Grade 7

In grade 7, instructional time will emphasize five areas:

(1) recognizing that fractions, decimals and percentages are different representations of rational numbers and performing all four operations with rational numbers with procedural fluency;
(2) creating equivalent expressions and solving equations and inequalities;
(3) developing understanding of and applying proportional relationships in two variables;
(4) extending analysis of two- and three-dimensional figures to include circles and cylinders and
(5) representing and comparing categorical and numerical data and developing understanding of probability.

Number Sense and Operations

MA.7.NSO.1 Rewrite numbers in equivalent forms.

MA.7.NSO.1.1	Know and apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to whole-number exponents and rational number bases.

Benchmark Clarifications:
Clarification 1: Instruction focuses on building the Laws of Exponents from specific examples. Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.
Clarification 2: Problems in the form $\frac{a^n}{a^m} = a^p$ must result in a whole-number value for p.

MA.7.NSO.1.2	Rewrite rational numbers in different but equivalent forms including fractions, mixed numbers, repeating decimals and percentages to solve mathematical and real-world problems.

Example: Justin is solving a problem where he computes $\frac{17}{3}$ and his calculator gives him the answer 5.6666666667. Justin makes the statement that $\frac{17}{3} = 5.6666666667$; is he correct?

MA.7.NSO.2 Add, subtract, multiply and divide rational numbers.

MA.7.NSO.2.1	Solve mathematical problems using multi-step order of operations with rational numbers including grouping symbols, whole-number exponents and absolute value.

Benchmark Clarifications:
Clarification 1: Multi-step expressions are limited to 6 or fewer steps.

MA.7.NSO.2.2 Add, subtract, multiply and divide rational numbers with procedural fluency.

MA.7.NSO.2.3 Solve real-world problems involving any of the four operations with rational numbers.

Benchmark Clarifications:
Clarification 1: Instruction includes using one or more operations to solve problems.

Algebraic Reasoning

MA.7.AR.1 Rewrite algebraic expressions in equivalent forms.

MA.7.AR.1.1 Apply properties of operations to add and subtract linear expressions with rational coefficients.

Example: $(7x - 4) - \left(2 - \frac{1}{2}x\right)$ is equivalent to $\frac{15}{2}x - 6$.

Benchmark Clarifications:
Clarification 1: Instruction includes linear expressions in the form $ax \pm b$ or $b \pm ax$, where a and b are rational numbers.
Clarification 2: Refer to Properties of Operations, Equality and Inequality (Appendix D).

MA.7.AR.1.2 Determine whether two linear expressions are equivalent.

Example: Are the expressions $\frac{4}{3}(6 - x) - 3x$ and $8 - \frac{5}{3}x$ equivalent?

Benchmark Clarifications:
Clarification 1: Instruction includes using properties of operations accurately and efficiently.
Clarification 2: Instruction includes linear expressions in any form with rational coefficients.
Clarification 3: Refer to Properties of Operations, Equality and Inequality (Appendix D).

MA.7.AR.2 Write and solve equations and inequalities in one variable.

MA.7.AR.2.1 Write and solve one-step inequalities in one variable within a mathematical context and represent solutions algebraically or graphically.

Benchmark Clarifications:
Clarification 1: Instruction focuses on the properties of inequality. Refer to Properties of Operations, Equality and Inequality (Appendix D).
Clarification 2: Instruction includes inequalities in the forms $px > q$; $\frac{x}{p} > q$; $x \pm p > q$ and $p \pm x > q$, where p and q are specific rational numbers and any inequality symbol can be represented.
Clarification 3: Problems include inequalities where the variable may be on either side of the inequality symbol.

MA.7.AR.2.2 Write and solve two-step equations in one variable within a mathematical or real-world context, where all terms are rational numbers.

Benchmark Clarifications:
Clarification 1: Instruction focuses the application of the properties of equality. Refer to Properties of Operations, Equality and Inequality (Appendix D).
Clarification 2: Instruction includes equations in the forms $px \pm q = r$ and $p(x \pm q) = r$, where p, q and r are specific rational numbers.
Clarification 3: Problems include linear equations where the variable may be on either side of the equal sign.

MA.7.AR.3 Use percentages and proportional reasoning to solve problems.

MA.7.AR.3.1 Apply previous understanding of percentages and ratios to solve multi-step real-world percent problems.

Example: 23% of the junior population are taking an art class this year. What is the ratio of juniors taking an art class to juniors not taking an art class?
Example: The ratio of boys to girls in a class is $3:2$. What percentage of the students are boys in the class?

Benchmark Clarifications:
Clarification 1: Instruction includes discounts, markups, simple interest, tax, tips, fees, percent increase, percent decrease and percent error.

MA.7.AR.3.2 Apply previous understanding of ratios to solve real-world problems involving proportions.

Example: Scott is mowing lawns to earn money to buy a new gaming system and knows he needs to mow 35 lawns to earn enough money. If he can mow 4 lawns in 3 hours and 45 minutes, how long will it take him to mow 35 lawns? Assume that he can mow each lawn in the same amount of time.

Example: Ashley normally runs 10-kilometer races which is about 6.2 miles. She wants to start training for a half-marathon which is 13.1 miles. How many kilometers will she run in the half-marathon? How does that compare to her normal 10K race distance?

MA.7.AR.3.3 Solve mathematical and real-world problems involving the conversion of units across different measurement systems.

Benchmark Clarifications:
Clarification 1: Problem types are limited to length, area, weight, mass, volume and money.

MA.7.AR.4 Analyze and represent two-variable proportional relationships.

MA.7.AR.4.1 Determine whether two quantities have a proportional relationship by examining a table, graph or written description.

Benchmark Clarifications:
Clarification 1: Instruction focuses on the connection to ratios and on the constant of proportionality, which is the ratio between two quantities in a proportional relationship.

MA.7.AR.4.2 Determine the constant of proportionality within a mathematical or real-world context given a table, graph or written description of a proportional relationship.

Example: A graph has a line that goes through the origin and the point $(5, 2)$. This represents a proportional relationship and the constant of proportionality is $\frac{2}{5}$.

Example: Gina works as a babysitter and earns \$9 per hour. She can only work 6 hours this week. Gina wants to know how much money she will make. Gina can use the equation $e = 9h$, where e is the amount of money earned, h is the number of hours worked and 9 is the constant of proportionality.

MA.7.AR.4.3 Given a mathematical or real-world context, graph proportional relationships from a table, equation or a written description.

Benchmark Clarifications:
Clarification 1: Instruction includes equations of proportional relationships in the form of $y = px$, where p is the constant of proportionality.

MA.7.AR.4.4 Given any representation of a proportional relationship, translate the representation to a written description, table or equation.

Example: The written description, there are 60 minutes in 1 hour, can be represented as the equation $m = 60h$.

Example: Gina works as a babysitter and earns $9 per hour. She would like to earn $100 to buy a new tennis racket. Gina wants to know how many hours she needs to work. She can use the equation $h = \frac{1}{9}e$, where e is the amount of money earned, h is the number of hours worked and $\frac{1}{9}$ is the constant of proportionality.

Benchmark Clarifications:
Clarification 1: Given representations are limited to a written description, graph, table or equation.
Clarification 2: Instruction includes equations of proportional relationships in the form of $y = px$, where p is the constant of proportionality.

MA.7.AR.4.5 Solve real-world problems involving proportional relationships.

Example: Gordy is taking a trip from Tallahassee, FL to Portland, Maine which is about 1,407 miles. On average his SUV gets 23.1 miles per gallon on the highway and his gas tanks holds 17.5 gallons. If Gordy starts with a full tank of gas, how many times will he be required to fill the gas tank?

Geometric Reasoning

MA.7.GR.1 Solve problems involving two-dimensional figures, including circles.

MA.7.GR.1.1 Apply formulas to find the areas of trapezoids, parallelograms and rhombi.

Benchmark Clarifications:
Clarification 1: Instruction focuses on the connection from the areas of trapezoids, parallelograms and rhombi to the areas of rectangles or triangles.
Clarification 2: Within this benchmark, the expectation is not to memorize area formulas for trapezoids, parallelograms and rhombi.

MA.7.GR.1.2 Solve mathematical or real-world problems involving the area of polygons or composite figures by decomposing them into triangles or quadrilaterals.

Benchmark Clarifications:
Clarification 1: Within this benchmark, the expectation is not to find areas of figures on the coordinate plane or to find missing dimensions.

MA.7.GR.1.3 Explore the proportional relationship between circumferences and diameters of circles. Apply a formula for the circumference of a circle to solve mathematical and real-world problems.

Benchmark Clarifications:
Clarification 1: Instruction includes the exploration and analysis of circular objects to examine the proportional relationship between circumference and diameter and arrive at an approximation of pi (π) as the constant of proportionality.
Clarification 2: Solutions may be represented in terms of pi (π) or approximately.

MA.7.GR.1.4 Explore and apply a formula to find the area of a circle to solve mathematical and real-world problems.

Example: If a 12-inch pizza is cut into 6 equal slices and Mikel ate 2 slices, how many square inches of pizza did he eat?

Benchmark Clarifications:
Clarification 1: Instruction focuses on the connection between formulas for the area of a rectangle and the area of a circle.
Clarification 2: Problem types include finding areas of fractional parts of a circle.
Clarification 3: Solutions may be represented in terms of pi (π) or approximately.

MA.7.GR.1.5 Solve mathematical and real-world problems involving dimensions and areas of geometric figures, including scale drawings and scale factors.

Benchmark Clarifications:
Clarification 1: Instruction focuses on seeing the scale factor as a constant of proportionality between corresponding lengths in the scale drawing and the original object.
Clarification 2: Instruction includes the understanding that if the scaling factor is k, then the constant of proportionality between corresponding areas is k^2.
Clarification 3: Problem types include finding the scale factor given a set of dimensions as well as finding dimensions when given a scale factor.

MA.7.GR.2 Solve problems involving three-dimensional figures, including right circular cylinders.

MA.7.GR.2.1 Given a mathematical or real-world context, find the surface area of a right circular cylinder using the figure's net.

Benchmark Clarifications:
Clarification 1: Instruction focuses on representing a right circular cylinder with its net and on the connection between surface area of a figure and its net.
Clarification 2: Within this benchmark, the expectation is to find the surface area when given a net or when given a three-dimensional figure.
Clarification 3: Within this benchmark, the expectation is not to memorize the surface area formula for a right circular cylinder.
Clarification 4: Solutions may be represented in terms of pi (π) or approximately.

MA.7.GR.2.2 Solve real-world problems involving surface area of right circular cylinders.

Benchmark Clarifications:
Clarification 1: Within this benchmark, the expectation is not to memorize the surface area formula for a right circular cylinder or to find radius as a missing dimension.
Clarification 2: Solutions may be represented in terms of pi (π) or approximately.

MA.7.GR.2.3 Solve mathematical and real-world problems involving volume of right circular cylinders.

Benchmark Clarifications:
Clarification 1: Within this benchmark, the expectation is not to memorize the volume formula for a right circular cylinder or to find radius as a missing dimension.
Clarification 2: Solutions may be represented in terms of pi (π) or approximately.

Data Analysis and Probability

MA.7.DP.1 Represent and interpret numerical and categorical data.

MA.7.DP.1.1 Determine an appropriate measure of center or measure of variation to summarize numerical data, represented numerically or graphically, taking into consideration the context and any outliers.

Benchmark Clarifications:
Clarification 1: Instruction includes recognizing whether a measure of center or measure of variation is appropriate and can be justified based on the given context or the statistical purpose.
Clarification 2: Graphical representations are limited to histograms, line plots, box plots and stem-and-leaf plots.
Clarification 3: The measure of center is limited to mean and median. The measure of variation is limited to range and interquartile range.

MA.7.DP.1.2 Given two numerical or graphical representations of data, use the measure(s) of center and measure(s) of variability to make comparisons, interpret results and draw conclusions about the two populations.

Benchmark Clarifications:
Clarification 1: Graphical representations are limited to histograms, line plots, box plots and stem-and-leaf plots.
Clarification 2: The measure of center is limited to mean and median. The measure of variation is limited to range and interquartile range.

MA.7.DP.1.3 Given categorical data from a random sample, use proportional relationships to make predictions about a population.

Example: O'Neill's Pillow Store made 600 pillows yesterday and found that 6 were defective. If they plan to make 4,300 pillows this week, predict approximately how many pillows will be defective.

Example: A school district polled 400 people to determine if it was a good idea to not have school on Friday. 30% of people responded that it was not a good idea to have school on Friday. Predict the approximate percentage of people who think it would be a good idea to have school on Friday from a population of 6,228 people.

MA.7.DP.1.4 Use proportional reasoning to construct, display and interpret data in circle graphs.

Benchmark Clarifications:
Clarification 1: Data is limited to no more than 6 categories.

MA.7.DP.1.5 Given a real-world numerical or categorical data set, choose and create an appropriate graphical representation.

Benchmark Clarifications:
Clarification 1: Graphical representations are limited to histograms, bar charts, circle graphs, line plots, box plots and stem-and-leaf plots.

MA.7.DP.2 Develop an understanding of probability. Find and compare experimental and theoretical probabilities.

MA.7.DP.2.1 Determine the sample space for a simple experiment.

Benchmark Clarifications:
Clarification 1: Simple experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.

MA.7.DP.2.2 Given the probability of a chance event, interpret the likelihood of it occurring. Compare the probabilities of chance events.

Benchmark Clarifications:
Clarification 1: Instruction includes representing probability as a fraction, percentage or decimal between 0 and 1 with probabilities close to 1 corresponding to highly likely events and probabilities close to 0 corresponding to highly unlikely events.
Clarification 2: Instruction includes $P(event)$ notation.
Clarification 3: Instruction includes representing probability as a fraction, percentage or decimal.

MA.7.DP.2.3 Find the theoretical probability of an event related to a simple experiment.

Benchmark Clarifications:
Clarification 1: Instruction includes representing probability as a fraction, percentage or decimal.
Clarification 2: Simple experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.

MA.7.DP.2.4 Use a simulation of a simple experiment to find experimental probabilities and compare them to theoretical probabilities.

Example: Investigate whether a coin is fair by tossing it 1,000 times and comparing the percentage of heads to the theoretical probability 0.5.

Benchmark Clarifications:
Clarification 1: Instruction includes representing probability as a fraction, percentage or decimal.
Clarification 2: Instruction includes recognizing that experimental probabilities may differ from theoretical probabilities due to random variation. As the number of repetitions increases experimental probabilities will typically better approximate the theoretical probabilities.
Clarification 3: Experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
