



Grade 3 Mathematics

Performance Level Descriptors

Introduction

The federal government requires states to adopt and assess standards and report assessment results using three or more levels. Federal guidance specifies that state’s academic performance levels must include descriptions of the content-based competencies associated with each level. The descriptions, referred to as Performance Level Descriptors (PLDs), convey the degree of student achievement at each level. The Maryland Comprehensive Assessment Program (MACP) Policy, Content, and Range PLDs are included in this document.

MCAP Policy Performance Level Descriptors

The MCAP Policy PLDS provide high-level descriptions of a student’s ability to apply the knowledge and skills defined by the Maryland Content Standards for English Language Arts (ELA), Mathematics, Science, and Social Studies as demonstrated by their performance on MCAP assessments. Maryland elected to use the four performance levels, described below, when reporting assessment results.

Performance Level	MCAP Policy Performance Level Descriptors
4	Distinguished Learners demonstrate advanced proficiency. The students are well prepared for the next grade level or course and are well prepared for college and career readiness.
3	Proficient Learners demonstrate proficiency. The students are prepared for the next grade level or course and are on track for college and career readiness.
2	Developing Learners demonstrate partial proficiency. The students need additional academic support to ensure success in the next grade level or course and to be on track for college and career readiness.
1	Beginning Learners do not yet demonstrate proficiency. The students need substantial academic support to be prepared for the next grade level or course and to be on track for college and career readiness.

MCAP Mathematics Content Performance Level Descriptors

The results from each MCAP Mathematics assessment are reported using four performance levels. Mathematics Content PLDs for Grade 3 provide broad descriptions of what a student performing at each level means in terms of the mathematics content for the grade.

Grade 3

Performance Level	MCAP Mathematics Content Performance Level Descriptors for Grade 3
4	Distinguished Learners demonstrate advanced proficiency in solving complex problems involving mathematical operations, fractions, and measurements, and demonstrates an ability to connect multiple grade-level concepts to conceptualize and apply mathematics to model, reason through, and solve problems efficiently, and relate mathematics to the real world.
3	Proficient Learners demonstrate proficiency in solving problems involving mathematical operations, fractions, and measurements, and demonstrates an ability to conceptualize and apply mathematics to model, reason through, and solve problems efficiently, and relate mathematics to the real world.
2	Developing Learners demonstrate partial proficiency in solving problems involving mathematical operations, fractions, and measurements, and may need some support in conceptualizing and applying mathematics to model, reason through, and solve problems efficiently, and in relating mathematics to the real world.
1	Beginning Learners do not yet demonstrate proficiency in solving problems involving mathematical operations, fractions, and measurements where the required mathematics is either directly indicated or uses common grade level procedures, and typically needs support in conceptualizing and applying mathematics to model, reason through, and solve problems efficiently, and in relating mathematics to the real world.

MCAP Mathematics Range Performance Level Descriptors

Range PLDs are grade/course specific descriptors of the cognitive and content level rigor expected at each performance level. The individual grade-level/course PLD documents provide robust descriptions associated with specific content. To show proficiency of the Maryland College and Career Readiness Standards, students must demonstrate their knowledge and skills as described by the Level 3 and Level 4 PLDs.

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 .
- 3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ 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 $56 \div 8$.
- 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.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 $8 \times ? = 48$, $5 = \blacksquare \div 3$, $6 \times 6 = ?$

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 $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2)$ which leads to $40 + 16 = 56$. (Distributive property)

Evidence Statement Codes	Level 4 - Distinguished <i>A student performing at this level should be able to:</i>	Level 3 - Proficient <i>A student performing at this level should be able to:</i>	Level 2 - Developing <i>A student performing at this level should be able to:</i>	Level 1 - Beginning <i>A student performing at this level should be able to:</i>
3.OA.A.1 3.OA.A.2 3.OA.A.4	apply an understanding of the meaning of multiplication and division and the properties of operations to solve problems that require connecting multiple grade-level concepts.	interpret the unknown in single digit multiplication and division problems within the range of 10 x 10.	interpret the unknown in single digit multiplication or division problems within 10 x 10 using a visual model.	determine products and quotients within the range of 10 x 10.
3.OA.A.3	apply an understanding of the meaning of multiplication and division and the properties of operations to solve problems that require connecting multiple grade-level concepts.	solve a variety of one or two-step problems involving multiplication and division within 100.	solve one-step word problems within 50 using visual models.	solve one-step, thin context problems within 25 using visual models.

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3.OA.B.5	apply an understanding of the meaning of multiplication and division and the properties of operations to solve problems that require connecting multiple grade-level concepts.	use the properties of operations (commutative, associative, and distributive) to solve multiplication and division problems.	use the commutative property and associative property to multiply and divide.	use the commutative property to multiply when given visual models.

3.OA.C Multiply and divide within 100.

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

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

3.OA.D.9 Identify arithmetic patterns (including patterns in the addition table or multiplication 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.*

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3.OA.C.7	accurately multiply or divide within 100 to solve problems that require connecting multiple grade-level concepts.	accurately multiply or divide within 100 to solve for an unknown product, quotient, or factor(s); select or identify a strategy that could be used to find the product, quotient, or unknown factors.	accurately multiply and divide with factors within the range of 5×5 ; select or identify a strategy that could be used to find the product, quotient, or unknown factors.	accurately multiply and divide within the range of 5×5 using visual models.
3.OA.D.9	identify and explain arithmetic patterns that require connecting multiple grade-level concepts.	identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations.	use a visual tool (multiplication or addition table), with one row or column shaded and identify the pattern in the shaded row or column.	find the missing term using an addition or multiplication table.

3.NBT Number and Operations in Base Ten

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

- 3.NBT.A.1 Use place value understanding to round whole numbers to the nearest 10 or 100.
- 3.NBT.A.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
- 3.NBT.A.3 Multiply one-digit whole numbers by multiples of 10 in the range of 10-90 (e.g., 9×80 , 5×60) using strategies based on place value and properties of operations.

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3.NBT.A.1	apply an understanding of place value, addition and subtraction within 1000, and multiplication of one-digit whole numbers by multiples of 10 to solve problems that require connecting multiple grade-level concepts.	round two- and three-digit whole numbers to the nearest 10 or 100; use a number line to round numbers to the nearest 10 or 100.	round two-digit whole numbers to the nearest 10 and three-digit numbers to the nearest 100.	round two-digit whole numbers to the nearest 10 using visual models.
3.NBT.A.2	apply an understanding of place value, addition and subtraction within 1000, and multiplication of one-digit whole numbers by multiples of 10 to solve problems that require connecting multiple grade-level concepts.	accurately add and subtract within 1000.	accurately add and subtract within 1000 using visual models such as a number line.	accurately add and subtract within 500 using visual models such as base ten blocks, place value chart, two hundreds chart, etc.
3.NBT.A.3	apply an understanding of place value, addition and subtraction within 1000, and multiplication of one-digit whole numbers by multiples of 10 to solve problems that require connecting multiple grade-level concepts.	multiply one-digit whole numbers by multiples of 10 (10-90); select or identify a strategy that could be used to find the product.	multiply one-digit whole numbers by multiples of 10 (10-50); or select or identify a strategy that could be used to find the product.	multiply one-digit whole numbers within 5 by multiples of 10 (10-50) using visual models.

3.NF Number and Operations – Fractions

3.NF.A Develop an 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 $\frac{1}{b}$.
- 3.NF.A.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.
- 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.
 - Represent a fraction $\frac{a}{b}$ on a number line diagram by marking off a lengths of $\frac{1}{b}$ 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.

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3.NF.A.1	apply fraction concepts to solve problems that require connecting multiple grade-level concepts. Understand fair shares as well as all types of fractions (fractions less than or greater than one).	identify unit fractions and fractions that are made up of multiples of unit fractions; demonstrate an understanding of the meaning of the numerator and denominator.	identify unit fractions and fractions that are made up of multiples of unit fractions using visual models; identify the numerator and denominator in a given fraction.	identify wholes that are partitioned into fractional parts using a visual model; or identify the number of total parts and the unit fraction that each part represents.
3.NF.A.2a 3.NF.A.2b	apply fraction concepts to solve problems that require connecting multiple grade-level concepts. Understand fair shares as well as all types of fractions (fractions less than or greater than one).	identify or represent a fraction $\frac{1}{b}$ and $\frac{a}{b}$ on a number line, between 0 and 5.	identify or represent a fraction $\frac{1}{b}$ and $\frac{a}{b}$ on a number line between 0 and 1.	identify a unit fraction on a number line between 0 and 1.

3.NF Number and Operations – Fractions

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

- 3.NF.A.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
- Represent two fractions as equivalent (equal) if they are the same size, or the same point on the number line.
 - 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.
 - 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 $6 = \frac{6}{1}$; locate $\frac{4}{4}$ and 1 at the same point of a number line diagram.*
 - 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.

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3.NF.A.3a 3.NF.A.3c	apply the meaning of equivalent fractions to solve problems that require connecting multiple grade-level concepts.	recognize and generate two fractions as equivalent if they are the same size or the same point on the number line; express whole numbers as fractions.	recognize and generate two fractions as equivalent with denominators of 2, 3, 4, 6, 8 if they are the same size or the same point on the number line between 0 and 3; express whole numbers as fractions.	recognize two fractions as equivalent with denominators of 2, 4 and 8 if they are the same size or the same point on the number line between 0 and 2; or express whole numbers as fractions.
3.NF.A.3b 3.NF.A.3d	apply the meaning of equivalent fractions and compare fractions with the same numerator or denominator to solve problems that require connecting multiple grade-level concepts.	recognize, generate, and compare simple equivalent fractions, including fractions greater than one, reasoning about their size using comparison symbols.	recognize and generate simple equivalent fractions with denominators of 2, 3, 4, 6, 8 using a visual model; compare two fractions using comparison symbols.	recognize or generate simple equivalent fractions with denominators of 2, 4 and 8 using a visual model; compare fractions with the same numerators or same denominators.

3.MD Measurement and Data

3.MD.A Solve problems involving measurement and estimation of intervals of time, liquid volume, 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.
- 3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), 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.

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3.MD.A.1	apply the skills and concepts of telling time and measuring time intervals to solve problems that require connecting multiple grade-level concepts.	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.	tell and write time to the nearest minute; solve one-step addition and subtraction problems involving time intervals to the nearest minute using a given number line.	tell and write time to the nearest minute around the half hour; measure time intervals within the hour using a labeled number line with thin context problems.
3.MD.A.2	apply the skills and concepts of measuring and estimating liquid volume and masses of objects to solve problems that require connecting multiple grade-level concepts.	read measurement scales for liquid volume and masses of objects using standard units, solve one-step word problems involving the four operations and masses and volumes given in the same units to represent the problem.	read measurements of mass and liquid volume and solve one-step addition and subtraction word problems involving mass and liquid volume.	read measurements of mass and liquid measurement using visual models.

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” and “how may less” problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*
- 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.

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3.MD.B.3	apply an understanding of how to complete a scaled picture graph and scaled bar graph when given a data set; solve one and two-step “how many more” or “how many less” problems using the information from the graph that require connecting multiple grade-level concepts.	complete a scaled picture graph and a scaled bar graph that represents a data set; solve one- and two-step “how many more/less” problems using the data in a given scaled bar graph.	complete a scaled picture graph and a scaled bar graph to represent a data set; solve one- step “how many more/less” problems using the data in a given scaled bar graph.	complete a scaled picture graph or a scaled bar graph to represent a data set.
3.MD.B.4	apply an understanding of how to generate measurement data using rulers to complete a line plot or to complete a line plot with a given data set; solve word problems based on the data found in the line plot that require connecting multiple grade-level concepts.	generate measurement data using rulers to complete a line plot with a horizontal scale marked off in whole numbers, halves, and quarters.	generate measurement data to the nearest fourth, using rulers to complete a line plot with a horizontal scale marked off in fourths.	generate measurement data to the nearest half or complete a line plot using given data and a horizontal scale marked off in halves.

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

- 3.MD.C.6 Measure areas by counting unit squares (square cm, square m, square in., square ft., and improvised units).
- 3.MD.C.7 Relate area to the operations of multiplication and addition.
 - b. 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.
 - d. Recognize area as additive. Find areas 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.

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

- 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.

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3.MD.C.6 3.MD.C.7b	apply an understanding of area and perimeter to determine the area of rectangles or the perimeter of polygons to solve problems that require connecting multiple grade-level concepts.	use the formula for finding the area of rectangles with whole side lengths within or without context.	find the area of a rectangle by counting unit squares using a visual model limited to 10 x 10 on the multiplication table.	find the area of a rectangle by counting unit squares using a visual model limited to 5 x 5 on the multiplication table.
3.MD.C.7d	apply an understanding of area to determine the area of rectilinear figures to solve problems that require connecting multiple grade-level concepts.	find the areas of rectilinear figures by decomposing them into non-overlapping rectangles, apply this technique to solve real-world problems.	find the area of rectilinear figures with specific non-overlapping areas and simple context (provides all dimensions for the rectilinear figure without having to determine a missing dimension).	find the area of rectilinear figures by counting unit squares using a visual model with sums within 100.
3.MD.D.8	apply an understanding of area and perimeter to determine the area of rectangles or rectilinear figures or the perimeter of polygons to solve problems that require connecting multiple grade-level concepts.	solve real-world and mathematical problems involving perimeters of polygons including finding the perimeter given the side lengths, finding the unknown side length and rectangles with the same perimeter and different areas or the same area and different perimeters.	solve real-world and mathematical problems involving perimeters with polygons using given side lengths and unknown side lengths.	find the perimeter of a rectangle with given side lengths on a visual model (The dimensions are no greater than the sums within 100).

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.
- 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.*

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3.G.A.1	apply an understanding of shapes and their attributes in order to place them in different categories to solve word problems that require connecting multiple grade-level concepts.	identify a large category of shapes that are quadrilaterals and identify shapes that belong or do not belong in this category based on their attributes.	describe and/or compare the attributes of two-dimensional shapes.	sort shapes by their attributes.
3.G.A.2	apply an understanding of partitioning shapes into equal parts and describe the area of each part as a unit fraction to solve problems that require connecting multiple grade-level concepts.	partition shapes into parts with equal areas or identify the number of parts within the equal areas. Express the area of each part as a unit fraction.	recognize the parts have equal areas, given a partitioned shape; identify the number of equal parts and identify the unit fraction that each part represents.	identify the shapes that represent a whole that is correctly or incorrectly divided into fractional parts.

Reasoning Performance Level Descriptors

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:

- one-point machine scored items. For one-point reasoning items, refer to the associated content PLDs.
- three-point constructed response items. For three-point reasoning items, refer to both the reasoning PLDs below and the associated content PLDs.

Reasoning Evidence Statements

- 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 make a generalization.
- 3.R.2 Identify flawed thinking/reasoning and explain how to correct the thinking or work.
- 3.R.3 Prove or disprove a statement, conjecture, or generalization, using correct and precise mathematical examples.
- 3.R.4 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.

Level 4 - Distinguished <i>A student performing at this level should be able to provide evidence of mathematical reasoning by communicating:</i>	Level 3 - Proficient <i>A student performing at this level should be able to provide evidence of mathematical reasoning by communicating:</i>	Level 2 - Developing <i>A student performing at this level should be able to provide evidence of mathematical reasoning by communicating:</i>	Level 1 - Beginning <i>A student performing at this level should be able to provide evidence of mathematical reasoning by communicating:</i>
a sophisticated chain of reasoning.	a well-developed chain of reasoning.	a partially developed, valid chain of reasoning.	the beginning of a chain of reasoning.
a precise, logical solution pathway.	a logical solution pathway that may contain minor flaws.	a solution pathway that contains some correct processes yielding an incorrect solution.	an attempted solution pathway.
an extensive command of mathematical representations and vocabulary.	a proficient command of mathematical representations and vocabulary.	an understanding of some mathematical representations and vocabulary.	a developing understanding of some mathematical representations and vocabulary.

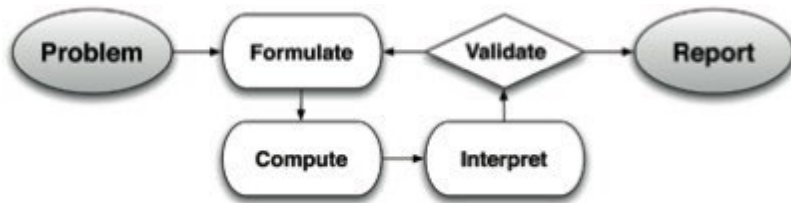
Modeling Performance Level Descriptors

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 use one or more steps of the modeling cycle by responding to:

- one-point machine scored items. For one-point modeling items, refer to the associated content PLDs.
- three-point constructed response items. For three-point modeling items, refer to both the modeling PLDs below and the associated content PLDs.

Modeling Cycle



Modeling Evidence Statements

- 3.M.1-1 Determine the problem that needs to be solved in a real-world situation.
- 3.M.1-2 Determine the information that is needed to solve a problem in a given real-world situation.
- 3.M.1-3 Identify the mathematics that is needed to create a solution path for a real-world situation.
- 3.M.1-4 Create a solution path that represents the mathematics needed to solve a real-world situation.
- 3.M.1-5 Evaluate a partial or complete solution path to a real-world situation.

Level 4 - Distinguished <i>A student performing at this level should be able to provide evidence of the ability to use the modeling cycle by:</i>	Level 3 - Proficient <i>A student performing at this level should be able to provide evidence of the ability to use the modeling cycle by:</i>	Level 2 - Developing <i>A student performing at this level should be able to provide evidence of the ability to use the modeling cycle by:</i>	Level 1 - Beginning <i>A student performing at this level should be able to provide evidence of the ability to use the modeling cycle by:</i>
determining the information or mathematics needed to solve a problem that requires connecting multiple grade-level concepts.	determining needed information or mathematics.	Identifying needed information or mathematics.	Identifying some needed information or mathematics.
communicating an accurate, organized solution path aligned to the problem using appropriate, effective, and precise representations.	communicating an accurate, organized solution path aligned to the problem using appropriate, effective, and precise representations that may contain minor flaws.	communicating a partial solution path that may contain mathematical errors.	communicating the beginning of a solution path, containing mathematical errors.
evaluating or validating a solution path or showing how to improve a model or correct a given solution.	evaluating or validating a solution path or showing how to improve a model, but work may include minor flaws.	partially validating a solution path or incorrectly improving the model.	attempting to validate a solution path.