ILLINOIS STATE BOARD OF EDUCATION

MATHEMATICS GRADE 7

Theory of Action: Academic standards represent a collective commitment around what students should learn each year. The state assessment asks students to demonstrate their knowledge, skills, and understanding related to these standards using a common measure. The resulting data allows us to see patterns in performance that should guide school and district improvement, helping identify areas of strength and opportunity.

Role of Performance Level Descriptors in Defining Proficiency: Performance level descriptors bridge the state assessment to classroom instruction and the systems of formative assessments that guide local instruction and choices about individual students. *Academic proficiency represents a <u>range</u> of observable student performance characteristics*. There are multiple pathways to proficiency, and students rely upon their strengths differently within that range of performance.

Proficiency and Difficulty: A student's ability to demonstrate proficiency is influenced by the complexity of the texts or stimuli presented, tasks they're asked to complete, and the contexts in which they are engaged. As student performance improves, students are typically able to handle more challenging texts/stimuli, tasks, and contexts, and are able to demonstrate their skills and knowledge more accurately and consistently.

Ratios and Proportional Relationships *Student performance indicates the ability to…*

Claim 1	Below Proficient	Approaching Proficient	Proficient	Above Proficient
7.RP.1	Identify that a unit rate $\frac{a}{b}$ is a ratio $a:b$.	Compute unit rates for simple units of fractions in like units.	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.	Compute unit rates involving complex fractions in various contexts, including lengths, areas, and other quantities with like or different units. Demonstrate advanced problem-solving by explaining reasoning clearly and applying methods to novel or multi-step problems.
7.RP.2a	Recognize simple patterns in tables or graphs.	Calculate multiple ratios in a table or graph.	Decide whether two quantities are in a proportional relationship (e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin).	Solve complex problems and interpret results using understanding of proportional relationships vs. non-proportional relationships.
7.RP.2b	Recognize patterns in tables, graphs, and diagrams.	Recognize and describe patterns in tables, graphs, equations, diagrams, and verbal descriptions.	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions. Explain reasoning clearly and apply knowledge to solve complex problems.
7.RP.2c	Recognize proportional relationships.	Represent proportional relationships using a ratio.	Represent proportional relationships by equations.	Represent proportional relationships by equations and use those equations to make predictions.

Claim 1	Below Proficient	Approaching Proficient	Proficient	Above Proficient
7.RP.2d	Identify points on a coordinate plane.	Identify points on a coordinate plane using labels related to the situation.	Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	Use a point (x, y) on the graph of a proportional relationship to construct chains of reasoning that will justify or refute propositions or conjunctures
7.RP.3	Recognize proportional relationships and solve basic ratio problems.	Solve ratio problems and begin to apply proportional reasoning to multi-step tasks.	Analyze proportional relationships and use them to solve real-world and mathematical problems. Use proportional relationships to solve multi-step ratio and percentage problems (e.g., simple interest, tax, markups and markdowns, gratuities and commissions, fees, percentage increase and decrease, percent error).	Solve complex, multi-step ratio problems using proportional relationships in a variety of contexts.

The Number System *Student performance indicates the ability to…*

Claim 2	Below Proficient	Approaching Proficient	Proficient	Above Proficient
7.NS.1a	Use positive and negative numbers to represent quantities in real-world contexts.	Describe multiple real-world contexts in which opposite quantities combine to make 0 using integers.	Describe multiple real-world contexts in which opposite quantities combine to make 0, including fractions and decimals.	Explain a real-world context in which three quantities would combine to make 0.
7.NS.1b	Represent addition and subtraction of positive numbers on a horizontal or vertical number line. Represent a real-world context involving addition of positive numbers using an expression or equation and vice versa.	Represent on a horizontal or vertical number line that a number and its opposite have a sum of 0 using integers. Represent a real-world context involving addition of positive and negative numbers using an expression or equation and vice versa using integers.	Represent on a horizontal or vertical number line that a number and its opposite have a sum of 0, including fractions and decimals. Represent a real-world context involving addition of positive and negative numbers using an expression or equation and vice versa, including fractions and decimals.	Represent on a horizontal or vertical number line that a sum of two numbers and the opposite of that sum have a sum of 0. Represent a real-world context involving addition of three positive and negative numbers using an expression or equation and vice versa.

Claim 2	Below Proficient	Approaching Proficient	Proficient	Above Proficient
7.NS.1c	Represent on a horizontal or vertical number line that the distance between two positive numbers is the same as the absolute value of their difference.	Represent on a horizontal or vertical number line that the distance between two rational numbers is the same as the absolute value of their difference using integers.	Represent on a horizontal or vertical number line that the distance between two rational numbers is the same as the absolute value of their difference, including fractions and decimals.	Represent on a horizontal or vertical number line that the distance between three rational numbers is the same as the absolute value of their difference.
	Represent a real-world context involving subtraction of positive numbers using an expression or equation and vice versa.	Represent a real-world context involving subtraction of positive and negative numbers using an expression or equation and vice versa using integers.	Represent a real-world context involving subtraction of positive and negative numbers using an expression or equation and vice versa, including fractions and decimals.	Represent a real-world context involving subtraction of three positive and negative numbers using an expression or equation and vice versa.
7.NS.1d	Apply properties of operations as strategies to add and subtract positive rational numbers.	Apply properties of operations as strategies to add and subtract rational numbers using integers.	Apply properties of operations as strategies to add and subtract rational numbers including fractions and decimals.	Apply properties of operations as strategies to add or subtract three or more rational numbers, including fractions and decimals.
7.NS.2a1 7.NS.2b1	Use models to represent multiplication and/or division of positive numbers.	Use models to represent multiplication and/or division of positive and negative numbers using integers.	Use models to represent multiplication and/or division of positive and negative numbers, including fractions and decimals.	Use models to represent multiplication and/or division of three or more positive and negative numbers.
7.NS.2a2 7.NS.2b2	Represent a real-world context involving multiplication and/or division of positive numbers using an expression or equation and vice versa.	Represent a real-world context involving multiplication and/or division of positive and negative numbers using an expression or equation and vice versa using integers.	Represent a real-world context involving multiplication and/or division of positive and negative numbers using an expression or equation and vice versa, including fractions and decimals.	Represent a real-world context involving multiplication and/or division of three or more positive and negative numbers using an expression or equation and vice versa.
7.NS.2c	Apply properties of operations as strategies to multiply and/or divide positive rational numbers.	Apply properties of operations as strategies to multiply and/or divide rational numbers using integers.	Apply properties of operations as strategies to multiply and/or divide rational numbers, including fractions and decimals.	Apply properties of operations as strategies to multiply and/or divide three or more rational numbers, including fractions and decimals.
7.NS.2d	Convert fractions with powers of 10 to a decimal (e.g., 1/10 = 0.1).	Convert a rational number to a terminating or repeating decimal using a calculator.	Convert a rational number to a terminating or repeating decimal using long division.	Convert a rational mixed number to a decimal terminating or repeating decimal using long division.
7.NS.3	Solve real-world and mathematical problems involving the four operations with positive rational numbers.	Solve real-world and mathematical problems involving the four operations with rational numbers using integers.	Solve real-world and mathematical problems involving the four operations with rational numbers, including fractions and decimals.	Solve multi-step real-world and mathematical problems involving the four operations with rational numbers.

Expressions and Equations

Claim 3	Below Proficient	Approaching Proficient	Proficient	Above Proficient
7.EE.1	Identify equivalent expressions given linear expressions with rational coefficients.	Apply properties of operations as strategies to add or subtract linear expressions with rational coefficients.	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	Apply properties of operations as strategies to add, subtract, factor, and expand multi-step linear expressions with rational coefficients.
7.EE.2	Identify an expression in different forms.	Rewrite an expression in different forms in a problem context.	Rewrite an expression in different forms in a problem context and identify how the quantities in it are related.	Rewrite an expression in different forms and explain the relationship between the different forms and their meanings in a problem context.
7.EE.3	Solve single-step math problems.	Solve single-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals).	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals).	Justify solutions to multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form.
	Apply properties of operations to calculate with numbers in any form and convert between forms as appropriate.	Apply properties of operations to calculate with numbers in any form and convert between forms as appropriate.	Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	Justify properties of operations to calculate with numbers in any form. Convert between forms as appropriate and assess the reasonableness of answers using mental computation and estimation strategies.
7.EE.4	Use variables to represent quantities in a real-world or mathematical problem.	Use variables to represent quantities in a real-world or mathematical problem and construct simple equations to solve problems by reasoning about the quantities.	Use variables to represent quantities in a real-world or mathematical problem and construct simple equations and inequalities to solve problems by reasoning about the quantities.	Use variables to represent quantities in a real-world or mathematical problem and construct multi-step equations and inequalities to solve problems by reasoning about the quantities.
7.EE.4a-1	Solve equations of the forms $px + q = r$ and $p(x + q) = r$, where p, q, and r are whole numbers.	Solve equations of the forms $px + q = r$ and $p(x + q) = r$, where p, q, and r are integers.	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers.	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers and prove the solution is correct.
7.EE.4a-2	Solve equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are whole numbers.	Solve equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are integers.	Solve equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers.	Solve word problems leading to equations of the form $px = q = r$ and $p(x + q) = r$, and $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers and prove the solution is correct.

Claim 3	Below Proficient	Approaching Proficient	Proficient	Above Proficient
7.EE.4a-2	Identify solutions to word problems given inequalities of the form $px + q > r$ or $px + q < r$, where p, q and r are whole numbers.	Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are integers.	Solve word problems leading to inequalities of the $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers.	Compare an algebraic solution to an arithmetic solution, explaining the sequence of the operations used in each approach.
7.EE.4b	Identify graphs of solution sets of inequalities on number lines.	Graph the solution set of the inequality.	Graph the solution set of the inequality and interpret it in the context of the problem.	Graph the solution set of a multi-step inequality and interpret it in the context of a problem.

Statistics and Probability   *Student performance indicates the ability to…*

Claim 4	Below Proficient	Approaching Proficient	Proficient	Above Proficient
7.SP.1	Identify valid inferences from a table or a graph.	Describe what a sample of a population is and draw valid inferences from a table or graph.	Examine a sample population and support valid inferences from random samples.	Examine a sample population and support valid inferences from random samples across multiple representations.
7.SP.2	Gather data from a random sample.	Generate multiple samples (or simulated samples) of the same size.	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.	Use the variation in estimates or predictions to draw conclusions regarding the data.
7.SP.3	Use a set of data collected to answer a statistical question that has a distribution that can be described by its center, spread, and overall shape.	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers.	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. Apply this to real-world context in describing the difference.
7.SP.4	Identify the measure of center and measure of variability for data.	Use measures of center and measures of variability for numerical data from random samples to describe two populations.	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations and evaluate the accuracy of the inference.

Claim 4	Below Proficient	Approaching Proficient	Proficient	Above Proficient
7.SP.5	Plot basic fractions and decimals on a number line.	Order basic fractions and decimals from least to greatest.	Calculate the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.	Use the probability of a chance event to make predictions.
7.SP.6	Calculate probabilities using a probability model.	Develop a basic probability model to calculate probabilities of events and compare them to observed frequencies.	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency and predict the approximate relative frequency given the probability.	Apply the concept to real-world data.
7.SP.7a	Find probabilities using a probability model.	Use a probability model to find probabilities of events. Note that probabilities from a model and observed events are not always the same.	Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events.	Decide if a specified model is consistent with results from a given data-generating process (e.g., using simulation).
7.SP.7b	Generate data from a chance process.	Use a probability model to find probabilities of events. Note that probabilities from a model and observed events are not always the same.	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.	Decide if a specified model is consistent with results from a given data-generating process (e.g., using simulation).
7.SP.8a	Recognize when an event is a compound event.	Compute the probability of a compound event using lists or diagrams.	Compute the probability of a compound event using lists or diagrams to support a written explanation.	Accurately determining probabilities of compound events using multiple methods.
7.SP.8b	Identify an organized list, table, or tree diagram.	List sample spaces for compound events given an organized list, table, or a tree diagram.	Represent sample spaces for compound events using methods, such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space, which compose the event.	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes.
7.SP.8c	Gather data from a simulation.	Given results of a simulation, calculate frequencies of compound events.	Design and use a simulation to generate frequencies for compound events.	Use the frequencies for compound events generated by a simulation to draw conclusions regarding the data.

Geometry	Student performance indicates the ability to…			
Claim 5	**Below Proficient**	**Approaching Proficient**	**Proficient**	**Above Proficient**
7.G.1	Solve problems involving scale drawings of geometric figures by identifying a scale.	Solve problems involving scale drawings of geometric figures, with a given scale.	Solve problems involving scale drawings of geometric figures, including computing actual lengths and area from a scale drawing, and reproducing a scale drawing at a different scale.	Solve problems involving scale drawings of geometric figures, including computing actual lengths and area from a scale drawing, and reproducing a scale drawing at a different scale.
7.G.2	Classify geometric shapes with given conditions using a variety of methods. Construct triangles from three measures of angles or sides, noticing that when the conditions determine a unique triangle there is more than one triangle.	Identify geometric shapes with given conditions using a variety of methods by constructing triangles from three measures of angles or sides, noticing that when the conditions determine a unique triangle there is more than one triangle or no triangle.	Draw geometric shapes with given conditions using a variety of methods by constructing triangles from three measures of angles or sides, noticing that when the conditions determine a unique triangle there is more than one triangle or no triangle.	Draw complex geometric shapes with given conditions using a variety of methods by constructing triangles from three measures of angles or sides, noticing that when the conditions determine a unique triangle there is more than one triangle or no triangle.
7.G.3	Identify cross sections that result from slicing 3D figures, as in plane sections of right rectangular prisms.	Identify cross sections that result from slicing 3D figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	Describe cross sections that result from slicing irregular three-dimensional figures (right rectangular prisms and right rectangular pyramid) on a specific plane not parallel or perpendicular to the base.
7.G.4-a	Given the formulas for the area and circumference of a circle, determine the area or circumference of a circle. Distinguish the difference between area and circumference of a circle.	Apply the formulas for the area OR circumference of a circle. Give an informal derivation of the relationship between the circumference OR area of a circle and partial circles.	Use the formulas for the area and circumference of a circle to solve problems. Give an informal derivation of the relationship between the circumference and area of a circle.	Apply the formulas for the area and circumference of a circle and use them to solve problems including finding area and circumference of partial circles. Give an informal derivation of the relationship between the circumference and area of a circle and partial circles.
7.G.5	Identify supplementary, complementary, vertical, and adjacent angles in a figure.	Use facts about supplementary, complementary, vertical, and/or adjacent angles to find the measure of unknown angles in a given figure.	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	Apply facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve complex equations for an unknown angle in a figure in real-world situations.

Claim 5	Below Proficient	Approaching Proficient	Proficient	Above Proficient
7.G.6	Solve mathematical problems involving areas of two-dimensional objects composed of triangles, quadrilaterals, and other polygons.	Solve mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms including composite shapes.