Pennsylvania Mathematics

Assessment Anchors & Eligible Content: Seventh Grade

The Number System M07.A-N

1 **Apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers.** M07.A-N.1

1 Solve real-world and mathematical problems involving the four operations with rational numbers. M07.A-N.1.1

1 Apply properties of operations to add and subtract rational numbers, including real-world contexts. M07.A-N.1.1.1

2 Represent addition and subtraction on a horizontal or vertical number line. M07.A-N.1.1.2

3 Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats. M07.A-N.1.1.3

Ratios and Proportional Relationships M07.A-R

1 **Demonstrate an understanding of proportional relationships.** M07.A-R.1

Skip to main content

1 Analyze, recognize, and represent proportional relationships and use them to solve real-world and mathematical problems. M07.A-R.1.1

1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. Example: If a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 / 1/4 miles per hour, equivalently 2 miles per hour. M07.A-R.1.1.1

2 Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin). M07.A-R.1.1.2

3 Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. M07.A-R.1.1.3

4 Represent proportional relationships by equations. Example: If total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn. M07.A-R.1.1.4

5 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. M07.A-R.1.1.5

6 Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease. M07.A-R.1.1.6

Expressions and Equations M07.B-E

1 Represent expressions in equivalent forms. M07.B-E.1

1 Use properties of operations to generate equivalent expressions. M07.B-E.1.1

1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. Example 1: The expression 1/2 • (x + 6) is equivalent to 1/2 • x + 3. Example 2: The expression 5.3 – y + 4.2 is equivalent to 9.5 – y (or – y + 9.5). Example 3: The expression 4w – 10 is equivalent to 2(2w – 5). M07.B-E.1.1.1

2 Solve real-world and mathematical problems using numerical and algebraic expressions, equations, and inequalities. M07.B-E.2

1 Solve multi-step real-world and mathematical problems posed with positive and negative rational numbers. M07.B-E.2.1

1 Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. Example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50 an hour (or 1.1 × $25 = $27.50). M07.B-E.2.1.1

Skip to main content

2 Use variables to represent quantities in a real-world or mathematical problem and construct simple equations and inequalities to solve problems. M07.B-E.2.2

1 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. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? M07.B-E.2.2.1

2 Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers, and graph the solution set of the inequality. Example: A salesperson is paid $50 per week plus $3 per sale. This week she wants her pay to be at least $100. Write an inequality for the number of sales the salesperson needs to make and describe the solutions. M07.B-E.2.2.2

3 Determine the reasonableness of the answer(s) in problem-solving situations. M07.B-E.2.3

1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem. Example: If you want to place a towel bar that is 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. M07.B-E.2.3.1

Geometry M07.C-G

1 Demonstrate an understanding of geometric figures and their properties M07.C-G.1

1 Describe and apply properties of geometric figures. M07.C-G.1.1

1 Solve problems involving scale drawings of geometric figures, including finding length and area. M07.C-G.1.1.1

2 Identify or describe the properties of all types of triangles based on angle and side measures. M07.C-G.1.1.2

3 Use and apply the triangle inequality theorem. M07.C-G.1.1.3

4 Describe the two-dimensional figures that result from slicing three-dimensional figures. Example: Describe plane sections of right rectangular prisms and right rectangular pyramids. M07.C-G.1.1.4

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2 Solve real-world and mathematical problems involving angle measure, circumference, area, surface area, and volume. M07.C-G.2

1 Identify, use, and describe properties of angles and their measures. M07.C-G.2.1

1 Identify and use properties of supplementary, complementary, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure. M07.C-G.2.1.1

2 Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding). M07.C-G.2.1.2

Skip to main content

2 Determine circumference, area, surface area, and volume. M07.C-G.2.2

1 Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided. M07.C-G.2.2.1

2 Solve real-world and mathematical problems involving area, volume, and surface area of twoand three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided. M07.C-G.2.2.2

Statistics and Probability M07.D-S

1 Use random sampling to draw inferences about a population. M07.D-S.1

1 Use random samples. M07.D-S.1.1

1 Determine whether a sample is a random sample given a real-world situation. M07.D-S.1.1.1

2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Example 1: Estimate the mean word length in a book by randomly sampling words from the book. Example 2: Predict the winner of a school election based on randomly sampled survey data. M07.D-S.1.1.2

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2 Draw comparative inferences about populations. M07.D-S.2

1 Use statistical measures to compare two numerical data distributions. M07.D-S.2.1

1 Compare two numerical data distributions using measures of center and variability. Example 1: The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team. This difference is equal to approximately twice the variability (mean absolute deviation) on either team. On a line plot, note the difference between the two distributions of heights. Example 2: Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth grade science book. M07.D-S.2.1.1

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3 Investigate chance processes and develop, use, and evaluate probability models. M07.D-S.3

1 Predict or determine the likelihood of outcomes. M07.D-S.3.1

1 Predict or determine whether some outcomes are certain, more likely, less likely, equally likely, or impossible (i.e., a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event). M07.D-S.3.1.1

Skip to main content

2 Use probability to predict outcomes. M07.D-S.3.2

1 Determine the probability of a chance event given relative frequency. Predict the approximate relative frequency given the probability. Example: When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times but probably not exactly 200 times. M07.D-S.3.2.1

2 Find the probability of a simple event, including the probability of a simple event not occurring. Example: What is the probability of not rolling a 1 on a number cube? M07.D-S.3.2.2

3 Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation. M07.D-S.3.2.3