

- The student may give the place value of the 8 in 380,000 in the teacher’s number without comparing it to the value of the 8 in the student’s number.

<table>
<thead>
<tr>
<th>Ten Thousands</th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

8 \times \boxed{} = 80,000
80,000 \div 8 = \boxed{}
80,000 \div 8 = 10,000

80 \div 8 \neq 10,000
Sample Response: 0 points

A teacher wrote the number 380,000. A student wrote the number 38,000.

How many times larger is the 8 in the teacher’s number than the 8 in the student’s number? Enter the number in the box.

9000

Notes on Scoring

This response earns no credit (0 points) because it incorrectly identifies how many times larger the value of the 8 in 380,000 is than the value of the 8 in 38,000.

- The student may think that to find how many times larger requires finding the difference, not recognizing the multiplicative relationship. Then the student may subtract 1,000 from 10,000 because the 8 in 380,000 is in the ten thousands place and the 8 in 38,000 is in the thousands place.

10,000 – 1,000 = 9,000
80 ÷ 8 ≠ 9,000
Question 40

Question and Scoring Guidelines
Question 40

Destini and Myles are playing a video game. Myles has 125 points. Destini has 9 times as many points as Myles.

How many points do they have altogether?

A. 139  
B. 259  
C. 1125  
D. 1250

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)

Depth of Knowledge: Level 2
d. Solve a routine problem requiring multiple steps/decision points, or the application of multiple concepts
Scoring Guidelines

Rationale for Option A: This is incorrect. The student may think Myles has 9 times as many points as Destini, then determine Destini has 14 points when rounded, and add 14 to 125 to get 139 combined points.

Rationale for Option B: This is incorrect. The student may add 9 to 125 instead of multiplying 9 and 125 to get Destini’s points, and then add Myles’s 125 points to get 259 combined points.

Rationale for Option C: This is incorrect. The student may choose the number of points Destini has instead of the combined number of points for Myles and Destini.

Rationale for Option D: **Key** – The student correctly multiplies 9 and 125 to get 1125 points for Destini, and then adds Myles’s 125 points to get 1250 combined points.

Sample Response: 1 point

Destini and Myles are playing a video game. Myles has 125 points. Destini has 9 times as many points as Myles.

How many points do they have altogether?

- A: 139
- B: 259
- C: 1125
- **D**: 1250
Question 41

The denominator of a fraction is doubled and the numerator stays the same. What is the effect on the value of the fraction?

A. The value of the fraction is doubled.
B. The value of the fraction is halved.
C. The value of the fraction increases by 2.
D. The value of the fraction increases by $\frac{1}{2}$.

Points Possible: 1

Content Cluster: Extend understanding of fraction equivalence and ordering limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

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 $\frac{1}{2}$. 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)*

Depth of Knowledge: Level 3
g. Generalize a pattern
Scoring Guidelines

Rationale for Option A: This is incorrect. The student may confuse doubling the denominator with doubling the numerator.

Rationale for Option B: Key – The student correctly recognizes the value of the fraction is halved when the denominator is doubled.

Rationale for Option C: This is incorrect. The student may apply addition to the value of the fraction instead of multiplication.

Rationale for Option D: This is incorrect. The student may think that increasing the value of a fraction by ½ involves multiplying the fraction by ½ instead of adding ½ to the fraction.

Sample Response: 1 point

The denominator of a fraction is doubled and the numerator stays the same. What is the effect on the value of the fraction?

A. The value of the fraction is doubled.

B. The value of the fraction is halved.

C. The value of the fraction increases by 2.

D. The value of the fraction increases by 1/2.
Question 45

An expression is given.

2344 + 835

What is the value of the expression? Enter the number in the box.

1  2  3
4  5  6
7  8  9
0  .  

Points Possible: 1

Content Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic with whole numbers less than or equal to 1,000,000.

Content Standard: Fluently add and subtract multi-digit whole numbers using a standard algorithm. (4.NBT.4)

Depth of Knowledge: Level 1
b. Apply/compute a well-known algorithm (e.g., sum, quotient)
Scoring Guidelines

Exemplar Response

• 3179

Other Correct Responses

• any equivalent value

For the item, a full-credit response includes

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

An expression is given.
2344 + 835

What is the value of the expression? Enter the number in the box.

3179

Notes on Scoring

This response earns full credit (1 point) because it correctly identifies the value of the expression.

- The student may use expanded form to add 2344 + 835.

\[
2344 + 835 = \begin{array}{c}
2000 & + & 300 & + & 40 & + & 4 \\
+ & 800 & + & 30 & + & 5 \\
\hline
3100 & + & 1100 & + & 70 & + & 9 \\
\hline
3179
\end{array}
\]

2344 + 835 = 3179
Sample Response: 1 point

An expression is given.

2344 + 835

What is the value of the expression? Enter the number in the box.

3179.

Notes on Scoring

This response earns full credit (1 point) because it correctly identifies the value of the expression.

- The student may decompose 2344 and 835 to add them together.

\[
2344 = 2000 + 300 + 40 + 4 \\
835 = 800 + 30 + 5
\]

\[
2344 + 835 = 2000 + 300 + 40 + 4 + 800 + 30 + 5 \\
= 2000 + 800 + 300 + 40 + 30 + 4 + 5 \\
= 2000 + 1100 + 70 + 9 \\
= 3100 + 79 \\
= 3179
\]

\[
2344 + 835 = 3179
\]
Sample Response: 0 points

An expression is given.

2344 + 835

What is the value of the expression? Enter the number in the box.

3.179

Notes on Scoring

This response earns no credit (0 points) because it incorrectly identifies the value of the expression.

- The student may think the decimal in 3.179 takes the place of the comma in 3,179.

2344 + 835 \neq 3.179
3,179 \neq 3.179
Sample Response: 0 points

An expression is given.

2344 + 835

What is the value of the expression? Enter the number in the box.

1509

Notes on Scoring

This response earns no credit (0 points) because it incorrectly identifies the value of the expression.

- The student may subtract 835 from 2344 instead of adding.

\[
\begin{align*}
2344 & = 2300 + 30 + 14 \\
- 835 & = -800 + 30 - 5 \\
1500 + 0 + 9 & = 1509
\end{align*}
\]

2344 − 835 = 1509

2344 + 835 ≠ 1509
Grade 4 Math
Spring 2019 Item Release

Question 46

Question and Scoring Guidelines
Question 46

A fraction is given.
\[
\frac{13}{100}
\]

Which decimal is equal to the given fraction?

- A. 0.0013
- B. 0.013
- C. 0.13
- D. 1.3

Points Possible: 1

**Content Cluster:** Understand decimal notation for fractions, and compare decimal fractions limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

**Content Standard:** Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as \( \frac{62}{100} \); describe a length as 0.62 meters; locate 0.62 on a number line diagram. (4.NF.6)

**Depth of Knowledge:** Level 1

k. Recall, identify, or make conversions between and among representations or numbers (fractions, decimals, and percents), or within and between customary and metric measures.
Scoring Guidelines

Rationale for Option A: This is incorrect. The student may think there needs to be two zeros, as in 100, rather than two decimal places.

Rationale for Option B: This is incorrect. The student may think the 1 instead of the 3 would need to be in the hundredths place.

Rationale for Option C: Key – The student correctly notes that the 1 goes in the tenths place and the 3 goes in the hundredths place.

Rationale for Option D: This is incorrect. The student may select $\frac{13}{10}$ rather than $\frac{13}{100}$.

Sample Response: 1 point

A fraction is given.

\[
\frac{13}{100}
\]

Which decimal is equal to the given fraction?

- A. 0.0013
- B. 0.013
- C. 0.13
- D. 1.3