Grade 3 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 • Reasoning • 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 3 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 • The evidence statement code is the same as the MCCRSM. • 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 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 • 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, … • The portion of the standard that is assessed will appear in bold font.	3.OA.A.3-1 **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. 3.OA.A.3-2 **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 • 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, … • The portion of the standard that is being assessed will appear in bold font.	4.OA.A.1-1 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. 4.OA.A.1-2 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. • The letter "R" appears after the grade level in the code to indicate Reasoning. • The number at the end of the evidence statement code refers to a specific reasoning evidence statement.	3.R.1 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. • The letter “M” appears after the grade level in the code to indicate Modeling. • The number at the end of the evidence statement code refers to a specific modeling evidence statement.	3.M.1-1 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

3.OA Operations and Algebraic Thinking

3.OA.A Represent and solve problems involving multiplication and division.

3.OA.A.1 **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 objects can be expressed as 5 × 7.**

Evidence Statement:

- The intent of this standard is to interpret multiplication expressions and equations using the definition of multiplication as stated in the standard. This standard does not assess calculating products.

Clarifications:

- Item context should reflect the equal parts problem types. Refer to the Multiplication and Division Situations table, found in the back of this document.
- Items use a variety of representations of multiplication for students to interpret, such as equal groups, arrays, area, and/or measurement quantities.

3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.

Evidence Statement:

- The intent of this standard is to interpret division expressions and equations using the definition of division as stated in the standard. It is not to assess calculating quotients. Items involve interpreting quotients rather than calculating quotients in terms of equal groups, arrays, area, and/or measurement quantities.

Clarifications:

- Items will be written to include a balance of interpreting quotients as a number of objects in each share and interpreting quotients as a number of equal shares (both Partitive and Measurement division types).
- Refer to the *Multiplication and Division Situations* table, found in the back of this document.

3.OA.A.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, or arrays, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem

3-1. Use multiplication within 100 to solve word problems in situations involving equal groups, or arrays, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Evidence Statement:

- 3.OA.A.3-1 focuses on multiplication within 100 with both factors being less than or equal to 10. The intent of the standard is for students to solve word problems.

Clarifications:

- Type I items must have context for a one-step word problem.
- Context may include words and/or visual models of equal groups, arrays, or area models.
- Items may require students to represent the context of a multiplication or division problem with a correct equation.
- Items will not include a symbol for the unknown. This concept will be assessed in 3.OA.A.4 and 3.OA.D.8 using a symbol/letter for the unknown.
- If students are asked to identify the equation that matches the problem situation, a variety of equation representations should be used, such as
  $5 \times 8 = 40$ or $40 = 5 \times 8$, etc.

3-2. Use division within 100 to solve word problems in situations involving equal groups, or arrays, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Evidence Statement:

- 3.OA.A.3-2 focuses on division within 100 with both factors less than or equal to 10.

Clarifications:

- See 3.OA.A.3-1 and apply it for division problem types and representations.

3.OA.A.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8\times ?=48$, $5=\blacksquare \div 3$, $6\times 6=?$

Evidence Statement:

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

Clarifications:

- Items do not have a context.
- Items may require students to write the equation.
- The unknown will be represented with a small box or question mark. This standard is a transition standard to 3.OA.D.8 where students are introduced to equation notation with the unknown represented with a letter.
- Equations should use a variety of formats. Refer to examples in the standard.
- Items will include the relationship between multiplication and division. Refer to the table Multiplication and Division Situations, found in the back of this document.

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

3.OA.B.5 Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property)*

Evidence Statement:

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

Clarifications:

- Type I items may have thin or no context.
- Type II or Type III items have context that requires students to apply one of the properties of operations to solve a problem.
- Products and related quotients are limited to the 10 × 10 multiplication table.
- These items may not exceed the content limits of grade 3. For example, 2 × 4 × 5 would be acceptable as students can use the associative property to rewrite the expression as 8 × 5 = 40, which falls within the content limits of grade 3. The problem 7 × 4 × 6 would exceed the content limits of grade 3 because any use of the associative property would result in a two-digit multiplier.
- Items do not require students to identify or name the property.
- Items may include parentheses.

3.OA.B.6 Understand division as unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*

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

3.OA.C Multiply and divide within 100.

3.OA.C.7-1 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By end of grade 3, know from memory all products of two one-digit numbers.

7-1. Fluently **multiply** within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations.

Evidence Statement:

- 3.OA.C.7-1 focuses on multiplication within 100 for fluency. The word fluency does not mean instant recall (automaticity). Fluency refers to accuracy, efficiency, and flexibility. The standard focuses on the strategies commonly used to find the products.

Clarifications:

- Items do not have a context.
- Items are not timed.
- Items may include how the mental math strategies, properties of operations, or relationships between and among operations are used to multiply whole numbers with factors within 100.
- Type I content items assess the entire standard except for the last sentence, “By end of grade 3, know from memory all products of two one-digit numbers". This is an expectation of instruction.

7-2. Fluently **divide** within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations.

Evidence Statement:

- 3.OA.C.7-2 focuses on division within 100 for fluency. The word fluency does not mean instant recall (automaticity). Fluency refers to accuracy, efficiency, and flexibility. The standard focuses on the strategies commonly used to find the products.

Clarifications:

- See 3.OA.C.7-1 and apply it for division items.

3.OA.D Solve problems involving the four operations, and identify and explain the patterns in arithmetic.

3.OA.D.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimate strategies including rounding.

Evidence Statement:

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

Clarifications:

- This standard is used as the content focus for Type II and III items only.
- Items will allow students to represent their solution with or without equations with a letter for the unknown quantity depending on the reasoning or modeling evidence statement of the item.
- Items include two out of the four operations and any of the problem situation types with unknowns in various positions. Refer to the *Multiplication and Division Situations* table, found in the back of this document.

3.OA.D.9 Identify arithmetic patterns (including patterns in the addition table) and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*

Evidence Statement:

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

Clarifications:

- Items may ask students to (but are not limited to):
    - identify, select, describe or explain arithmetic patterns in the addition or multiplication tables.
    - identify or describe patterns based on the properties of operations.
    - describe or explain patterns in multiplication for odd and even factors.
- Use the number limitations for addition/subtraction/multiplication/division.

3.NBT Numbers and Operations in Base Ten

3.NBT.A Use place value understanding and properties of operations to perform multi-digit arithmetic.

3.NBT.A.1 Use place value to understanding to round whole numbers to the nearest 10 or 100.

Evidence Statement:

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

Clarifications:

- Type I content items have thin or no context.
- Items will allow students to apply strategies of rounding numbers to the nearest 10 or to the nearest 100.
- Items may involve rounding numbers to the nearest 10 or 100 using a number line.
- Items may provide several examples of rounding three- and four-digit numbers and ask students to identify and describe resulting place value patterns.

3.NBT.A.2 Fluently add and subtract within 1000 using strategies based on place value, properties of operations and/or relationship between addition and subtraction.

Evidence Statement:

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

Clarifications:

- Items may be written to include only addition, only subtraction, or both addition and subtraction.
- Items have thin or no context.
- Items reflect commonly used strategies as named in the standard.
- Type II and III items may require students to explain how they arrived at an answer by explaining the strategy used to find the answer (place value, properties of operations or the relationship between operations).

3.NBT.A.3 Multiply one-digit whole numbers by multiples of 10 in the range 10 – 90 (e.g., 9×80, 5×60) using strategies based on place value and properties of operations.

Evidence Statement:

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

Clarifications:

- Type I content items have thin or no context.
- Items may ask students to continue patterns of multiplying one-digit whole numbers by multiples of ten in the range of 10 – 90.

3.NF Numbers and Operations – Fractions

3.NF.A Develop understanding of fractions as numbers.

3.NF.A.1 Understand a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction $\frac{a}{b}$ as the quantity formed by a parts of size $\frac{1}{b}$.

Evidence Statement:

- This standard focuses on understanding unit fractions, based on work for 3.G.A.2.

Clarifications:

- Type I items may have thin context.
- Items are limited to fractions with denominators 2, 3, 4, 6, and 8.
- Fractions should be written in stacked form.
- Items include a variety of the fraction models, such as bar models/tape diagrams or area models.
- When a visual fraction model shows a 'whole' partitioned into equal pieces, there does not need to be a separate visual that shows an unpartitioned "whole". If an item needs to have a separate visual fraction model to represent the whole, then the model should be the same size as the partitioned visual model.
- Items focus on fractions of a partitioned whole, not fraction of a set.

3.NF.A.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.

2a. Represent a fraction $\frac{1}{b}$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size $\frac{1}{b}$ and that the endpoint of the part based at 0 locates the number $\frac{1}{b}$ on the number line.

Evidence Statement:

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

Clarifications:

- Type I items have thin context.
- Items are limited to fractions with denominators 2, 3, 4, 6, and 8.

- Fractions will be written in stacked form.
- Items may include fractions greater than 1.
- Fractions equivalent to whole number are limited to 0 through 5.

2b. Represent a fraction $\frac{a}{b}$ on a number line diagram by marking off a lengths $\frac{1}{b}$ from 0. Recognize that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the number $\frac{a}{b}$ on the number line.

Evidence Statement:

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

Clarifications:

- This standard is similar to 3.NF.A.2a, but 2b extends to fractional representations that are greater than a unit fraction.
- Type I items have thin context.
- Items are limited to fractions with denominators 2, 3, 4, 6, and 8.
- Items may include fractions greater than 1.

3.NF.A.3 Explain equivalence of fractions in special cases and compare fractions by reasoning about their size.

3a. Understand two fractions as equivalent (equal) if they are the same size or the same point on a number line.

Evidence Statement:

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

Clarifications:

- Items are limited to fractions with denominators 2, 3, 4, 6, and 8.
- Items may include fractions greater than 1.
- Fractions equivalent to whole number are limited to 0 through 5.
- Items may include the use of number lines or bar models/tape diagrams to show equivalent fractions.

3b. Recognize and generate simple equivalent fractions, e.g.,$\frac{1}{2}=\frac{2}{4}$, $\frac{4}{6}=\frac{2}{3}$. Explain why the fractions are equivalent e.g., by using a visual fraction model.

Evidence Statement:

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

Clarifications:

- Items are limited to fractions with denominators 2, 3, 4, 6, and 8.
- Fractions equivalent to whole numbers are limited to 1 through 5.
- Items use a visual fraction model (bar models/tape diagrams, number lines, or area models) for students to identify or create equivalent fractions. No circle fraction models will be used.
- Items may require students to explain or identify equivalent fractions by using visual fraction models.

3c. Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form $3=\frac{3}{1}$; recognize that $\frac{6}{1}=6$; locate $\frac{4}{4}$ and 1 at the same point of a number line diagram.

Evidence Statement:

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

Clarifications:

- Items are limited to fractions with denominators 2, 3, 4, 6, and 8.
- Fractions equivalent to whole numbers are limited to 1 through 5.
- Items may include number lines or other visual models (bar models, tape diagrams, etc.) to be used to identify or recognize fractions that are equivalent to whole numbers.

3d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Evidence Statement:

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

Clarifications:

- Items are limited to fractions with denominators 2, 3, 4, 6, and 8.
- Fractions equivalent to whole numbers are limited to 1 through 5.

- Items focus on justifying a comparison of two fractions based on the same-sized whole by using reasoning or a visual fraction model.
- Items may use a visual fraction model, (bar models/tape diagrams, numbers lines or area models). No circle fraction models will be used.

3.MD Measurement and Data

3.MD.A Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

3.MD.A.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

Evidence Statement:

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

Clarifications:

- Items are limited to 60 minutes intervals.
- Acceptable time interval: Start time 1:20. End time 2:10. Total time interval is 50 minutes which is within the 60 minute interval requirement.
- Unacceptable interval: Start time 1:20. End time 2:30. Total time interval exceeds 60 minutes.
- Items may require students to tell and write time to the nearest minute.
- Items may require students to solve word problems involving addition and subtraction of time intervals in minutes. These items:
- Require students to measure time intervals or elapsed time. Elapsed time is time that has passed.
- May include an open number line.
- May include a start or end time and the amount of time that passes to find the end or start time.
    - **Example 1:** Given start and end time, find the amount of time in between start and end time. (A student starts math homework at 3:30 and ends at 3:55. Then the student does reading homework from 3:55 until 4:25. How much total time did the student spend on homework?)
    - **Example 2:** Given the start time and the time in between, find end time. (The student got home from school at 4:00. The student played outside for 30 minutes and did homework for 25 minutes. What time did the student finish homework?)
    - **Example 3:** Given time in between the start and end time and given end time, find start time. (A student went to the library and stayed at the library for 25 minutes. The student left the library at 2:30. What time did the student arrive at the library?)

3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g) and kilograms (kg), and liters (l). Add subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Evidence Statement:

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

Clarifications:

- Type I items involve only one-step word problems.
- Items do not require computations beyond the grade 3 expectations.
- Items use images such as a beaker with measurement scale or balance scales, etc. to provide information for solving or answering the problem.

3.MD.B Represent and interpret data.

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" or "how many less" problem using information presented in the scaled bar graph. *For example, draw a bar graph or picture graph in which each square (symbol) in the bar might represent 5 pets*.

Evidence Statement:

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

Clarifications:

- Type I items may extend to two-step "how many more" or "how many less" problems based on information given on the graph.
- Type II or Type III items may extend to three-step "how many more" or "how many less" problems based on the information given on the graph.
- Items will engage students in constructing, reading, and interpreting bar and picture graphs.
- Items do not require computations beyond the grade 3 expectations.

3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units- whole numbers, halves, or quarters.

Evidence Statement:

- The intent of the standard is to generate or complete line plots, not to solve problems using data from line plots.

Clarifications:

- Items provide a line plot with the horizontal scale marked off in units with whole numbers, halves, or quarters. Students may generate data using rulers marked off in halves or fourths of an inch or may be given a set of a data with no more than 8 values.
- Line plot data points are represented by "X" rather than dots.

3.MD.C Geometric Measurement: Understand concepts of areas and relate area to multiplication and to addition.

3.MD.C.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.

- **5a**. A square with side length 1 unit, called "a square unit" is said to have "one square unit" of area, and can be used to measure area.
- **5b**. A plane figure which can be covered without gaps or overlaps by n unit questions is said to have an area of n square units.
- **Instructional standard only. The content of this standard is assessed in other standards.**

3.MD.C.6 Measure areas by counting unit squares (square cm, square m, square in, square ft., and improvised units).

Evidence Statement:

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

Clarifications:

- N/A

3.MD.C.7 Relate area to the operations of multiplication and addition.

7a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. **Instructional standard only. The content of this standard is assessed in other standards.**

7b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

Evidence Statement:

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

Clarifications:

- Items have a context.
- Items are limited to products within 100.

7c. Use tiling to show in a concrete case that the area of a rectangle with whole number side lengths *a* and *b* + *c*. Use area models to represent the distributive property in mathematical reasoning. **Instructional standard only. The content of this standard is assessed in other standards.**

7d. Recognize area as additive. Find area of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas 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:

- A rectilinear figure is a polygon in which all angles measure 90 or 270 degrees.
- Items have a context.
- Items do not require computations beyond the grade 3 expectations, Products of each component of the composite figure should not be greater than 9 × 10 (3.NBT.A.3).

3.MD.D Geometric Measurement: Recognize perimeter as an attribute of plane figures and distinguish between linear and area measurements.

3.MD.D.8 Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Evidence Statement:

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

Clarifications:

- Items should not exceed computation levels for grade 3.
- Items should not include only finding the perimeter of rectilinear figures, but could include polygons with a different number of

sides.

3.G Geometry

3.G.A Reason with shapes and their attributes.

3.G.A.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

Evidence Statement:

- The intent of this standard is for students to identify the attributes of shapes. Items ask students to use their knowledge of the attributes of shapes to sort them into a larger category e.g., quadrilaterals.

Clarifications:

- Items may ask students to identify the attributes of two-dimensional shapes up to 5 sides and corners.
- Items may require students to sort shapes with like attributes of sides and corners into a larger category of quadrilaterals.
- Classifications using parallelogram, parallel lines, and perpendicular lines are not permitted in grade 3.

3.G.A.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as $\frac{1}{4}$ of the area of the shape.

Evidence Statement:

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

Clarifications:

- The content of this standard is a prerequisite concept to the 3.NF standards.

Reasoning Subclaim

All reasoning assessment items connect to both the Grade 3 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.

3.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).

3.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).

3.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.

3.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).

3.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).

3.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.

3.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.

3.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).

3.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? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two bunnies? 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? ? + 3 = 5
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 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? ? – 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? 2 + 3 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5 5 – 3 = ?	Grandma has five flowers. How many can she put in the red vase and how many in her blue vase? 5 = 0 + 5 5 = 5 + 0 5 = 1 + 4 5 = 4 + 1 5 = 2 + 3 5 = 3 + 2

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

Multiplication and Division Situations

Problem Situation	Unknown Product	Group Size Unknown (How many in each group?) 3 × ? = 18 and 18 ÷ 3 = ?	Number of Groups Unknown (How many groups?)
Equal groups **(Grades 3 – 5)**	There are 3 bags with 6 plums in each bag. How many plums are there in all? Measurement example: 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? Measurement example: 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? Measurement example: 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 **(Grades 3 – 5)**	There are 3 rows of apples with 6 in each row. How many apples are there? OR The apples in the grocery window are in 3 rows and 6 columns. How many apples are there? Area Example: 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 If 18 apples are arranged into an array with 3 rows, how many columns of apples are there? Area example: 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 If 18 apples are arranged into an array with 3 columns, how many rows are there? Area example: A rectangle has an area of 18 square centimeters. If one side is 6 cm long, how long is a side next to it?

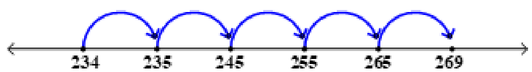
Problem Situation	Unknown Product	Group Size Unknown (How many in each group?) 3 × ? = 18 and 18 ÷ 3 = ?	Number of Groups Unknown (How many groups?)
Compare **(Grades 4 – 5)** Multiplicative Compare problems appear first in Grade 4, with the “times as much” language.	A blue hat costs $6. A red hat costs 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

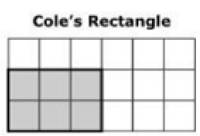
B. 10+10+10+10+110+10+10+10+1

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

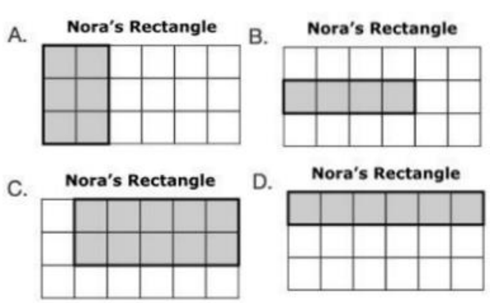
D. 1+10+10+10+11+10+10+10+1

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?

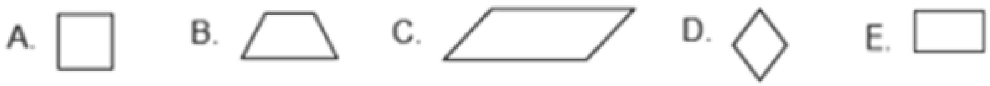


Example 3

A student says that some quadrilaterals are not rhombuses.

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

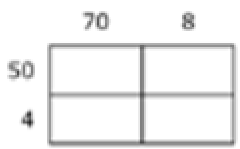
Select the **three** correct answers.



Example 4

A model is shown.

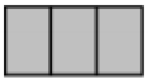
Explain how the model could be used to find the result of 54 × 78. Then find the result of 54 × 78 .



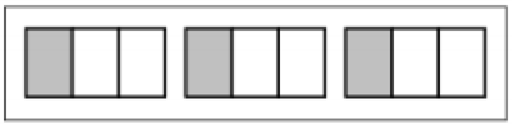
Enter your answer and your explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

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

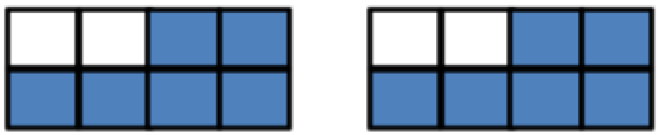
In a third grade classroom, the teacher asked two students to name a fraction. Student A says $\frac{5}{8}$ and Student B says $\frac{3}{4}$. The teacher asks, if both fractions have the same size whole, how are $\frac{5}{8}$ and $\frac{3}{4}$ alike and how are they different?

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.

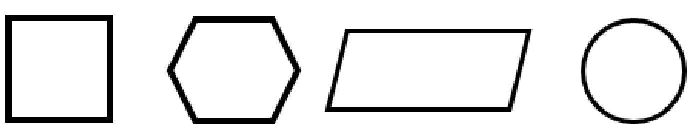
Find the total area, in square yards, of both pieces of land.

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 × 2 = 46
>
> 46÷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.