NSCAS NEBRASKA STUDENT-CENTERED ASSESSMENT SYSTEM

Summative Assessment
Mathematics Grade 5 Range Achievement Level Descriptors

What are Range Achievement Level Descriptors?

Range Achievement Level Descriptors (ALDs) demonstrate how skills described in the Nebraska College and Career Ready (CCR) Standards likely change and become more sophisticated as ability and performance increases. The ALDs also describe the evidence needed to help infer where a student is along the range. This range is defined by Nebraska using three levels:

- Developing – not yet demonstrating proficiency
- On Track – demonstrating proficiency
- College and Career Benchmark – demonstrating advanced proficiency

The ALDs help show the within-standard reasoning complexity that increases in sophistication as the achievement levels increase. Such skill advancement is often related to increases in content difficulty, increases in reasoning complexity, and a reduction in the supports required for students to demonstrate what they know within a task or item.

The Range ALDs provide a way to communicate a progression that is visible and usable to all stakeholders, while also providing a foundation for a robust bank of assessment items that meets the needs of all Nebraska students.

How were Nebraska's Mathematics ALDs created?

The ALDs were developed in an iterative manner, centered around multiple teacher reviews and evidence of student learning from the NSCAS assessment.

After the 2017 Content/Bias Review of new development to the NE CCR Mathematics Standards, a draft of the ALDs was created based on the feedback from Nebraska educators on the items and standards. NDE reviewed the draft and provided initial feedback which was then incorporated. A committee of Nebraska educators reviewed the ALDs with NDE's feedback implemented. The educator feedback was used to update the ALDs.

The updated ALDs were taken to the 2018 Item Writing Workshop where they were used to help facilitate item writing. Feedback was again gathered from Nebraska educators based on their use of the ALDs for writing items. The ALDs were also used at the 2018 Content/Bias review to help review the items. Additional educator feedback was documented at each grade.

Feedback from both item writing and committee reviews was then used to update the ALDs prior to taking the ALDs to the 2018 Standard Setting meeting and presenting them to the committee, which was comprised of Nebraska educators.

The ALDs were then updated based on the final cut scores from the assessment and a comparison of a representative sample of items in the NSCAS item bank to the ALDs. The updated ALDs were shared with NDE to obtain their final recommendations.

Notes about interpreting the final ALDs can be found at the bottom of each page.

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MA 5.1 NUMBER: Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.			
MA.5.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among whole numbers, fractions, and decimals within the base-ten number system.			
MA 5.1.1.a Determine multiple equivalent representations for whole numbers and decimals through the thousandths place using standard form, word form, and expanded notation.	Determines another form/representation (standard, word, expanded, visual) of a whole number greater than 1,000,000 given in standard form, word form, expanded form/notation, or in a visual representation. Determines another form/representation (standard, word, visual) of a number containing decimals to the thousandths (0.001 to 999,999.999) given in standard form or in a visual representation. Determines the standard form of a number containing decimals to the thousandths (0.001 to 999,999.999) given in word form. Determines another form/representation (standard, word, visual) of a number containing decimals to the thousandths (0.001 to 999,999.999) given in expanded form/notation. (Refer to *MA 4.1.1.a* for whole numbers within the range of 100,000 - 1,000,000 and decimals within the range of 0.01 - 99,999.99.)	Determines the expanded form/notation or a visual representation of a number containing decimals to the thousandths (0.001 to 999,999.999) given in word form.	Analyzes representations of whole numbers greater than 1,000,000 and numbers containing decimals to the thousandths (0.001 to 999,999.999). Ex: Explain why 30 + 2 + 0.04 + 0.007 is not the expanded form of 30.247.

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MA 5.1.1.b Compare whole numbers, fractions, mixed numbers, and decimals through the thousandths place and represent comparisons using symbols <,>, or =.	Uses symbols to represent comparisons of two whole numbers when at least one value is greater than 1,000,000. Uses symbols to represent comparisons of two numbers when both values are fractions. Orders three or more whole numbers with at least one value being greater than 1,000,000 (may or may not use symbols). (Refer to *MA 4.1.1.f* for whole numbers within the range of 100,000 - 1,000,000 and decimals within the range of 0.01 - 99,999.99.)	Uses symbols to represent comparisons of two decimals between 0.001 and 999,999.999 when both values are thousandths (e.g., compare 1.015 and 100.017). Uses symbols to represent comparisons of two numbers when one value is a mixed number or a decimal to the thousandths (0.001 to 999,999.9999) and the other value is a fraction, whole number, or a decimal to the tenths or hundredths (e.g., compare 0.2 and 5/6). Uses symbols to represent comparisons of two numbers when both values are a mixed number or one value is a mixed number and the other value is a decimal to the thousandths (0.001 to 999,999.999). Orders three numbers (whole number, mixed number, fraction, decimal) where at least one value is a mixed number or decimal to the thousandths.	Orders more than three numbers up to 1,000,000 with at least two values being a mixed number or decimal to the thousandths (0.001 to 999,999.999). Analyzes comparisons between two numbers (whole number, mixed number, fraction, decimal) where at least one value is a mixed number or is a decimal to the tenths or hundredths. Ex: Which two numbers could replace the question mark to make the comparison true? Justify your answer. 0.65 > ?/4
MA 5.1.1.c Round whole numbers and decimals to any given place.	Rounds any whole number greater than 1,000,000 to any given place value. (Refer to *MA 4.1.1.g* for whole numbers within the range of 1,000 - 1,000,000.)	Rounds a value with a decimal up to the thousandths place to the ones, tenths or hundredths place.	Rounds a value with any decimal beyond the thousandths place to the tenths, hundredths, or thousandths place. Analyzes the rounding of a whole number greater than 1,000,000 to any place value or a decimal rounded to the tenths, hundredths, or thousandths (e.g., explain why 52.7 is equal to 52.698 rounded to the nearest hundredth).

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MA 5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g., halves, thirds, fourths, fifths, and tenths).	Determines equivalent decimal forms for fractions and mixed numbers with denominator 2, 4, or 5. May include visual representations. Determines equivalent, simplified fractions and mixed numbers with denominator 2, 4, or 5 from decimal form. May include visual representations. Determines percents for fractions with denominators of 10 or 100. May include visual representations. Determines equivalent fractions with denominators of 10 or 100 from a percent. May include visual representations. (Refer to MA 4.1.1.h for decimal forms for fractions and mixed numbers with a denominator of 10 or 100.)	Determines equivalent decimal forms for fractions and mixed numbers with denominator 3. May include visual representations. Determines equivalent fractions and mixed numbers with denominator 3 from a decimal form. May include visual representations. Determines percents for fractions with denominators 2, 3, 4, and 5 or decimals. May include visual representations. Determines equivalent fractions with denominators 2, 3, 4, and 5 or decimals from a percent. May include visual representations. Determines complete set of equivalent representations for fractions, decimals, and percents (all three must be included) for fractions with denominators 2, 3, 4, and 5. May include visual representations.	Determines fractions, decimals, and percents for whole numbers or fractions with denominators of 6 and 8. May include visual representations. Explains or justifies conversions between fractions, decimals, and percents for fractions or mixed numbers with denominators 2, 3, 4, or 5.
MA 5.1.1.e Write powers of 10 with exponents.	Determines equivalent expressions using exponents for 10, 100, and 1,000.	Determines equivalent expressions for powers of 10 where the exponent is a whole number greater than 3.	Uses powers of 10 to indicate place value in the expanded form of a number (e.g., 600 = 6 x 10^2).
MA 5.1.2 Operations: Students will demonstrate the meaning of operations and compute accurately with whole numbers, fractions, and decimals.			
MA 5.1.2.a Multiply multi-digit whole numbers using the standard algorithm.	Multiplies a whole number with 5 or more digits by a one-digit whole number. Multiplies a three-digit whole number times a two-digit whole number. (Refer to *MA 4.1.2.b* for multiplying a two-, three-, or four-digit whole number by a one-digit whole number.) (Refer to *MA 4.1.2.c* for multiplying a two-digit whole number by a two-digit whole number.)	Multiplies any whole number with 4 or more digits by a two-digit whole number. Multiplies any whole number with 3 or more digits by a three-digit whole number.	Analyzes multiplication of multi-digit whole numbers using the standard algorithm. Ex: When shown the steps for calculating the product using the standard algorithm, determine the step where an error occurred in multiplying two whole numbers and calculate the correct product.

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MA 5.1.2.b Divide four-digit whole numbers by a two-digit divisor, with and without remainders using the standard algorithm.	Divides a two-, three-, or four-digit whole number by a two-digit divisor with or without a remainder. (Refer to *MA 4.1.2.d* for dividing a two-, three-, or four-digit whole number by a one-digit whole number.)	Explains the meaning of a remainder in division and how it relates to multiplication (not within a context).	Analyzes division of two, three, or four-digit whole numbers by a two-digit whole number (e.g., explain why the quotient of 450 divided by 15 is greater than the quotient of 450 divided by 30).
MA 5.1.2.c Multiply a whole number by a fraction or a fraction by a fraction using models and visual representations.	Multiplies a non-unit fraction by a whole number with or without a visual model. Products may be represented as a mixed number or improper fraction (simplified if directed). Multiplies a unit fraction by a unit fraction with the use of an appropriate visual model. (Refer to *MA 4.1.2.g* for multiplying a whole number by a unit fraction.)	Multiplies a unit fraction by a non-unit fraction with the use of an appropriate visual model. Multiplies two non-unit fraction given a visual model.	Creates a visual model to represent multiplication of two fractions with a visual model. Analyzes multiplication of two fractions based on visual representations (e.g., given the visual representation, explain how to use the representation to determine the product).
MA 5.1.2.d Divide a unit fraction by a whole number and a whole number by a unit fraction.	Represents division of two whole numbers as multiplication by a unit fraction (e.g., 6 ÷ 2 = 6 x 1/2). May include the use of visual representations.	Divides a unit fraction by a whole number and vice versa. May include the use of visual representations.	Represents division of a unit fraction by a whole number or a whole number by a unit fraction with a visual model. Analyzes division of a unit fraction by a whole number or a whole number by a unit fraction. May include the use of visual representations. (e.g., Explain why the quotient of 4 divided by 1/5 is greater than the quotient of 4 divided by 1/3.)
MA 5.1.2.e Explain division of a whole number by a fraction using models and visual representations.	Assessed at the local level		
MA 5.1.2.f Interpret a fraction as division of the numerator by the denominator.	Assessed at the local level		

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MA 5.1.2.g Add, subtract, multiply, and divide decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations (i.e. Commutative, Associative, Distributive, Identity, Zero), and/or relationships between operations.	Adds or subtracts decimals to the tenths or hundredths when provided a visual model. Multiplies or divides a decimal by a whole number based on place value (e.g., only needs to determine the correct decimal placement for the product or quotient). Multiplies or divides decimals to the tenths or hundredths when provided a visual model and the numerical expression.	Adds or subtracts decimals to the tenths or hundredths using strategies based on place value, properties of operations, or relationships between operations (e.g., Which expression is equivalent to (0.16 + 0.25) + 0.05?). Multiplies or divides decimals to the tenths or hundredths when provided only a visual model. Multiplies or divides two decimals to the tenths or hundredths using strategies based on place value, properties of operations, or relationships between operations.	Divides a decimal by a whole number using strategies based on place value, properties of operations, or relationships between operations when the strategies go beyond determining the correct decimal placement. Adds, subtracts, multiplies, and divides decimals to the tenths or hundredths where two operations are required using strategies based on place value, properties of operations, or relationships between operations. Knowledge of order of operations among addition, subtraction, multiplication, and division is not required. Analyzes addition, subtraction, multiplication, or division of decimals to the tenths or hundredths using models or strategies based on place value, properties of operations, or relationships between operations (e.g., explain how a given model relates to dividing decimals and how to use the model to determine the quotient).
MA 5.1.2.h Add and subtract fractions and mixed numbers with unlike denominators.	Adds fractions with unlike denominators without regrouping. Adds mixed numbers with unlike denominators without regrouping. (Refer to *MA 4.1.2.f* for adding and subtracting fractions with like denominators.)	Adds fractions with unlike denominators with regrouping. Adds two mixed numbers with unlike denominators with regrouping. Subtracts fractions with unlike denominators with or without regrouping Subtracts two mixed numbers with unlike denominators with or without regrouping Adds and subtracts a mixed number and a fraction with unlike denominators with or without regrouping.	Adds and subtracts a combination of fractions and mixed numbers, containing three or more terms with at least two having unlike denominators. Analyzes addition and subtraction of fractions and mixed numbers with unlike denominators (e.g., explain how to subtract 1 2/3 from 5 1/12).
MA 5.1.2.i Determine the reasonableness of computations involving whole numbers, fractions, and decimals.	Assessed at the local level		

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MA 5.1.2.j Multiply and divide by powers of 10.	Multiplies or divides a whole number by a given positive power of 10. The power of 10 may be written in standard form or exponential form. The division should result in a whole number.	Multiplies a decimal to the tenths or hundredths by a power of 10. The power of 10 may be written in standard form or exponential form. Divides a given whole number by a given positive power of 10 resulting in a decimal to the tenths or hundredths. The power of 10 may be written in standard form or exponential form.	Determines the unknown factor or divisor as a power of 10 for a pair of numbers. The power of 10 may be written in standard form or exponential form (e.g., determine that 10^2 or 100 goes in the blank for 340 x ___ = 34,000).
MA 5.2 ALGEBRA: Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.			
MA 5.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations.			
MA 5.2.1.a Form ordered pairs from a rule such as y=2x, and graph the ordered pairs on a coordinate plane.	Determines an output value when given a rule and an input value.	Determines which ordered pair(s) is/are formed by a given rule, where the rule is in algebraic form such as $y = x + 5$ or described in words. The ordered pair(s) may be in (x, y) format, in a table, or point(s) graphed in the first quadrant of the coordinate plane. Determines an input value when given a rule and an output value.	Determines a combination of input and output values that correspond to given output and input values for a specific rule (e.g. when given an input/output table with a combination of missing input and output values, determine the missing values based on the rule). Determines the rule, where the rule is in algebraic form (e.g., $y = x + 5$) or described in words, when given ordered pairs as coordinates, tables, or graphed in the first quadrant of the coordinate plane.
MA 5.2.2 Algebraic Processes: Students will apply the operational properties when evaluating expressions and solving equations.			

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MA 5.2.2.a Interpret and evaluate numerical or algebraic expressions using order of operations (excluding exponents).	Evaluates two-step numerical expressions involving the order of operations (excluding exponents). Evaluates three-step numerical expressions involving the order of operations (excluding exponents) when addition is to the left of subtraction and multiplication is to the left of division (e.g., 15 + 2x3 - 4). Determines the first step in evaluating a numerical expression involving the order of operations (excluding exponents). Determines the basic operation or placement of grouping symbols needed to make a numerical expression involving the order of operations (excluding exponents) equal a given value. Substitutes a given value for a variable in an algebraic expression with one or two steps and then evaluates the expression using the order of operations (excluding exponents).	Evaluates three-step numerical expressions involving the order of operations (excluding exponents) when subtraction is to the left of addition and division is to the left of multiplication (e.g., 15 - 2x3 + 4). Evaluates numerical expressions with four or more steps involving the order of operations (excluding exponents). Substitutes a given value for a variable in an algebraic expression with three or more steps and then evaluates the expression using the order of operations (excluding exponents). Interprets visual images to determine and evaluate numerical expressions using order of operations. Determines two equivalent numerical expressions when one of the expressions has four or more steps involving the order of operations (excluding exponents) and the change between the expressions is either in parenthesis, addition, or multiplication. Ex: Which expressions is equivalent to 2 x (5-1) + 3 x 1? choices include: 10 - 1 + 3x1; 2 x 4 + 3 x 1; 2 - 1 + 3 x 1; etc.	Determines two equivalent numerical expressions when one of the expressions has four or more steps involving the order of operations (excluding exponents) and the change between the expressions is not in parenthesis, addition, or multiplication. Ex: Which expressions is equivalent to 52 - 20/4 + 2 x 3? choices include: 32/4 + 3 x 1; 52 - 5 + 3 x 1; 52 - 20/10; etc. Explains or justifies the evaluation of numerical or algebraic expressions using order of operations (excluding exponents).
MA 5.2.3 Applications: Students will solve real-world problems involving equations with fractions and mixed numbers.			

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MA 5.2.3.a Solve real-world problems involving addition and subtraction of fractions and mixed numbers with like and unlike denominators.	Solves real-world problems involving the addition and/or subtraction of fractions and/or mixed numbers with like denominators.	Solves real-world problems involving the addition of fractions and/or mixed numbers with unlike denominators with and without regrouping the sum into mixed numbers required. Solves real-world problems involving subtraction of fractions and/or mixed numbers with unlike denominators without regrouping required (e.g., 6 4/5 - 4 1/2). Solves real-world problems involving both addition and subtraction of fractions and/or mixed numbers with unlike denominators and no regrouping required for the subtraction (e.g., 1 7/10 + 4 1/2 - 2 1/5). Solves real-world problems involving subtracting a fraction and/or mixed number from a whole number (e.g., 5 - 3 4/7).	Solves real-world problems involving both addition and subtraction of fractions and/or mixed numbers with unlike denominators and regrouping required for the subtraction (e.g., 2 1/4 + 3 1/8 - 1 1/2). Solves real world problems involving subtraction of mixed numbers with unlike denominators or the subtraction of fractions and mixed numbers with unlike denominators with regrouping required (e.g., 5 1/4 - 2 7/8). Identifies details of a real-world problem, including identifying details of the problem situation that are not relevant to the solution. Analyzes solutions to real-world addition and/or subtraction problems with fractions and mixed numbers with unlike denominators (e.g., explains or justifies why a solution is or is not correct).
MA 5.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.			
MA 5.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.			
MA 5.3.1.a Identify three-dimensional figures including cubes, cones, pyramids, prisms, spheres, and cylinders.	Classifies cubes, cones, pyramids, prisms, spheres, and cylinders from images.	Classifies cubes, cones, pyramids, prisms, spheres, and cylinders from descriptions. Distinguishes between or classifies types of pyramids. Distinguishes between or classifies types of prisms.	Analyzes the classification of different three-dimensional shapes based on their properties (e.g., explains why a classification is or is not correct based on the properties of the shape).
MA 5.3.1.b Identify faces, edges, and vertices of rectangular prisms.	Identifies the faces, edges, and/or vertices of rectangular prisms from images. Determines the number of faces and/or vertices of rectangular prisms from images.	Determines the properties of the faces, edges, and/or vertices of rectangular prisms (e.g., determines that the faces of a cube are squares). Determines the number of edges of a rectangular prism from an image.	Explains how general features of rectangular prisms (e.g. the number of faces or number of edges) are related to the properties of the faces, edges, and vertices.

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MA 5.3.1.c Justify the classification of two-dimensional figures based on their properties.	Determines two-dimensional shapes that belong to classification categories when given properties of the categories. Determines classification categories for two-dimensional shapes when given properties of the shapes. Classifies triangles and quadrilaterals into a specific category using multiple properties (e.g., isosceles right triangle).	Classifies polygons with five or more sides into a specific category using multiple properties (e.g., regular pentagon). Explains or justifies the classification of a quadrilateral, set of quadrilaterals, or regular polygons based upon the properties of the shape(s) and categories.	Explains or justifies the classification of a shape or set of shapes, beyond quadrilaterals and regular polygons, based upon the properties of the shape(s) and categories.
MA 5.3.2 Coordinate Geometry: Students will determine location, orientation, and relationships on the coordinate plane.			
MA 5.3.2.a Identify the origin, x axis, and y axis of the coordinate plane.	Assessed at the local level		
MA 5.3.2.b Graph and name points in the first quadrant of the coordinate plane using ordered pairs of whole numbers.	Determines the graph of or graph the point (0, 0) on the coordinate plane. Determines the graph of or graph a point within the first quadrant given ordered pairs.	Determines the ordered pair describing a point within the first quadrant.	Determines the graph of or graph a point along the *x* -axis or *y* -axis on the coordinate plane, given an ordered pair (0, n) or (n, 0), where n is a whole number.
MA 5.3.3 Measurement: Students will perform and compare measurements and apply formulas.			
MA 5.3.3.a Recognize that solid figures have volume that is measured in cubic units.	Assessed at the local level		
MA 5.3.3.b Use concrete models to measure the volume of rectangular prisms in cubic units by counting cubic units.	Determines the volume of rectangular prisms with cubic units shown by counting the cubic units (may include context).	Determines the image(s) of rectangular prims with cubic units shown that result in a given volume (may include context). Compares the volumes of rectangular prims with cubic units shown (may include context).	Explains or justifies that the volume of a rectangular prism can also be obtained by multiplying the whole-number dimensions of the rectangular prism (may include context).

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MA 5.3.3.c Generate conversions within the customary and metric systems of measurement.	Determines equivalent measurements that are one step or one degree of change from a smaller to larger unit using customary or metric units of measurement (e.g., inches to feet)-may include context. Determines equivalent measurements that are two steps or two degrees of change from each other using customary or metric units of measurement (e.g., inches to yards, millimeters to decimeters)-may include context. (Refer to *MA 4.3.3.c* for one- and two-step conversions from a lager unit to a smaller unit.)	Determines equivalent measurements that are three steps or three degrees of change from each other using customary or metric units of measurement (e.g., cups to gallons, millimeters to meters)-may include context. Compares customary or metric units of measurement within the same system using one or two step conversions from a smaller unit to a larger unit. Compares customary or metric units of measurement within the same system using three step conversions - may include context.	Determines equivalent measurements that are four steps or four degrees of change from each other using customary or metric units of measurement (e.g., millimeters to dekameters) - may include context. Explains how to determine equivalent measurements within the same system using customary or metric units that include three steps or three degrees of change.
MA 5.4 DATA: Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.			
MA 5.4.1 Representations: Students will create displays that represent data.			
No additional indicator(s) at this level. Mastery is expected at previous grade levels.			
MA 5.4.2 Analysis & Applications: Students will analyze data to address the situation.			
MA 5.4.2.a Use observations, surveys, and experiments to collect, represent, and interpret the data using tables (e.g., frequency charts) and bar graphs.	Determines the bar graph with a scale other than 1, 2, 5, or 10 that represents given data from observations, surveys, or experiments and vice versa. Includes answering questions about quantity differences in the graph or accuracy of the graph. Determines the double or triple bar graph that represents given data from observations, surveys, or experiments and vice versa. Includes answering questions about quantity differences in the graph, simple comparisons from the graph (e.g., more students choose dogs than cats), or accuracy of the graph. Determines the difference or sum of data that includes only whole numbers presented in a table. (Refer to *MA 3.4.1.a* for bar graphs with scales of 2, 5, or 10.)	Draws conclusions about trends in data from observations, surveys, or experiments that are related to data given in a data list, a bar graph of the data, or a double or triple bar graph of the data. Determine the frequency chart that represents given data from observations, surveys, or experiments and vice versa. Includes answering questions about quantity differences in the frequency chart or accuracy of the chart. Compares the change of data from observations, surveys, or experiments presented in a table, bar graph, or double or triple bar graph (e.g., Between which two hours did the greatest change in temperature occur?)	Explains or justifies conclusions about trends in data from observations, surveys, or experiments. Explains or justifies representation of data or interpretations of data from observations, surveys, or experiments. Includes data represented in frequency charts, tables, bar graphs, or double or triple bar graphs, and data represented in multiple ways.

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MA 5.4.2.b Formulate questions that can be addressed with data and make predictions about the data.	Categorizes questions as those that can be addressed with data and those that cannot be addressed with data.	Determines questions that can be answered with data given a context. Determines predictions based on given data or a representation of the data.	Explains or justifies given reasoning for a prediction based on data provided. Explains and justifies a conclusion based on data provided.
MA 5.4.3 Probability: Students will interpret and apply concepts of probability.			
No additional indicator(s) at this level.			

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