Mathematics Benchmarks for Grade 7

Mathematics Content

Strand: *Ratios and Proportional Relationships (RP)*

Analyze proportional relationships and use them to solve real-world and mathematical problems.

Compute unit rates associated with ratios of fractions

Determine the proportional relationship between two quantities

Identify the constant of proportionality or unit rate in a variety of contexts

Represent proportional relationships by writing an equation

Describe what a point (x, y) on the graph of a proportional relationship means in terms of the context

Use proportional relationships to solve multistep ratio and percent problems

Strand: *The Number System (NS)*

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Describe situations in which opposite quantities combine to make 0

Recognize p + q as the number located a distance |q| from p

Show that a number and its opposite have a sum of zero

Interpret sums of rational numbers by describing real world contexts

Recognize subtraction of rational numbers as adding the additive inverse, p − q = p + (−q)

Show that the distance between two rational numbers on a number line is the absolute value of their difference

Apply the principle of absolute value difference in real world contexts

Add and subtract rational numbers using properties of operations

Show that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations

Interpret products of rational numbers in real world contexts

Divide integers with non-zero divisors

Recognize that every quotient of integers with a non-zero divisor is a rational number

Interpret quotients of rational numbers in real world contexts

Multiply and divide rational numbers by applying properties of operations

Convert a rational number to a decimal using long division

Show that the decimal form of a rational number terminates in zeros or eventually repeats

Solve real world and mathematical problems using the four operations with rational numbers

Strand: *Expressions and Equations (EE)*

Use properties of operations to generate equivalent expressions.

Add and subtract linear expressions with rational coefficients using properties of operations

Factor linear expressions with rational coefficients using properties of operations

Expand linear expressions with rational coefficients using properties of operations

Solve problems by rewriting an expression in different forms

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Solve multi-step real-life and mathematical problems using positive and negative rational numbers in any form, including whole numbers, fractions, and decimals

Calculate with positive and negative rational numbers in any form using properties of operations

Convert between numeric forms using properties of operations

Assess the reasonableness of solutions by mentally computing and estimating with positive and negative rational numbers

Solve word problems leading to equations of the form px + q = r, where p, q, and r are specific rational numbers

Solve word problems leading to equations of the form p(x + q) = r, where p, q, and r are specific rational numbers

Compare the algebraic and arithmetic solutions to word problems by showing the sequence of operations used in each approach

Solve word problems leading to inequalities of the form px + q > r, where p, q, and r are specific rational numbers

Solve word problems leading to inequalities of the form px + q < r, where p, q, and r are specific rational numbers

Solve word problems by graphing the solution set of an algebraic inequality

Interpret a graph showing the solution set of an algebraic inequality in the context of a word problem

Mathematics Benchmarks for Grade 7

Strand: *Geometry (G)*
Draw, construct, and describe geometrical figures and describe the relationships between them.
Solve problems involving scale drawings of geometric figures
Reproduce a scale drawing using a different scale
Draw geometric shapes with given conditions
Describe the two-dimensional figures that result from slicing three-dimensional figures
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
Memorize the formulas for the area and circumference of a circle
Solve problems using the formulas for the area and circumference of a circle
Write equations for an unknown angle in a figure in a multi-step problem
Solve equations for an unknown angle in a figure using facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem
Solve real world and mathematical problems involving area of two- and three-dimensional objects
Solve real world and mathematical problems involving volume of two- and three-dimensional objects
Solve real world and mathematical problems involving surface area of two- and three-dimensional objects

Strand: *Statistics and Probability (SP)*
Use random sampling to draw inferences about a population.
Compare the characteristics of a sample to a statistical population
Determine under which conditions a sample is representative of a population
Determine under which conditions information obtained from a sample can support valid inferences
Use data from a random sample to draw inferences about a population
Compare multiple or simulated samples of the same size to determine the variation in an estimate or prediction
Draw informal comparative inferences about two populations.
Compare the visual overlap of two numerical data distributions with similar variabilities

Measure the difference between the centers of two overlapping numerical data distributions by expressing the difference as a multiple of a measure of variability
Use measures of center and variability for numerical data from random samples to draw informal comparative inferences about two populations
Draw inferences from two populations by comparing measures of center and variability for numerical data from random samples
Investigate chance processes and develop, use, and evaluate probability models.
Show that the likelihood or probability of a chance event occurring is a number between 0 and 1
Approximate the probability of a chance event occurring by collecting data on the chance process that produces it
Approximate the probability of a chance event occurring by observing its long-run relative frequency
Predict the approximate relative frequency given the probability of a chance event
Develop a uniform probability model by assigning equal probability to all outcomes of an event
Use a uniform probability model to determine the probabilities of an event
Develop a non-uniform probability model by observing frequencies in data generated from a chance process
Show that the probability of a compound event is the fraction of outcomes in the sample space for which the event occurs
Create a list, table, or tree diagram to represent sample spaces for compound events
Describe the outcomes of a compound event in everyday language, by analyzing a sample space which composes an event
Design a simulation to generate frequencies for compound events
Use a simulation to generate frequencies for compound events

Mathematics Benchmarks for Grade 7

Mathematical Practice
Strand: *Solve Problems (MP1)*
1. Make sense of problems and persevere in solving them.
Make sense of problems and persevere in solving them
Strand: *Reason (MP2)*
2. Reason abstractly and quantitatively.
Reason abstractly and quantitatively
Strand: *Construct Arguments (MP3)*
3. Construct viable arguments and critique the reasoning of others.
Construct viable arguments and critique the reasoning of others
Strand: *Model (MP4)*
4. Model with mathematics.
Model with mathematics
Strand: *Use Tools (MP5)*
5. Use appropriate tools strategically.
Use appropriate tools strategically
Strand: *Attend to Precision (MP6)*
6. Attend to precision.
Attend to precision
Strand: *Use Structure (MP7)*
7. Look for and make use of structure.
Look for and make use of structure
Strand: *Express Regularity (MP8)*
8. Look for and express regularity in repeated reasoning.
Look for and express regularity in repeated reasoning