# Grade 5 Mathematics – Evidence Statements

## Overview of the Maryland Comprehensive Assessment Program (MCAP)

The MCAP includes a coherent set of summative mathematics assessments aligned to the Maryland College and Career Ready Standards for Mathematics (MCCRSM). Students are required to take an MCAP mathematics assessment at the end of grades 3 – 8 and at the end of Algebra I. Students may also take an MCAP mathematics assessment at the end of Geometry and Algebra II.

The MCAP mathematics assessment development process is based on Evidence-Centered Design. The ECD process begins by establishing the answer to "What skills and understandings should be assessed?". The MCCRSM describes the skills and understandings that the MCAP mathematics assessments assess. Assessments are then designed to gather evidence that allows inferences to be made. Assessments can be designed to allow inferences of various grain sizes. The MCAP mathematics assessments are summative assessments and are therefore designed to provide evidence that allows only general inferences about a student's mathematical skills and understandings. The MCAP Mathematics Claims Structure describes the grain size of the evidence that the MCAP mathematics assessments will yield. Assessment items are designed to elicit evidence of a student's level of proficiency for each claim.

### MCAP MATHEMATICS CLAIMS STRUCTURE

### Master Claim

The student is college and career ready or is on track to being college and career ready in mathematics.

### Subclaims

**Content** - The student solves problems related to all content of the grade/course related to the Standards for Mathematical Practice.

**Reasoning** - The student expresses grade/course level appropriate mathematical reasoning.

**Modeling** - The student solves real-world problems with a degree of difficulty appropriate to the grade/course.

## MCAP MATHEMATICS ASSESSMENT ITEM TYPES

| Item Type | Description | Subclaim | Scoring Method | Number of Operational Items per Form |
|---|---|---|---|---|
| **Type I** | Type I items will assess conceptual understanding, procedural skills, reasoning, and the ability to use mathematics to solve real-world problems. | • Content<br>• Reasoning<br>• Modeling | Machine scored | **31** |
| **Type II** | Type II items assess a student's ability to reason mathematically. Items may require students to provide arguments or justifications, critique the reasoning of others, and to use precision when explaining their thinking related to mathematics. | • Reasoning | Human scored | **2** |
| **Type III** | Type III items assess a student's ability to apply their understanding of mathematics when solving real-world contextual problems. | • Modeling | Human scored | **2** |
| | | | **Total** | **35** |

# Overview of the MCAP Mathematics Evidence Statements

MCAP Mathematics Evidence Statements help teachers, curriculum developers, and administrators understand how the MCCRSM will be assessed. Assessment items are designed to elicit the evidence described in the Evidence Statements.

The MCAP Mathematics Evidence Statements for the Content Sub-Claim are organized using the same structure as the MCCRSM. The Domains, Clusters, and then Standards organize the Grade 5 Evidence Statements.

## Evidence Statements

Evidence statements are provided for each standard to describe the type of evidence that a task addressing the standard should elicit. In some cases, the standard clearly describes the type of evidence that an aligned task should elicit. The Evidence Statement for such standards will read “As stated in the standard”. In cases where the wording of a standard does not adequately describe the type of evidence that should be elicited, the Evidence Statement will attempt to better describe the type of evidence items should elicit. In cases where a standard is taught in both Algebra I and Algebra II, the Evidence Statement and/or Item Specification will seek to describe how the items might differ between the two courses.

## CODING OF CONTENT EVIDENCE STATEMENTS

| Explanation of Coding | Example of the Evidence Statement |
|---|---|
| **Assessing the Entire Standard**<br>• The evidence statement code is the same as the MCCRSM.<br>• The exact language and intent of the entire standard is assessed, which includes examples and "e.g." parts of the standard. | 3.OA.A.1<br>Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objectives can be expressed as 5 × 7. |
| **Assessing Portions of a Standard with Multiple Operations**<br>• The evidence statement code is the same as the MCCRSM with an addition of a dash and a sequential number, e.g. -1, -2, -3, …<br>• The portion of the standard that is assessed will appear in bold font. | 3.OA.A.3-1<br>**Use multiplication** and division **within 100 (both factors less than or equal to 10) to solve word problems in situations involving question groups, arrays, or area, e.g., by using drawings and equations** with a symbol for the unknown number to represent the problem.<br>3.OA.A.3-2<br>**Use** multiplication and **division within 100 (both factors less than or equal to 10) to solve word problems in situations involving question groups, arrays, or area, e.g., by using drawings and equations** with a symbol for the unknown number to represent the problem. |

| Explanation of Coding | Example of the Evidence Statement |
|---|---|
| **Assessing Portions of a Standard with Two or More Concepts**<br>• The evidence statement code is the same as the MCCRSM with an addition of a dash and a sequential number, e.g. -1, -2, -3, …<br>• The portion of the standard that is being assessed will appear in bold font. | 4.OA.A.1-1<br>Interpret a multiplication equation as comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplication comparisons as multiplication equations.<br>4.OA.A.1-2<br>Interpret a multiplication equation as comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. **Represent verbal statements of multiplication comparisons as multiplication equations.** |

## CODING FOR REASONING EVIDENCE STATEMENTS

| Explanation of Coding | Example of the Evidence Statement |
|---|---|
| • The evidence statement code begins with the corresponding grade level.<br>• The letter “R” appears after the grade level in the code to indicate Reasoning.<br>• The number at the end of the evidence statement code refers to a specific reasoning evidence statement. | 5.R.1<br>Base reasoning or explanations on a given pictorial representation and explain how the pictorial model represents a mathematical concept, or how it can be used to justify or refute a statement (with or without flaws) or how it can be used to generalize. |

## CODING FOR MODELING EVIDENCE STATEMENTS

| Explanation of Coding | Example of the Statement |
|---|---|
| • The evidence statement code begins with the corresponding grade level.<br>• The letter “M” appears after the grade level in the code to indicate Modeling.<br>• The number at the end of the evidence statement code refers to a specific modeling evidence statement. | 5.M.1-1<br>Determine the problem that needs to be solved in a real-world situation. |

## Standards for Mathematical Practice

The Standards for Mathematical Practice describe the varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These practice rest on important “processes and proficiencies” with longstanding importance in mathematics education.

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

# Definitions

Defined below are some common terms used in the Evidence Statements.

- **Context:** The situation or setting for a word problem. The situations influence the solution path.
- **Thin Context:** A sentence or phrase that provides meaning for the quantity/quantities in a problem. For example, “The fractions represent lengths of a string.”
- **No context:** The item has no situation or setting. There are only numbers, symbols, and/or visual models in the item.
- **Visual models:** Drawn or pictorial examples that are representations of the mathematics.

# Content Subclaim

## 5.OA Operations and Algebraic Thinking

### 5.OA.A Write and interpret numerical expressions.

**5.OA.A.1** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items include situations that model order of operations and make connections to the Associative Property of Addition, the Associative Property of Multiplication, and the Distributive Property of Multiplication.
- Expressions will include parenthesis and brackets only. Expressions will not require the use of braces.
- Items may involve solving problems and equations using parenthesis and/or applying order of operations.
- Items may require students to place parenthesis to represent a given scenario or match an expression to a scenario.

**5.OA.A.2** Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as $2\times(8+7)$. Recognize that $3\times(18932+921)$ is three times as large as $18932+921$, without having to calculate the indicated sum or product.*

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Expressions will include parenthesis and brackets only. Expressions will not require the use of braces.

## 5.OA.B Understand properties of multiplication and the relationship between multiplication and division.

**5.OA.B.3** **Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms.** Form ordered pairs consisting of corresponding terms from the two patterns and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence.* **Explain informally why this is so.**

**Evidence Statement:**

- Items focus on generating two numerical patterns using two given rules, identifying, and explaining apparent relationships between the corresponding terms. Items will not assess forming ordered pairs.

**Clarifications:**

- Items assess only what is stated in the first two sentences and the last sentence in the standard (bold font). The rest of this standard will be assessed along with 5.G.1 and 5.G.2.

## 5.NBT Numbers and Operations in Base Ten

### 5.NBT.A Understand the place value system.

**5.NBT.A.1** Recognize that in a multi-digit number, a digit in ones place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items have thin to no context
- Items involve the decimal point in a substantial way (e.g., by involving a comparison of a tenths digit to a thousandths digit or a tenths digit to a tens digit).
- Decimals will be limited to decimals to the thousandths.

**5.NBT.A.2** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items focus on the explanation or application of patterns rather than moving the decimal or adding zeros.

**5.NBT.A.3** Read, write, and compare decimals to thousandths. (Builds on grade 4 work to hundredths).

**3a.** Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g.

$$347.392 = 3\times 100 + 4\times 10 + 7\times 1 + 3\times\left(\frac{1}{10}\right) + 9\times\left(\frac{1}{100}\right) + 2\times\left(\frac{1}{1000}\right)$$

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items have thin to no context.
- Items assess conceptual understanding, e.g., by including a mixture (both within and between items) of expanded form, number names, and base ten numerals.

**3b.** Compare two decimals to thousandths based on meanings of the digits in each place, using ≥ , = and ≤ symbols to record the results of comparisons.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items have thin to no context.
- Items assess conceptual understanding, e.g., by including a mixture (both within and between items) of expanded form, number names, and base ten numerals.
- Comparisons include thousandths to thousandths or thousandths to hundredths, hundredth to hundredths, not tens to tens or hundredths to ten.

**5.NBT.A.4** Use place value understanding to round decimals to any place.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items have thin to no context.

## 5.NBT.B Perform operations with multi-digit whole numbers and with decimals to hundredths.

**5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items do not have context.
- Items assess accuracy. The given factors are such as to require an efficient/standard algorithm (e.g., 26 ×4871 ).
- Factors in the item do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as(7250 × 40).
- For purposes of assessment, the possibilities are 1-digit × 2-digit, 1-digit × 3-digit, 2-digit × 2-digit, 2-digit × 3-digit, or 2-digit × 4-digit.
- Items are not timed.

**5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- This standard is not only about calculating the correct answer. Some items will focus on the strategies used to find whole number quotients as described in the last sentence in the standard.

**5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

**7-1.** Add decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

**Evidence Statement:**

- 5.NBT.B.7-1 focuses on adding decimals.

**Clarifications:**

- Prompts may include visual models, or prompts may present the addends or subtrahend and minuend as numbers. The answer sought is a number, not a picture.
- Each addend is greater than or equal to 0.01 and less than, or equal to 99.99.

**7-2.** Subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

**Evidence Statement:**

- 5.NBT.B.7-2 focuses on subtracting decimals.

**Clarifications:**

- Prompts may include visual models, or prompts may present the addends or subtrahend and minuend as numbers. The answer sought is a number, not a picture.
- The subtrahend and minuend are each greater than or equal to 0.01 and less than or equal to 99.99. Items include positive differences only. Every included subtraction problem is an unknown-addend problem included in 5.NBT.B.7a.

**7-3.** Multiply decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

**Evidence Statement:**

- 5.NBT.B.7-3 focuses on multiplying decimals.

**Clarifications:**

- Items may include visual models, but prompts must also present the factors or the dividend and divisor as numbers, and the answer sought is a number, not a picture.
- Each factor is greater than or equal to 0.01 and less than or equal to 99.99.
- The product must not have any non-zero digits beyond the thousandths place. (For example, $1.67 \times 0.34 = 0.5678$ is excluded because the product has an 8 beyond the thousandths place. See 5.NBT.3 and p. 17 of the Number and Operations in Base Ten Progression document.)
- Items are 2-digit × 2-digit or 1-digit by 3- or 4-digit. (For example, $7.8 \times 5.3$ or $0.3 \times 18.24$)

**7-4.** Divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

**Evidence Statement:**

- 5.NBT.B.7-4 focuses on dividing decimals.

**Clarifications:**

- Items may include visual models, but items must also present the factors or the dividend and divisor as numbers, and the answer sought is a number, not a picture.
- Divisors and dividends are in the forms one- or two-digit whole numbers, including zero in the tens place, any decimal that includes whole numbers and decimals to hundredths, or decimals to hundredths.
- Quotients are either whole numbers or else decimals terminating at the tenths or hundredths place. (Every included division problem is an unknown-factor problem included in 5.NBT.B.7c.)

# 5.NF Numbers and Operations – Fractions

## 5.NF.A Use equivalent fractions as a strategy to add and subtract fractions.

**5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. (*For example,* $\frac{2}{3}+\frac{5}{4}=\frac{8}{12}+\frac{15}{12}=\frac{23}{12}$ *In general,* $\frac{a}{b}+\frac{c}{d}=\frac{(ad+bc)}{bd}$*).*

**1-1.** Add fractions with unlike denominators by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. (*For example,* $\frac{2}{3}+\frac{5}{4}=\frac{8}{12}+\frac{15}{12}=\frac{23}{12}$ *In general,* $\frac{a}{b}+\frac{c}{d}=\frac{(ad+bc)}{bd}$)

**Evidence Statement:**

- 5.NF.A.1-1 focuses on adding fractions with unlike denominators.

**Clarifications:**

- Items have thin to no context.
- Items ask for the answer or ask for an intermediate step that shows evidence of using equivalent fractions as a strategy.
- Items do not include mixed numbers (see 5.NF.A.1-3 and 5.NF.A. 1-4).
- Items may involve fractions greater than one (including fractions equal to whole numbers).
- Items do not provide visual fraction models; students may draw fraction models as a strategy.

**1-2**. Subtract fractions with unlike denominators by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.

**Evidence Statement:**

- 5.NF.A.1-2 focuses on subtracting fractions with unlike denominators.

**Clarifications:**

- See 5.NF.A.1-1.

**1-3.** Add mixed numbers with unlike denominators by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example:* $3+\frac{1}{2}+2\frac{2}{3}=(3+2)+\frac{1}{2}+\frac{2}{3}=5+\frac{3}{6}+\frac{4}{6}=5+\frac{7}{6}=\frac{7}{6}=5+1+\frac{1}{6}=6\frac{1}{6}$.

**Evidence Statement:**

- 5. NF.A.1-3 focuses on adding mixed numbers with unlike denominators.

**Clarifications:**

- Type I items have thin context.
- Items ask for the answer or ask for an intermediate step that shows evidence of using equivalent fractions as a strategy.
- Items do not provide visual fraction models; students may draw fraction models as a strategy.

**1-4.** Subtract mixed numbers with unlike denominators by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators

**Evidence Statement:**

- 5. NF.A.1-4 focuses on subtracting mixed numbers with unlike denominators.

**Clarifications:**

- See 5.NF.A.1-3.

**5.NF.A.2** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result* $\frac{2}{5}+\frac{1}{2}=\frac{3}{7}$ *by observing that* $\frac{3}{7}\leq\frac{1}{2}$.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Type I items have thin to no context and have one or two steps.
- Items may use any of the situation types of problems as shown in the table, *Addition and Subtraction Situations* at the back of this document.
- Items may provide visual fraction models, such as bar models/tape diagrams, number lines or area models or students may draw fraction models as a strategy.
- Items may involve fractions greater than one, including mixed numbers.

## 5.NF.B Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

**5.NF.B.3** Interpret a fraction as division of the numerator by the denominator $\left(\frac{a}{b}=a \div b\right)$. Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret* $\frac{3}{4}$ *as the result of dividing 3 by 4, noting that* $\frac{3}{4}$ *multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size* $\frac{3}{4}$. *If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items have context that includes the understanding of a fraction as division of the numerator by the denominator.
- Fraction models or equations can be used to represent the problem (linear fraction models such as bar models/tape diagrams and number lines or area models will be used in items.)

**5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
**4a.** Interpret the product $\frac{a}{b} \times q$ as a part of *a* partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show* $\frac{2}{3} \times 4 = \frac{8}{3}$, *and create a story context for this equation. Do the same with* $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$ *(In general,* $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$*).*

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items have context in the prompt or solution.
- Items may use visual fractions models (such as bar models/tape diagrams, number lines, or area models) to represent a situation in which students need to multiply a whole number by a fraction or a fraction by a fraction.
- Fraction circles are not used.

**4b.** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas.

**Instructional standard only. The content of the standard is assessed in other standards.**

**5.NF.B.5** Interpret multiplication as scaling (sizing) by:

**5a.** Comparing the size of a product to the size of one factor based on the size of the other factor, without performing the indicated multiplication.

**5b.** Explaining why multiplying a given number by a fraction greater than a 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $\frac{a}{b} = \frac{n \times a}{n \times b}$ to the effect of multiplying $\frac{a}{b}$ by 1.

**Instructional standard only. The content of the standard is assessed in other standards.**

5.NF.B.6 Solve real-world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items include word problems multiplying a fraction times a fraction, a fraction times a mixed number, and a mixed number times a mixed number.
- When items involve multiplying two mixed numbers, the denominator of the product is less than or equal to 24.
- Items include area and comparison (times as many/times as much), with product unknown.
- Type I items may provide a visual fraction model. If a model is used, numbers must be reasonable, so they do not impede finding the solution.
- Reasoning items will not include a model but will be open enough so that students can draw visual fraction models that align to the task using the draw tool. Numbers must be reasonable so as not to impede finding the solution.

**5.NF.B.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. Interpret division of a unit fraction.

**7a.** Interpret division of a unit fraction by a non-zero whole number and compute such quotients. *For example, create a story context for* $\frac{1}{3} \div 4$ *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $\frac{1}{3} \div 4 = \frac{1}{12}$ *because* $\frac{1}{12} \times 4 = \frac{1}{3}$.

**Evidence Statement:**

- This evidence statement focuses on the first part of the standard. Since this is the first exposure of dividing fractions, students will apply and extend concepts of whole number division to dividing a unit fraction by a non-zero whole number.

**Clarifications:**

- Items have thin to no context.
- Items include computation of the quotient.
- Items may include the use of appropriate visual fraction models (bar models/tape diagrams and number lines or area models).

**7b**. Interpret division of a whole number by a unit fraction and compute such quotients. *For example, create a story context for* $4 \div \frac{1}{5}$ *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $4 \div \frac{1}{5} = 20$ *because* $20 \times \frac{1}{5} = 4$.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- See 5.NF.B.7a.

**7c.** Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share* $\frac{1}{2}$ *lb. of chocolate equally? How many* $\frac{1}{3}$*-cup servings are in 2 cups of raisins?*

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items involve equal group (partition) situations with part size unknown and the number of parts unknown (refer to the *Multiplication and Division Situations* table, found in the back of this document).
- Items do not provide visual fraction models; but students may draw visual fraction models as a strategy.

## 5.MD Measurement and Data

### 5.MD.A Convert like measurement units within a given measurement system.

**5.MD.A.1** Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5cm to 0.05cm) and use these conversions in solving multi-step problems.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- N/A

### 5.MD.B Represent and interpret data.

5.MD.B.2 Make a line plot to display a data set of measurements in fractions of a unit $\left(\frac{1}{2}, \frac{1}{4}, \frac{1}{8}\right)$. Use operations for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally (4.MD.B.4).*

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items have context.
- Use the measurement units found in the MCAP Reference Sheet Table.
- Operations need to align to the grade 5 expectations for computations of fractions with unlike denominators.
- Line plot data points are represented by “X” rather than dots.

### 5.MD.C Geometric Measurement: Understand concepts of volume and relate volume to multiplication and to addition.

**5.MD.C.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

**3a.** A cube with side length of one unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.

**3b.** A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units

**Instructional standard only. The content of the standard is assessed in other standards.**

**5.MD.C.4** Measure volumes by counting cubes, using cubic cm. cubic in., cubic ft., and improvised units.

**Instructional standard only. The content of the standard is assessed in other standards.**

- This standard may be assessed with 5.MD.C.5a, 5.MD.C.5b, and or 5.MD.C.5c or within reasoning and modeling items.

**5.MD.C.5** Relate volume to the operations of multiplication and addition, and solve real-world and mathematical problems involving volume.

**5a**. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items may include concepts from 5.MD.C.3a, 5.MD.C.3b, and/or 5.MD.C.4.
- Items must include a right rectangular prism with whole number side lengths (no fractions). The right rectangular prism is only packed with unit cubes (cm or half-inch) that do not overlap or leave spaces.
- No other filling (water, sand, etc.) will be used in items that fill a right rectangular prism.

**5.MD.C.5b** Relate volume to the operations of multiplication and addition, and solve real-world and mathematical problems involving volume.

**5b.** Apply the formulas V= (l) (w) (h) and V= (b) (h) for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items. This standard deepens students' understanding of finding the volume of a rectangular prism.

**Clarifications:**

- Items may have thin to no context.
- Items may require students to measure to find edge lengths to the nearest centimeter, millimeter, or inch.
- The right rectangular prisms are NOT filled. This standard calls for students to apply their knowledge of packing the right rectangular prisms with unit cubes to determine the volume.

**5c**. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non- overlapping parts, applying this technique to solve real-world problems.

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items may have thin to no context.
- Items may require students to measure to find edge lengths to the nearest centimeter, millimeter, or inch.
- Items require students to apply their knowledge of finding the volume of a right rectangular prism with two non-overlapping prisms. (This standard is an extension of finding the area of rectilinear figures in grade 3). In grade 5, this involves finding the volume of three-dimensional figures.
- The right rectangular prisms are NOT filled. This standard calls for students to apply their knowledge of packing the right rectangular prisms with unit cubes to finding the formula for volume and adding the two volumes to find the total volume of the two figures.

## 5.G Geometry

### 5.G.A Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y- axis and y-coordinate).

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- Items assess student understanding of the essential features of the coordinate plane. Items focus more on the intent of 5.G.A.2 with the concepts described in 5.G.A.1 and the second part of 5.OA.B.3.
- For 5.G.A.1 only, items may involve only the plotting of points.
- Coordinates must be whole numbers only.

5.G.A.2 Represent real-world mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation

**Evidence Statement:**

- The language of the standard guides the creation of assessment items.

**Clarifications:**

- See 5.G.A.1. Items use the knowledge and concepts from 5.G.A.1 to represent real-world mathematical problems.

## 5.G.B Classify two-dimensional figures in a hierarchy based on properties.

5.G.B.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

**Evidence Statement:**

- The language of this standard also overlaps with the intent of 5.G.B.4.

**Clarifications:**

- Items focus on reasoning about the attributes of shapes. These properties include, sides (parallel, perpendicular, congruent), angles (type, measurement, congruent), and symmetry (point and line).
- MCCRS uses this definition of a trapezoid: A trapezoid is defined as “A quadrilateral with <u>at least one pair</u> of parallel sides.” Students will not be asked to define a trapezoid. The definition should be understood so that students may use it to classify shapes into subcategories to meet the standard.

**5.G.B.4** Classify two-dimensional figures in a hierarchy based on properties.

**Evidence Statement:**

- 5.G.B.4 focuses not only on the properties of polygons, but also how to reason about the attributes of shapes. This standard overlaps with 5.G.B.3

**Clarifications:**

- Items may include a partially completed diagram showing the hierarchy of shapes to complete.
- Items may include questions that require students to reason about the shapes. For example, “Why is a square always a rectangle? What are the ways to classify triangles?”
- MCCRS uses this definition of a trapezoid: A trapezoid is defined as “A quadrilateral with <u>at least one pair</u> of parallel sides.” Students will not be asked to define a trapezoid. The definition should be understood so that students may use it to classify shapes into subcategories to meet the standard.

## Reasoning Subclaim

All reasoning assessment items connect to both the Grade 5 reasoning evidence statements and the content evidence statements. Students must provide evidence of their ability to reason mathematically by responding to Type I and Type II items.

### Type I

- Items are machine scored.
- Items are 1 point per item.
- Items may be aligned to any of the content standards.
- In Grade 3, items include one step. In Grades 4 and 5, items include one or two steps.*
- Calculators are allowed on all reasoning items.
- Four items from this grouping will appear on each assessment.

### Type II

- Items are human scored constructed response.
- In Grades 3 and 4, items are 3 points per item. In Grade 5, items are 3 points or 4 points per item.
- Items may be aligned to any of the content standards.
- In Grade 3, items include two steps. In Grades 4 and 5, items include at least three steps.*
- Calculators are allowed on all reasoning items.
- Two items from this grouping will appear on each assessment.

* The number of steps is determined by the number of different operations (if an operation repeats in another part of the solution, it only counts as one step), interpretation of a visual model, a chart or table, a graph, or a remainder.

The following pages provide the Reasoning Evidence Statements, specific clarifications, as well as sample items. Please keep in mind that sample items are used to help clarify the evidence statement. They are not a template for assessment items.

**5.R.1** **Evidence Statement:**

- Base reasoning or explanations on a given pictorial representation and explain how the pictorial model represents a mathematical concept, or how it can be used to justify or refute a statement (with or without flaws) or how it can be used to generalize.

*Type I items are 1-point machine scored. Grade 3 items include one step. Grade 4 and 5 items include one or two step(s).*

**Clarifications:**

- Items have a mathematical or real-world context.
- Pictorial representations are a representation of a specific mathematics concept. Visuals that provide information such as tables, charts, graphs, calibrated containers, etc. are not appropriate for this evidence statement.
- Items may provide a pictorial representation for students to identify the mathematical concept the representation exemplifies. Students select the mathematics represented by the pictorial representation (as shown in Appendix: Example 1).
- Items may provide a mathematical concept and require students to select the correct corresponding pictorial representation. Students select the pictorial representation that best explains a given mathematical concept or procedure (as shown in Appendix: Example 2).
- Items may state a conjecture or generalization and students select the pictorial representation that proves or disproves the conjecture or generalization. Students select the pictorial representation that proves or disproves a given conjecture or generalization (as shown in Appendix: Example 3).

*Type II items are 3-point human scored. Grade 3 items include two steps. Grade 4 and 5 items include at least 3 steps.*

**Clarifications:**

- Items have a rich mathematical or real-world context. The context supports a problem that requires two or more steps to solve.
- Pictorial representations are a representation of a specific mathematics concept. Visuals that provide information such as tables, charts, graphs, calibrated containers, etc. are not appropriate for this evidence statement.
- Items allow students to provide work and/or a written explanation and/or to use the drawing tool to describe their own reasoning.
- Items may provide a pictorial representation for students to explain how the pictorial model represents the mathematics (as shown in Appendix: Example 4).
- Items may state a conjecture or generalization and students explain why the pictorial representation supports or does not support the conjecture or generalization (as shown in Appendix: Example 5).

**5.R.2** **Evidence Statement:**

- Identify flawed thinking or reasoning and explain how to correct the thinking or work.

*Type I items are 1-point machine scored. Grade 3 items include one step. Grade 4 and 5 items include one or two step(s).*

**Clarifications:**

- Items have a rich mathematical or real-world context. The context supports a problem that requires two or more steps to solve.
- Pictorial representations are a representation of a specific mathematics concept. Visuals that provide information such as tables, charts, graphs, calibrated containers, etc. are not appropriate for this evidence statement.
- Items allow students to provide work and/or a written explanation and/or to use the drawing tool to describe their own reasoning.
- Items may provide a pictorial representation for students to explain how the pictorial model represents the mathematics (as shown in Appendix: Example 6).
- Items may state a conjecture or generalization and students explain why the pictorial representation supports or does not support the conjecture or generalization (as shown in Appendix: Example 7).

*Type II items are 3-point human scored. Grade 3 items include two steps. Grades 4 and 5 items include at least 3 steps.*

**Clarifications:**

- Items have a rich mathematical or real-world context. The context supports a problem that requires two or more steps to solve.
- Items provide only incorrect work/thinking. Items do not ask students to identify if work is correct or incorrect.
- Items allow students to provide work and/or a written explanation and/or to use the drawing tool to describe their own reasoning. Students may use multiple representations to support or further explain their own reasoning.
- Items may prompt students to identify the flaw AND explain how to correct the flaw (as shown in Appendix: Example 8).
- Items may prompt students to identify the flaw AND to correctly solve the problem (as shown in Appendix: Example 9).

**5.R.3** **Evidence Statement:**

- Prove or disprove a statement, conjecture, or generalization, using correct and precise mathematical examples (visual representations, words, symbols, equations, or expressions.)

*Type I items are 1-point machine scored. Grade 3 items include one step. Grades 4 and 5 items include one or two step(s).*

**Clarifications:**

- Items have a mathematical or real-world context.
- Items state a conjecture based on grade appropriate mathematical concept (number sense, fraction concepts, properties of operations, relationship between operations, place values, etc.) that is either true or false.
- Items require students to either support the conjecture or show that it is not true using mathematical examples (as shown in Appendix: Example 10). Items do not require students to identify if the conjecture is correct or incorrect.
- Items may include visual representations, expressions, or equations.

*Type II items are 3-point human scored. Grade 3 Items include two steps. Grades 4 and 5 items include at least 3 steps.*

**Clarifications:**

- Items have a rich mathematical or real-world context. The context supports a problem that requires two or more steps to solve.
- Items state a conjecture based on grade-appropriate mathematical concept (number sense, fraction concepts, properties of operations, relationship between operations, place values, etc.) that is either true or false.
- Items require students to provide their own mathematical examples to support the conjecture or to show that the conjecture is not true (as shown in Appendix: Examples 11 and 12). Items do not require students to identify if the conjecture is correct or incorrect.
- Items may include visual representations, equations, and expressions.

**5.R.4** **Evidence Statement:**

- Reason mathematically to create or analyze a correct and precise solution to a real-world problem and be able to explain why the answer is mathematically correct.

*Type I items are 1-point machine scored. Grade 3 items include one step. Grades 4 and 5 items include one or two step(s).*

**Clarifications:**

- Items have a mathematical or real-world context.
- Item context or answer choices may be based on big mathematics concepts, such as understanding of place value concepts, number concepts, properties, or relationships among whole numbers, fractions and decimals, etc.
- Items may prompt students to select an explanation why a procedure or strategy is correct or appropriate for solving a given problem (as shown in Appendix: Example 13).
- Items may prompt students to select a strategy or procedure that is best used to solve a given problem (as shown in Appendix: Example 14).

*In Grades 3 and 4, Type II items are 3-point human scored. In Grade 5, Type II items are 4-point human scored. Grade 3 items include two steps. Grade 4 and 5 items include at least three steps.*

**Clarifications:**

- Items have a rich mathematical or real-world context. The context supports a problem that requires two or more steps to solve.
- Item context may be based on big mathematics concepts, such as understanding of place value concepts, number concepts, properties, or relationships among whole numbers, fractions and decimals, etc.
- Items may prompt students to explain why a solution or procedure is mathematically correct or why the answer makes sense (as shown in Appendix: Example 15).
- Items may prompt students to provide or explain a valid chain of reasoning that results in a given solution to a problem (as shown in Appendix: Example 16).

# Modeling Subclaim

All modeling assessment items connect to both the Grade 3 modeling evidence statements and the content evidence statements. Students must provide evidence of their ability to apply one or more steps of the modeling cycle by responding to Type I and Type III items.

## Type I

- Items are aligned to M.1-1, M.1-2, or M.1-3.
- Items are machine scored.
- Items are 1 point per item.
- Items may be aligned to any of the content standards.
- In Grade 3, items include one step. In Grades 4 and 5, items include one or two steps.*
- Calculators are provided on all modeling items.
- Four items from this grouping will appear on each assessment.

## Type III

- Items are aligned to M.1-4 or M.1-5.
- Items are human scored constructed response.
- In Grades 3 and 4, items are 3 points per item. In Grade 5, items are 3 points or 4 points per item.
- Items may be aligned to any of the content standards.
- In Grade 3, items include two steps. In Grades 4 and 5, items include at least three steps.*
- Calculators are allowed on all modeling items.
- Two items from this grouping will appear on each assessment.

* The number of steps is determined by the number of different operations (if an operation repeats in another part of the solution, it only counts as one step), interpretation of a visual model, a chart or table, a graph, or a remainder.

Modeling items can have context even if the aligned content evidence statement clarifies that “Items do not have context”.

The following pages provide the modeling evidence statements, specific clarifications, as well as sample items. Please keep in mind that sample items are used to help clarify the evidence statement. They are not a template for assessment items.

*Type I items are 1-point machine scored. Grade 3 items include one step. Grade 4 and 5 items include one or two step(s).*

**5.M.1-1** **Evidence Statement:**

- Determine the problem that needs to be solved in a real-world situation.
- Clarifications:
- Items have a rich real-world context.
- Items do not require a solution.
- Items may include charts or graphs that could be analyzed for information about the problem.
- Items may require students to identify the problem that needs to be solved (as shown in Appendix: Example 17).
- The context of the problem may be a numberless word problem. This allows students to focus on the context of the problem, not just the numbers (as shown in Appendix: Example 18).

**5.M.1-2** **Evidence Statement:**

- Determine the information that is needed to solve a problem in a given real-world situation.

**Clarifications:**

- Items have a rich real-world context.
- Items do not require a solution.
- Items may include charts or graphs that can be analyzed for information.
- Items may prompt students to identify the information, from a given problem, that is needed to solve the problem (as shown in Appendix: Example 19).
- Items may not provide all of the information needed to solve the problem. Students will make conclusions based on the information that is given in the problem.

**5.M.1-3** **Evidence Statement:**

- Identify the mathematics that is needed to create a solution path for a real-world situation.

**Clarifications:**

- Items have a rich real-world context.
- Items do not require a solution.
- Items may prompt the students to identify the sequence of operations needed to create a solution path. The numbers used in the problem are not required in answer choices (as shown in Appendix: Example 20).
- Items may prompt students to identify an expression with the correct sequence of operations, write an equation with a letter for the answer, or to write expressions.
- Answer choices should be mathematically correct and precise.

*In Grades 3 and 4, Type III items are 3-point human scored. In Grade 5, Type III items are 3- or 4-point human scored. Grade 3 items include two steps. Grade 4 and 5 items include at least three steps.*

**5.M.1-4** **Evidence Statement:**

- Create a solution path that represents the mathematics needed to solve a real-world situation.

**Clarifications:**

- Items have a rich real-world context that supports a problem that requires two or more steps to solve.
- Items require one or more complete and accurate solution paths that include the answer (as shown in Appendix: Example 21).

**5.M.1-5** **Evidence Statement:**

- Evaluate a partial or complete solution to a real-world situation.

**Clarifications:**

- Items have a rich real-world context that supports a problem that requires two or more steps to solve.
- Items require students to analyze a given solution path (partial or complete) to determine if it represents mathematically correct thinking for the given real-world situation. Students should analyze and explain how the solution path represents the problem (as shown in Appendix: Example 22).

## Addition and Subtraction Situations

| | Results Unknown | Change Unkown | Start Unknown |
|---|---|---|---|
| **Add to** | Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now?<br>**2 + 3 = ?** | Two bunnies were sitting on the grass.<br>Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two bunnies?<br>**2 + ? = 5** | Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before?<br>**? + 3 = 5** |
| **Take from** | Five apples were on the table. I ate two apples. How many apples are on the table now?<br>**5 – 2 = ?** | Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat?<br>**5 - ? = 3** | Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before?<br>**? – 2 = 3** |
| | **Total Unknown** | **Addend Unknown** | **Both Addends Unknown** |
| **Put Together/ Take Apart** | Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now?<br>**2 + 3 = ?** | Five apples are on the table. Three are red and the rest are green. How many apples are green?<br>**3 + ? = 5**<br>**5 – 3 = ?** | Grandma has five flowers. How many can she put in the red vase and how many in her blue vase?<br>**5 = 0 + 5**<br>**5 = 5 + 0**<br>**5 = 1 + 4**<br>**5 = 4 + 1**<br>**5 = 2 + 3**<br>**5 = 3 + 2** |

| | Difference Unknown | Bigger Unknown | Smaller Unknown |
|---|---|---|---|
| **Compare** | **How many more?" version:**<br>Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?<br><br>**"How many fewer?" version:**<br>Lucy has two apples. Julies has five apples. How many fewer apples does Lucy have than Julie?<br>**2 + ? = 5**<br>**5 – 2 = ?** | **Version with "more":**<br>Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?<br><br>**Version with "fewer":**<br>Lucy has three fewer apples than Julie. Lucy has two apples. How many apples does Julie have?<br>**2 + 3 = ?**<br>**3 + 2 =?** | **Version with "more"**<br>Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?<br><br>**Version with "fewer"**<br>Lucy has three fewer apples than Julie.<br>Julie has five apples. How many apples does Lucy have?<br>**5 – 3 = ?**<br>**? + 3 = 5** |

# Multiplication and Division Situations

| Problem Situation | Unknown Product | Group Size Unknown (How many in each group?)<br>3 × ? = 18 and 18 ÷ 3 = ? | Number of Groups Unknown (How many groups?) |
|---|---|---|---|
| **Equal groups**<br>**(Grades 3 – 5)** | There are 3 bags with 6 plums in each bag. How many plums are there in all?<br><br>Measurement example:<br>Alex needs 3 lengths of string, each 6 inches long. How much string will Alex need? | If 18 plums are shared equally into 3 bags, then how many plums will be in each bag?<br><br>Measurement example:<br>Dale has 18 inches of string, which he will cut into 3 equal pieces. How long will each piece of string be? | If 18 plums are to be packed 6 to a bag, then how many bags are needed?<br><br>Measurement example:<br>Ruth has 18 inches of string, which she will cut into pieces that are 6 inches long. How many pieces of string will she have? |
| **Arrays and Area**<br>**(Grades 3 – 5)** | There are 3 rows of apples with 6 in each row. How many apples are there? OR<br>The apples in the grocery window are in 3 rows and 6 columns. How many apples are there?<br>Area Example:<br>What is the area of a 3 cm by 6 cm rectangle? | If 18 apples are arranged into 3 equal rows, how many apples will be in each row? OR<br>If 18 apples are arranged into an array with 3 rows, how many columns of apples are there?<br><br>Area example:<br>A rectangle has an area of 18 square centimeters. If one side is 3 cm long, how long is a side next to it? | If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? OR<br>If 18 apples are arranged into an array with 3 columns, how many rows are there?<br><br>Area example:<br>A rectangle has an area of 18 square centimeters. If one side is 6 cm long, how long is a side next to it? |

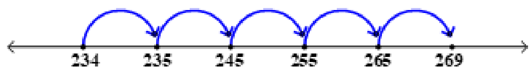
| Problem Situation | Unknown Product | Group Size Unknown (How many in each group?) 3 × ? = 18 and 18 ÷ 3 = ? | Number of Groups Unknown (How many groups?) |
|---|---|---|---|
| **Compare** **(Grades 4 – 5)** Multiplicative Compare problems appear first in Grade 4, with the “times as much” language. | A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? Measurement example: A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long? | A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? Measurement example: A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first? | A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? Measurement example: A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first? |

# Appendix

## Sample Reasoning Items

### Example 1

A student uses the number line to find the value of 269 - 234.




Which expression represents how the student used the number line to find the value of 269 – 234?

A. 10+10+10+10+1010+10+10+10+10

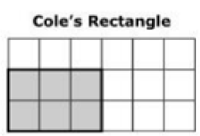
B. 10+10+10+10+110+10+10+10+1

C. 4+10+10+10+14+10+10+10+1

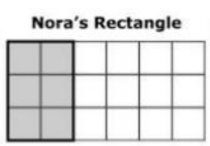
D. 1+10+10+10+11+10+10+10+1

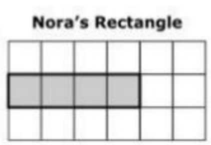
### Example 2

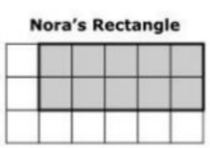
Cole drew the shaded rectangle on a piece of grid paper.

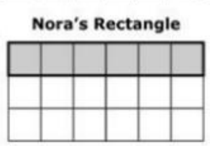



Nora also drew a rectangle on grid paper. Nora's rectangle has the same perimeter as Cole's rectangle but has a different area than Cole's rectangle. Which rectangle could be Nora's?

A.



B.



C.


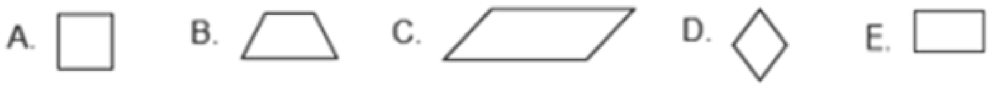

D.


### Example 3

A student says that some quadrilaterals are not rhombuses.

Which **three** figures prove that the student's statement is true?

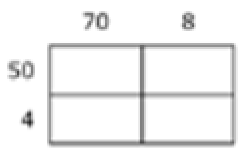
Select the **three** correct answers.




### Example 4

A model is shown.

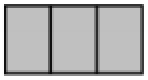
Explain how the model could be used to find the result of 54 × 78. Then find the result of 54 × 78 .



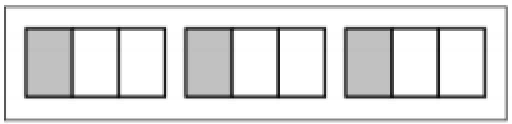

Enter your answer and your explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

### Example 5

A friend uses this model to show one whole.



The friend drew a model to represent the product $\frac{1}{3} \times 9$



The friend thinks that this model can represent the multiplication expression. Explain how the model disproves the friend's thinking. Enter your answer and your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

### Example 6

An artist drew a rectangle.

The artist said the area of the rectangle shown is found by adding 3+ 7 +3 +7=20. The artist made a mistake.

Which statement explains the artist's mistake?

A. The artist used the incorrect side lengths.

B. The artist added the side lengths incorrectly.

C. The artist calculated the final answer incorrectly.

D. The artist calculated the perimeter of the rectangle.

### Example 7

A student said the value of 11 tens, 8 ones and 2 hundreds is 1182.

The student made a mistake.

What is the correct value?

Enter your answer in the space provided.

### Example 8

Keisha said the value of 11 tens, 8 ones and 2 hundreds is 1182.

What error did the student make in her reasoning?

Explain how you would correct the error that the student made.

Enter your answer and your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

### Example 9

An explanation for finding the value of 4×2×3 is given:

- Multiply 4×2.
- Multiply 4×3.
- Add the two products.

A mistake is made in the explanation. Describe the mistake and explain a strategy that could be used to find the product for 4×2×3.

Enter your answer and your work or explanation in the space provided.

You may also use the drawing tool to help explain or support your answer.

### Example 10

A student says that two fractions can be compared using the benchmark fraction $\frac{1}{2}$.

Which **two** comparisons prove the students' thinking is correct?

Select the **two** correct answers.

A. $\frac{7}{8} \geq \frac{3}{12}$

B. $\frac{1}{4} \leq \frac{4}{8}$

C. $\frac{2}{6} \leq \frac{5}{6}$

D. $\frac{6}{10} \leq \frac{6}{8}$

E. $\frac{6}{12} \geq \frac{2}{8}$

### Example 11

Your teacher gives you this problem to solve.

*What happens to the sum in an addition problem if each addend is multiplied by two?*

What is the answer to the problem the teacher gave? Explain how you found the answer and provide two examples that support your answer.

Enter your answer and your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

## Example 12

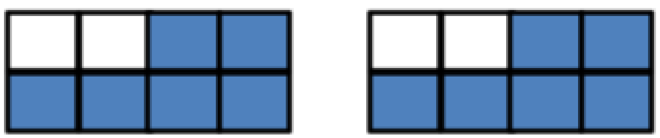
In a third grade classroom, the teacher asked two students to name a fraction. Student A says $\frac{5}{8}$ and Student B says $\frac{3}{4}$. The teacher asks, if both fractions have the same size whole, how are $\frac{5}{8}$ and $\frac{3}{4}$ alike and how are they different?

Explain how the two fractions are alike and different and include two examples to explain your thinking.

Enter your answer and your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

## Example 13

A pair of fraction models is shown.



Which statement explains the correct reasoning for the sum of the shaded parts?

A. Each model shows $\frac{5}{8}$ shaded, so the sum is $\frac{26}{8}$.

B. Each model shows $\frac{6}{8}$ shaded, so the sum is $2\frac{6}{8}$.

C. Each model is divided into 8 parts. There are 12 total parts shaded, so the sum is $\frac{12}{8}$.

D. Each model is divided into 8 parts. There are 12 total parts shaded, so the sum is $1\frac{2}{8}$

### Example 14

Which strategy can be used to multiply 8 × 7?

A. Multiply 8 × 2 and then add 7.

**B.** Multiply 10 × 7 and then subtract 2.

**C.** Multiply 4 × 2 three times and add 8 + 8 + 8.

**D.** Multiply 2 × 7 four times and add 14 + 14 + 14 + 14.

### Example 15

A contractor measured the length and width of two rectangular pieces of land.

- The two pieces of land are adjacent and share the same width of 17 yards.
- The first piece of land has a length of $32\frac{1}{3}$ yards.
- The second piece of land has a length of $25\frac{1}{4}$ yards.

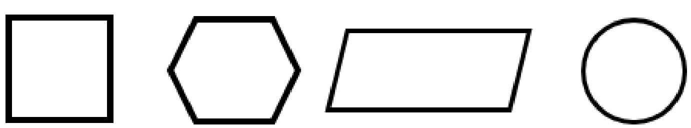
Find the total area, in square yards, of both pieces of land.

Analyze your work. Explain how your work correctly represents the problem.

Enter your answer, your work and your explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

### Example 16

A group of four shapes is shown.



- Pick two shapes from the group and explain why each shape does not belong in the group.
- Think about another shape that you could add to the group. Explain why that shape does not belong to the group.

Enter your answer, your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

## Sample Modeling Items

### Example 17

Two science classes are conducting an experiment together in the science lab. Each class has 23 students. The tables in the science lab can each seat up to 4 students.

Which question could be answered using **all** the information in the problem?

A. How many students enjoy the science class?

B. How many science books are needed for one class?

C. How many students can be seated at all of the tables?

D. How many tables are needed for all the students from both classes?

### Example 18

Some science classes are conducting an experiment together in the science lab. Each class has the same number of students. Each table can seat the same number of students.

Which question could be answered using **all** the information in the problem?

A. How many tables are needed for one class?

B. How many students are there in all of the classes?

C. How many science books are needed for one class?

D. How many tables are needed for all the students from both classes?

### Example 19

Two science classes are conducting an experiment together in the science lab. Each class has 23 students. The tables in the science lab can each seat up to 4 students. How many tables are needed for all the students from both classes?

Which three pieces of information are needed to solve the problem?

Select the **three** correct answers.

A. Each class has 23 students.

B. Each table seats up to 4 students.

C. Two science classes are in the lab.

D. The experiment is in the science lab.

E. Classes are conducting an experiment.

F. The students work on the experiment for 30 minutes.

### Example 20

Two science classes are conducting an experiment together in the science lab. Each class has 23 students. The tables in the science lab can each seat up to 4 students.

How many tables are needed for all the students from both classes?

Which operations could be used to solve the problem?

A. only division

B. only multiplication

C. first division and then addition

D. first addition and then division

### Example 21

Two science classes are conducting an experiment together in the science lab. Each class has 23 students. The tables in the science lab can each seat up to 4 students.

How many tables are needed for all the students from both classes?

Write an equation or equations to show how to find the least number of tables needed for all the students from both classes in the science lab.

Enter your answer and your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

### Example 22

Two science classes are conducting an experiment together in the science lab. Each class has 23 students. The tables in the science lab can each seat up to 4 students. How many tables are needed for all the students from both classes?

One student's work and explanation for the problem is given:

> $23 \times 2 = 46$
>
> $46 \div 4 = t$
>
> *t = 11 with remainder of 2 (total number of tables)*
>
> *12 tables are needed.*

Analyze the student's work. Explain how the student's work correctly or incorrectly represents the problem.

Enter your answer and your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.