NSCAS NEBRASKA STUDENT-CENTERED ASSESSMENT SYSTEM

Summative Assessment
Mathematics Grade 7 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.

Indicator	Developing learners do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level, as specified in the assessed Nebraska College and Career Ready Standards. A developing learner…	On Track learners demonstrate proficiency in the knowledge and skills necessary at this grade level, as specified in the assessed Nebraska College and Career Ready Standards. An on-track learner…	CCR Benchmark learners demonstrate advanced proficiency in the knowledge and skills necessary at this grade level, as specified in the assessed Nebraska College and Career Ready Standards. A college-and-career-ready learner…
MA 7.1 NUMBER: Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.			
MA.7.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among rational numbers within the base-ten number system.			
No additional indicator(s) at this level. Mastery is expected at previous grade levels.			
MA 7.1.2 Operations: Students will compute with rational numbers accurately.			
MA 7.1.2.a Solve problems using proportions and ratios (e.g., cross products, percents, tables, equations, and graphs).	Determines an appropriate proportion to represent a relationship not in context presented in a table, equation, list, or graph. Ratios are limited to benchmark fractions or percents that do not contain a decimal (e.g., 25%). Solves problems when given a proportion or ratio where the solution is a whole number (e.g., 3/4 = x/20 or 2.5/5 = x/ 10). Solves problems without context using percents. (excludes percent change)	Determines an appropriate proportion to represent a relationship not in context presented in a table, equation, list, or graph. At least one ratio should be a non-benchmark fraction or should involve a percent that also contains a decimal (e.g., 40.5%). Solves problems when given a proportion or ratio where the solution is a rational number, excluding whole numbers. (e.g., 3/4 = x/10). Solves problems with two or more steps without context that can be solved using proportions or ratios with rational numbers.	Analyzes solutions to problems using ratios and proportions (e.g., explains why a value is or is not a solution to a proportion).
MA 7.1.2.b Add, subtract, multiply, and divide rational numbers (e.g., positive and negative fractions, decimals, and integers).	Adds, subtracts, multiplies, and divides positive rational numbers, with an emphasis on working with fractions or mixed numbers together with decimals. Multiplies a positive rational number and a negative rational number. (Refer to *MA 7.1.2.d* for operations with integers.) (Refer to MA 6.1.2.d for operations with only decimals.) (Refer to *MA 6.1.2.a* for multiplying and dividing with only fractions or mixed numbers and refer to *MA 5.1.2.h* for adding and subtracting with only fractions or mixed numbers.)	Adds and subtracts rational numbers where at least one value is negative (this could be the answer). Divides a positive rational number and a negative rational number. Evaluates a numerical expression involving two or more of the four operations with rational numbers.	Explains or justifies a solution to a multi-step numerical expression using knowledge of the four operations with rational numbers. Ex: Which operation(s) could be used in the expression such that the result is a negative number? Justify your answer. 4-7___7*-0.5
MA 7.1.2.c Apply properties of operations as strategies for problem solving with rational numbers.	Assessed at the local level		

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MA 7.1.2.d Use multiple strategies to add, subtract, multiply, and divide integers.	Adds positive and negative integers. May include additive inverses. Multiplies a positive integer by a negative integer. Determines the sign of an answer when using the four operations with integers.	Multiplies integers where there are at least two or more negative integers. Divides positive and negative integers. Subtracts a negative integer from a positive or negative integer. Subtracts a positive integer from a negative integer.	Analyzes operations on integers based on an understanding of strategies for working with integers. Ex: What are two ways to subtract -5 from 5?
MA 7.1.2.e Estimate and check reasonableness of answers using appropriate strategies and tools.	Determines whether proposed estimates or proposed processes for estimating addition, subtraction, multiplication, and division of positive rational numbers in Grade 7 are reasonable using appropriate strategies and tools (may include context). Provides the best estimate using appropriate strategies and tools for a given problem involving the four operations on positive rational numbers from Grade 7 (may include context). Ex: Which value is the best estimate for…?	Determines whether proposed estimates or proposed process for estimating addition, subtraction, multiplication, and division of rational numbers in Grade 7 are reasonable using appropriate strategies and tools (may include context). Must include a negative value. Determines whether proposed estimates or proposed process for estimating solutions to problems involving ratios/proportions or one step equations in Grade 7 are reasonable using appropriate strategies and tools (may include context). Provides the best estimate using appropriate strategies and tools for a given problem involving the four operations on rational numbers from Grade 7 (may include context). Must include a negative value. Ex: Which value is the best estimate for…?	Explains whether proposed estimates for addition, subtraction, multiplication, and division of rational numbers, problems involving ratios/proportions, solutions to one-step equations in Grade 7 are reasonable using appropriate strategies and tools (may include context). Ex: Why is… the best estimate for…?
MA 7.2 ALGEBRA: Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.			
MA 7.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions, equations, and inequalities.			
MA 7.2.1.a Describe and create an inequality from words and pictures (e.g., one-step, one-variable).	Determines the graph of an inequality on a number line when the inequality is already simplified.	Represents a comparison statement with a one variable inequality (may include context) (e.g., represent "the door must be no more than 7.5 fee tall" as $d \leq 7.5$). Determines one-variable one-step inequalities from word phrases (basic context) or pictures (e.g., create a picture of a balance scale to represent $x + 3 > 4$).	Determines, describes, or creates one-variable one-step inequalities from word phrases and vice versa with more complex context. Explains or justifies the creation of a one-variable one-step inequality from a picture and vice versa. Explains or justifies the creation of a one-variable one-step inequality from a word phrase and vice versa.

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MA 7.2.1.b Represent real-world situations with proportions.	Determines or creates proportions to represent real-world situations, which involve benchmark fractions. Information may be presented in a graph.	Determines the meaning of unknown variables in proportions based on the context of real-world situations. Information may be presented in a graph. Determines or creates proportions to represent real-world situations, which involve fractions other than benchmark fractions. Information may be presented in a graph.	Extrapolates or makes predictions about a proportional real-world situation based on an understanding of the proportion. Information may be presented in a graph. Analyzes representations of real-world problems with proportions (e.g., explains why a proportion does or does not represent a given real-world problem). Information may be presented in a graph.
MA 7.2.2 Algebraic Processes: Students will apply the operational properties when evaluating expressions, and solving equations and inequalities.			
MA 7.2.2.a Solve equations using the distributive property and combining like terms.	Solves multi-step equations, with non-negative rational numbers, that involve combining like terms without the use of the distributive property when like terms are already on the same side of the equal sign.	Solves multi-step equations, with non-negative rational numbers, that involve combining like terms without the use of the distributive property when like terms are on different sides of the equal sign. Solves equations, with non-negative rational numbers, that involve the distributive property. Solves equations, with non-negative rational numbers, that involve the distributive property and combining like terms. Determines one or more steps necessary to solve multi-step equations with the distributive property and/or combining like terms.	Analyzes solutions to multi-step equations, with non-negative rational numbers, using the distributive property and/or combining like terms (e.g., explains why using the distributive property and combining like terms does or does not result in a given simplified expression).
MA 7.2.2.b Use factoring and properties of operations to create equivalent algebraic expressions (e.g., 2x + 6 = 2(x + 3)).	Determines equivalent algebraic expressions using the properties of operations with all positive terms (e.g., 2x + 6 +5x = 6 + 2x + 5x). Determines monomial numeric terms that can be factored from expressions. Determines monomial, single variables with a coefficient of one and exponent of 1 that can be factored from expressions.	Determines monomial algebraic terms that can be factored from expressions with exponent of 1 but coefficient other than 1 (e.g., determine that 3x can be factored from all terms in an expression). Determines or creates equivalent algebraic expressions using properties of operations with at least one negative term. Determines or creates equivalent algebraic expressions using factoring. Determines or creates equivalent algebraic expressions using factoring and properties of operations. Algebraic terms being factored are limited to monomials with exponent of 1.	Determines monomial algebraic terms that can be factored from expressions with exponents other than 1 (e.g., determine that 3xy^2 can be factored from all terms in an expression). Determines or creates equivalent algebraic expressions using factoring and properties of operations. Algebraic terms being factored should have exponents other than 1. Analyzes the use of the distributive property and/or properties of operations in creating equivalent algebraic expressions (e.g., explains why two algebraic expressions are or are not equivalent based on factoring and properties of operations).

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MA 7.2.2.c Given the value of the variable(s), evaluate algebraic expressions (including absolute value).	Evaluates multi-variable algebraic expressions without exponents or absolute values when given the value of the variable. The values of the variables should be limited to positive rational numbers.	Evaluates single variable algebraic expressions, which may include exponents and/or absolute value, with at least one negative rational number when given the value of the variable. Evaluates multi-variable algebraic expressions without exponents or absolute values when given the value of the variable. The values of the variables should include at least one negative rational number.	Evaluates multi-variable algebraic expressions, which must include exponents and/or absolute value, when given the values of the variables. The values of the variables can be any rational number. Analyzes the evaluation of single variable or multi-variable algebraic expressions, which may include exponents and/or absolute value when given value(s) of the variable(s) (e.g., explains why given values for the variables do or do not result in a specific evaluation for the algebraic expression).
MA 7.2.2.d Solve two-step equations involving rational numbers which include the integers.	Solves two-step equations with whole number coefficients for the variable (e.g., 5x-7 = 23).	Solves two-step equations with positive rational number coefficients for the variable (e.g., 2/3x - 7 = 2 1/3). Determines or shows steps for solving two-step equations involving rational numbers which include the integers.	Solves two-step equations with negative rational number coefficients for the variable (e.g., 7 - 2x = 1 or 7 - 1/2x = 1). Explains or justifies solutions to two-step equations involving rational numbers which include the integers.
MA 7.2.2.e Solve one-step inequalities involving integers and rational numbers and represent solutions on a number line.	Solves one-step inequalities involving whole numbers (e.g., Which inequality is equivalent to 5x>20?).	Solves one-step inequalities involving addition or subtraction of rational numbers (e.g., Which inequality is equivalent to x + 5 > -20?). Represents solutions on a number line for one-step inequalities involving addition or subtraction of rational numbers. Solves one-step inequalities involving multiplication or division of positive rationale numbers (e.g., Which inequality is equivalent to 3/4x >20?).	Solves one-step inequalities involving multiplication or division of rational numbers. At least one value is a negative rationale number. (e.g., Which inequality is equivalent to -4x >20?). Represents solutions on a number line for one-step inequalities involving multiplication or division of rational numbers. Compares the solutions of one-step inequalities involving rational numbers. Explains or justifies solutions to one-step inequalities involving rational numbers. Explains or justifies representations of solutions on a number line for one-step inequalities involving rational numbers.

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MA 7.2.3 Applications: Students will solve real-world problems involving expressions, equations, and inequalities.			
MA 7.2.3.a Describe and write linear equations from words and tables.	Determines linear equations with a slope of 1 from tables when the independent values in the tables have an increment of 1 and include x=0 (may include basic context).	Determines linear equations from descriptions. Determines linear equations from tables when the slope has a value other than 1 and/or the independent values in the tables have increments other than 1 (may include basic context).	Determines linear equations when both a table and description must be used to determine the equation. (may include basic or complex context) Explains or justifies the creation of linear equations from descriptions and/or tables.
MA 7.2.3.b Write a two-step equation to represent real-world problems involving rational numbers in any form.	Determines what the unknown variable represents in a two-step equation that represents a real-world problem involving rational numbers in any form.	Determines two-step equations to represent real-world problems involving rational numbers in any form using addition, subtraction, multiplication, and/or division.	Justifies why a given two-step equation does or does not represent a given real-world problem. Justifies whether or not a given equation matches a given real-world problem.
MA 7.2.3.c Solve real-world problems with equations that involve rational numbers in any form.	Solves real-world problems involving rational numbers in any form when given equations.	Solves real-world problems that can be solved with equations requiring two steps involving rational numbers in any form.	Explains or justifies solutions to real-world problems involving rational numbers in any form.
MA 7.2.3.d Solve real-world problems with inequalities.	Refer to MA 7.2.1.a for precursor skills involving writing inequalities from word problems.	Solves real-world problems with one-step inequalities that do not involve multiplying or dividing by negative numbers. Ex: A company has $50.00 to spend on paper and pens. A box of paper costs $31.88. How much money is left to spend on pens?	Solves real-world problems with one-step inequalities that involve multiplying or dividing by negative numbers. Solves real-world problems with two-variable inequalities when the value for one variable is given. Explains or justifies solutions to real-world problems with one-step inequalities.
MA 7.2.3.e Use proportional relationships to solve real-world problems, including percent problems, (e.g., % increase, % decrease, mark-up, tip, simple interest).	Uses proportional relationships to solve real-world problems involving two or more steps, excluding percent change. Use proportional relationships to solve real-world problems for percent change when given the initial and final values. Ex: A puppy's weight went from 8 pounds to 12 pounds. What was the percent change of the puppy's weight?	Uses proportional relationships to solve real-world problems involving two or more steps, including simple interest problems or problems involving application of percent change when given an initial value and a percentage.	Use proportional relationships to solve real-world problems involving application of percent change when given the percent change and a final value. Explains or justifies solutions to real-world problems involving proportional relationships.

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MA 7.2.3.f Solve real-world problems involving scale drawings using a proportional relationship.	Solves real-world problems by determining the scale factor when given corresponding lengths for scale drawings.	Solves real-world problems involving perimeter of a scale drawing. Solves real-world problems by determining the scale factor when given corresponding dimensions, other than lengths, for scale drawings. Solves real-world problems for the missing measures of a scale drawing using a given scale factor or other dimensions from the drawing.	Solves real-world problems involving area and scale drawings. Identifies needed information and solves real-world problems involving scale drawings using a proportional relationship. Determines, justifies, and/or compares solution methods for solving real-world problems involving scale drawings.
MA 7.3 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 7.3.1 Characteristics: Students will identify and describe geometric characteristics of two-dimensional shapes.			
MA 7.3.1.a Apply and use properties of adjacent, complementary, supplementary, and vertical angles to find missing angle measures.	Identifies adjacent, complementary, supplementary, and vertical angles based on a diagram without angle measures given. Determines the missing angle measure when given a diagram involving vertical, adjacent, complementary, and/or supplementary angles with an unknown angle and at least one known angle measurement in degrees.	Determines the unknown angle measurement when given one angle measurement in degrees and told the unknown angle is adjacent, complementary, supplementary, or vertical, without a diagram. Determines the value of the variable or the angle measurement of one or more angles when given angle measurements written as algebraic expressions or in terms of other angles (e.g., the measure of angle W is twice the measure of angle Z) when given a diagram involving vertical, adjacent, complementary, and/or supplementary angles. Determines if two angles could be complementary, supplementary, and/or vertical angles when given two angle measurements.	Determines the value of the variable or the angle measurement of one or more angles when given angle measurements written as algebraic expressions or in terms of other angles (e.g., the measure of angle W is twice the measure of angle Z) and told another angle is adjacent, complementary, supplementary, or vertical, without a diagram.
MA 7.3.1.b Draw triangles (freehand, using a ruler and a protractor, and using technology) with given conditions of three measures of angles or sides, and notice when the conditions determine a unique triangle, more than one triangle, or no triangle.	Assessed at the local level		
MA 7.3.2 Coordinate Geometry: Students will determine location, orientation, and relationships on the coordinate plane.			
No additional indicator(s) at this level. Mastery is expected at previous grade levels.			
MA 7.3.3 Measurement: Students will perform and compare measurements and apply formulas.			

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MA 7.3.3.a Solve real-world problems involving perimeter and area of composite shapes made from triangles, quadrilaterals and polygons.	Solves real-world problems by determining perimeter and area of composite shapes made from triangles and rectangles when necessary dimensions are given. Identifies process for calculating perimeter or area of composite shapes made from triangles, quadrilaterals, and polygons in a real-world situation without having to carry out the process.	Solves real-world problems by determining perimeter and area of composite shapes made from triangles and rectangles when one or more necessary dimensions is not directly given. Solves real-world problems by determining perimeter and area of composite shapes made from triangles, quadrilaterals and polygons when necessary dimensions are given and at least one of the shapes is not a triangle or a rectangle.	Solves real-world problems by determining perimeter and area of composite shapes made from triangles, quadrilaterals and polygons, including solving for a missing dimension, when one or more necessary dimensions is not directly given and at least one of the shapes is not a triangle or a rectangle. May include justifying or analyzing the approach to the problem. Solves real-world problems that require determining the perimeter or area of composite shapes made from triangles, quadrilaterals and polygons, but which require further application after determining perimeter or area (e.g., use the perimeter to then calculate the cost of placing ribbon around a figure). The further application should be beyond calculating area/perimeter. May include justifying or analyzing the approach to the problem.
MA 7.3.3.b Solve real-world problems involving surface area and volume of composite shapes made from rectangular and triangular prisms.	Solves real-world problems by determining the volume of composite shapes made from rectangular prisms when the division of rectangular prisms is explicitly given.	Solves real-world problems by determining the volume of composite shapes made from rectangular prisms when the division of rectangular prisms is not explicitly given. Solves real-world problems by determining the surface area of composite shapes made from rectangular and/or triangular prisms. Solves real-world problems by determining the volume of composite shapes made from at least one triangular prism and another prism (either triangular or rectangular).	Solves real-world problems that require determining the surface area or volume of shapes composed of rectangular and triangular prisms, but which require further application after determining surface area or volume (e.g., use the surface area to then calculate the cost of creating a figure). The further application should be beyond calculating surface area and volume. May include justifying or analyzing the approach to the problem. Solves real-world problems by determining a missing dimension when given the volume of composite shapes made from rectangular and/or triangular prisms. May include justifying or analyzing the approach to the problem.

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MA 7.3.3.c Determine the area and circumference of circles both on and off the coordinate plane.	Determine the radius of a circle when given the diameter or the diameter when given the radius.	Determines the area of a circle when given the radius or diameter. Determines the circumference of a circle when given the radius or diameter. Determines the diameter or radius when given the circumference of a circle. Solves real-world problems involving the area and circumference of circles where the words "area" or "circumference" are referenced OR a diagram is provided. Does not include determining area given the circumference. Does not include determining radius, diameter, or circumference given the area. Determines the area or circumference of a circle drawn on a coordinate plane, with the implied radius or diameter as a whole number that aligns with a horizontal or vertical grid line or halfway between grid lines.	Identifies and justifies why an area or circumference does or does not match given information. Determines the area of a circle when given the circumference. Includes real-world problems. Determines the radius, diameter, or circumference when given the area of a circle. Area must be given in terms of pi and radius must be a whole number from 1 to 9. Includes real-world problems. Solves real-world problems involving the area and circumference of circles where students must correlate area or circumference to the real-world situation without having those terms referenced in the item and without a diagram (e.g., distance around instead of circumference).
MA 7.4 DATA: Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.			
MA 7.4.1 Representations: Students will create displays that represent data.			
MA 7.4.1.a Represent data using circle graphs.	Assessed at the local level		
MA 7.4.2 Analysis & Applications: Students will analyze data to address the situation.			
MA 7.4.2.a Solve problems using information presented in circle graphs.	Determines the percentages for categories in circle graphs based on given percentages for other categories. Compares quantities represented in circle graphs based on their relative size in the circle graph. Size may or may not be directly given (e.g., which category is the least popular as another category).	Solves problems related to information in circle graphs that require calculation of specific quantities based on the size of the categories in the circle graph. Size of the category may or may not be directly given. Includes carrying out steps after calculating percentages (e.g., how many more people liked one category compared to another category).	Analyzes circle graphs and conclusions based on information presented in circle graphs. Ex: Explain what changes should be made to the circle graph so that it accurately represents the data. Ex: Keisha states that based on the circle graph, about half of third-grade students have a pet. Is Keisha correct? Justify your answer.
MA 7.4.2.b Explain the difference between a population and a sample.	Assessed at the local level		
MA 7.4.2.c Generate conclusions about a population based upon a random sample.	Assessed at the local level		
MA 7.4.2.d Determine and critique biases in different data representations.	Assessed at the local level		

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MA 7.4.3 Probability: Students will interpret and apply concepts of probability.			
MA 7.4.3.a Generate a list of possible outcomes for a simple event.	Assessed at the local level		
MA 7.4.3.b Describe the theoretical probability of an event using a fraction, percentage, and decimal.	Determines and describes the theoretical probability of one event using a fraction, percentage, or decimal when given the description of the event and necessary information.	Describes an event when given the probability as a fraction, percentage, or decimal and any necessary information (e.g., Based on the diagram, which event has a probability of 1/5.).	Analyzes the theoretical probability of an event represented by a fraction, percentage, or decimal. Ex: Explains how to change the calculations to better represent the event or situation.
MA 7.4.3.c Find theoretical probabilities for independent events.	Determines whether two events are independent, based on descriptions of the events, or provides a description of two independent events.	Determines the probability for two or more independent events given theoretical probabilities for each independent event. The probability may be written as a fraction, decimal, or percent. Determines the probability for two or more independent events given information about the outcomes. The probability may be written as a fraction, decimal, or percent. Ex: A bag contains 3 red marbles and 2 blue marbles. What is the probability of randomly drawing a red marble, putting it back in the bag, and randomly drawing another red marble?	Analyzes the calculation of the theoretical probability for independent events. Focus is on the theoretical probability concepts and not on calculation errors with fractions, decimals, or percents. Ex: Explain why drawing two things from a bag with replacement will use the same denominator for each component (e.g., 3/5 x 1/5) while flipping a coin then rolling a number cube will use different denominators for each component (e.g., 1/2 x 1/6).
MA 7.4.3.d Perform simple experiments and express the degree of likelihood (possible, impossible, certain, more likely, equally likely, or less likely); write as fractions and percentages.	Assessed at the local level		
MA 7.4.3.e Find experimental probability for independent events.	Determines the experimental probability of one simple event with only information required for that outcome given. The probability may be written as a fraction, decimal, or percent.	Determines the probability of a specific outcome given experimental probabilities for different independent events. The probability may be written as a fraction, decimal, or percent. Determines the experimental probability of an independent event given information about different outcomes. The probability may be written as a fraction, decimal, or percent.	Analyzes the calculation of experimental probability for independent events. Focus is on experimental probability concepts and not on calculation errors with fractions, decimals, or percent. Ex: Explain why drawing two things from a bag without replacement will use different denominators and possibly different numerators for each component (e.g., 3/5 x 1/4).

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MA 7.4.3.f Compare and contrast theoretical and experimental probabilities.	Differentiates between experimental or theoretical probabilities. Ex: Given how the probability was calculated, determine whether it is experimental or theoretical, or given the probabilities and different pieces of information, determine which is theoretical and which is experimental. Compares/contrasts experimental and theoretical probabilities when the theoretical probability is provided in addition to the number of outcomes of the experiment.	Compares/contrasts experimental and theoretical probabilities for given independent events when given the number of outcomes for the desired event and the total number of outcomes for each type of probability (no calculations). Compares/contrasts experimental and theoretical probabilities for given independent events that require some calculations. Primary focus should be on compare/contrast.	Extends the use of experimental or theoretical probabilities to making decisions about the outcomes or experiments. Ex: Based on the outcomes to this point, explain whether the theoretical or experimental probability should be used to plan for or predict the total number of each outcome. Ex: Determine which spinner is most likely to produce the given experimental outcomes.
MA 7.4.3.g Find the probability of dependent compound events.	Determines whether two events are dependent, based on descriptions of the events, or provides a description of two dependent events.	Determines the probability of dependent events when asked for the probability for one set of outcomes. The probability may be written as a fraction, decimal, or percent. Ex: There are 5 green marbles, 4 red marbles, and 1 blue marble in a bag. What is the probability of drawing a green marble then a red marble without replacement?	Determines the probability of dependent events when asked for the probability of two or more sets of outcomes. The probability may be written as a fraction, decimal, or percent. Ex: There are 5 green marbles, 4 red marbles, and 1 blue marble in a bag. A marble is drawn from the bag. Then, without replacing the first marble, a second marble is drawn from the bag. Which three events result in a probability of 20/90? Explains or justifies the calculation of the probability of dependent compound events.
MA 7.4.3.h Identify complementary events and calculate their probabilities.	Determines whether a pair of outcomes are complementary when the outcomes are stated as p and not p (e.g., the probability of drawing a red card and the probability of not drawing a red card). Determines the probability of a complimentary event when the outcomes are stated as p and not p. The probability may be written as a fraction, decimal, or percent.	Determines whether two sets of outcomes are complementary when each set includes two or more components (e.g., the probability of rolling 2 or 3 on a cube and the probability of rolling 1, 4, 5, or 6 on a cube). Determines the probability of a complimentary event when each set of outcomes include two or more components. The probability may be written as a fraction, decimal, or percent.	Explains or justifies statements about complementary events or their probabilities.

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