

APPENDIX

D

**Descriptions of Mathematics
Items at Each Benchmark**



Lower Quarter Benchmark Items

Fractions and Number Sense

- H09 Rounds to estimate the sum of two three-digit numbers.
- R07 Subtracts a three-decimal-place number from another with multiple regrouping.
- R13 Subtracts a four-digit number from another involving zeroes.

Data Representation, Analysis, and Probability

- A06 Calculates and compares the averages of two sets of data.
- P16 Reads a thermometer and locates the reading in a table.

Algebra

- P09 Selects an expression in exponential notation for repeated multiplication.

Median Benchmark Items

Fractions and Number Sense

- B08 Solves a word problem by finding the missing term in a proportion.
- C06 Determines which is the most unreasonable estimate for two 3-digit numbers.
- D12 Estimates the value, to one decimal place, of a point on a number line marked at whole number intervals.
- E04 Arranges four given digits in descending and ascending order and finds the difference between those two numbers.
- H08 Selects a figure with shaded parts that represents a familiar fraction.
- I05 Solves a word problem involving subtraction of a two-place decimal number from another.
- K01 Identifies a circular model of a fraction that best approximates a given rectangular model of the same fraction.



Data Representation, Analysis, and Probability continued

**Median
Benchmark Items
continued**

- M09 Given a table of values for two variables, selects the graph that could represent the given data.
- Q04 Solves a comparison problem by associating elements of a bar graph with a verbal description.

Geometry

- C03 Identifies corresponding parts of congruent trapezoids.
- J15 Selects the pair of similar triangles from a set of triangles.
- J16 Locates the point on a grid with 5-unit divisions when the point lies between the grid lines.
- K03 Identifies the diagrammatic representation of a three-dimensional object after rotation.

Algebra

- A02 Using properties of a balance, reasons to find an unknown weight (mass).
- B12 Identifies the linear equation corresponding to a given verbal statement involving a variable.
- D08 Solves for missing number in a proportion.
- G04 Solves equation for missing number in a proportion.
- H12 Selects the expression that represents a situation involving multiplication.
- J17 Finds a missing y value in a table relating x and y values.
- V04A Given a sequence of diagrams growing in one-dimension and a partially completed table, finds the next two terms in the table.

- P14 Estimates the product of two whole numbers in a word problem.
- Q05 Selects the statement that describes the effect of adding the same amount to both terms of a ratio.
- Q06 Estimates the product of a multiple of 1000 and a two-digit number in a word problem involving knowledge of units of time.
- Q09 Multiplies and adds fractions with different denominators in the correct order.
- R15 Solves a multi-step word problem that involves dividing a quantity in a given ratio.
- T04 Solves a word problem that involves multiplying a decimal in thousandth by a multiple of a hundred.
- V01 Provides an example of a measure that would round to a given value.
- V03 Determines the ratio of part to total in a word problem.

Measurement

- A03 Given a length rounded to the nearest centimeter, identifies what the actual length could have been in centimeters to one decimal place.
- C01 Compares volume by visualizing and counting cubes.
- I07 Finds the area between two rectangles when one is inside the other and their sides are parallel.
- M01 Reads the value indicated by an unlabeled tick mark on a circular scale.
- N15 Identifies an angle of a given size in a diagram.
- O06 Given the start time, and the duration of an event expressed as a fraction of an hour, determines the end time.
- S02A Finds a fraction of a given area of an irregular figure composed of squares of equal sides.
- T03 Finds the area of a rectangle contained in a parallelogram of given dimensions.



Geometry continued

- R11 Determines the number of triangles of given dimensions needed to cover a given rectangle.

Algebra

- C05 Finds a specified term in a sequence given the first three terms pictorially.
- D10 Identifies algebraic equation (formula) corresponding to a verbal description involving a constant and two variables.
- E05 Identifies the linear relationship between the first and second terms in a set of ordered pairs.
- F11 Solves a two-step problem involving multiplication and division of whole numbers and fractions.
- G06 Finds the value of an algebraic expression involving multiplication of negative integers.
- H10 Identifies the linear equation that describes the relationship between two variables given a table of values.
- L12 Translates a word problem into a short finite arithmetic sequence and sum the sequence.
- L14 Identifies the linear equation that describes the relationship between two variables given a table of values.
- L17 Solves a linear equation involving transposing.
- N13 Evaluates a rational expression in one variable for a given value of the variable.
- O07 Solves a linear equation involving parentheses.
- P11 Selects a multiplicative expression for repeated addition.
- Q02 Subtracts algebraic fractions with the same numeric denominator.
- Q07 Selects the formula satisfied by the given values of the variables.
- R12 Selects a simple, multiplicative expression in one variable that is positive for all negative values of that variable.
- S01A Given a sequence of diagrams growing in two dimensions and a partially completed table, finds the next two terms in the table.
- V04B Knowing the first five terms of a sequence growing in one dimension, finds the seventh term.

Top 10% Benchmark Items

Fractions and Number Sense

- C04 Identifies the pair of numbers satisfying given conditions involving ordering integers, decimals, and common fractions.
- F07 Solves a time-distance-rate problem that involves division of decimals and conversion of minutes to seconds.
- J14 Identifies the correct position for the decimal point in the quotient in a division of a decimal written in hundredths by a decimal written in thousandths.
- M06 Given the total number and the ratio of the two parts, finds the value of one part.
- M08 Multiplies a two-place decimal by a three-place decimal.
- N16 Solves multi-step problem with fractions requiring analysis of the verbal relations described.
- N17 Solves a word problem involving multiplication of two-digit one-place decimals and subtraction of decimals.
- O02 Finds the percent change given the original and the new quantities.
- P15 Solves a word problem involving both addition and subtraction of familiar fractions.
- P17 Writes a decimal expressed in hundredths as a fraction in lowest terms.
- Q08 Orders a set of decimals of up to three decimal places.
- R08 In a word problem, finds an average by dividing a decimal by a multiple of 100.
- R14 Solves a two-step problem involving multiplication of a whole number by a fraction.
- T02A In a multi-step word problem, finds how many of each of two groups of different sizes are required to produce a given number.

Measurement

**Top 10%
Benchmark Items
continued**

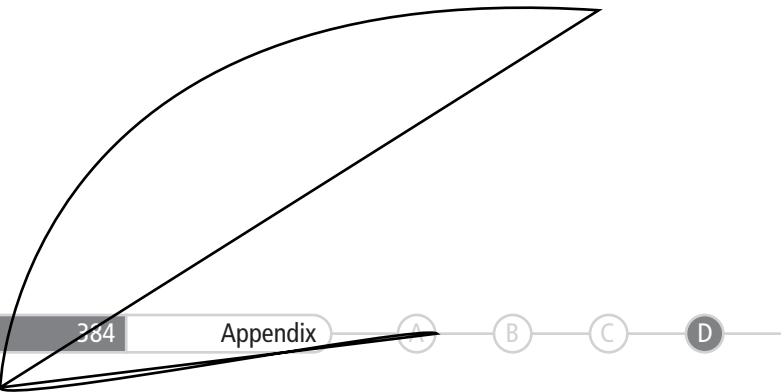
- E06 Identifies the length of a rectangle given its perimeter and width.
- F10 Recognizes that precision of measurement is related to the size of the unit of measurement.
- I03 Applies knowledge of number of milliliters in a liter to solve a word problem.
- J10 Finds the area between two rectangles when one is inside the other and their sides are parallel.
- K05 Finds the perimeter of a square given that its area is a square number less than 150.
- P12 Estimates the length of a curved piece of string adjacent to a ruler.
- Q03 From a set of times expressed variously in days, hours, minutes, and seconds, determines which is least.
- S02B Finds the length of a side of a square, given that its area is a square number.
- U02A Uses computation with fractions to find the length and width of a rectangle and draws and labels that rectangle on a grid.
- U02B Given the dimensions of two rectangles, expresses the ratio of their areas.
- U03 Finds the area of a triangle, on the same base and with the same height as a square, when the length of a side of the square is known.

Data Representation, Analysis, and Probability

- G01 Reads data from a frequency table to solve a problem.

Geometry

- I08 Given only the coordinates of two points on the line, selects the coordinates of a third point on that line.
- K08 Uses properties of congruent triangles and the sum of the angles of a triangle to find the measure of an angle.
- L16 Identifies the measure of an angle of a quadrilateral given the measures of the other three angles.



Items Above the Top 10% Benchmark

Fractions and Number Sense

- S03 Solves a word problem involving multiplication and subtraction of decimals.
- T02B Uses information in a word problem to determine numerator and denominator and writes the relevant common fraction.
- U01 Estimates the total time in minutes for an event made up of a series of events, each given in minutes and seconds.

Measurement

- P08 Finds the ratio of width to perimeter for a rectangle when given the ratio of length to width of a rectangle.
- S02C Finds the perimeter of a figure made up of squares with known length of sides.

Data Representation, Analysis, and Probability

- V02 Selects relevant information from two advertisements to solve a complex word problem involving decimals.

Algebra

- I01 Identifies what the variable represents in an equation for a given situation.
- I04 Identifies numbers common to two different arithmetic sequences.
- Q01 Selects an algebraic expression to answer a question about a set of linked verbal statements.
- S01C Generalizing from the first several terms of a sequence growing in two dimensions, explains a way to find a specified term, e.g. the 50th.

