Range Performance Level Descriptors

Grade 7 Math

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7.1.2.A Extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of rational numbers.	• Identifies when the sets of integers, rational numbers, and whole numbers are correctly labeled within a Venn diagram.	• Classifies numbers as rational numbers, integers, whole numbers, or natural numbers. • Labels the sets of integers, rational numbers, and whole numbers correctly within a Venn diagram.	• Explains the relationship between sets of rational numbers. • Labels the sets of integers, rational numbers, whole numbers, and natural numbers correctly within a Venn diagram.	• Identifies a value that would not be included in a subset of rational numbers (e.g., tell which value is not an integer). • Creates a Venn diagram from scratch for integers, rational numbers, whole numbers, and natural numbers and lists numbers in the most appropriate location.
7.1.6.A Represent sample spaces for simple and compound events using lists and tree diagrams.	• Identifies and completes lists, tree diagrams, or tables of outcomes that represent a sample space for two or more independent events.	• Identifies and completes a list, tree diagram, or table of outcomes that represents a sample space for two or more dependent events.	• Creates a tree diagram, table, or list from scratch given a real-world context that represents independent and dependent events.	• Creates a problem and describes the sample space with a list, table, or tree diagram.
7.1.6.C Make predictions and determine solutions using experimental data for simple and compound events.	• Identifies the experimental probability needed to make a prediction given experimental data of a simple event.	• Makes a prediction based on simple events and experimental data values between 100 and 1,000 and sample sizes greater than 20. • Identifies the experimental probability of simple events and makes a prediction given experimental data in a table when the total is given.	• Makes a prediction based on experimental data values greater than 1,000 and sample sizes greater than 100. • Determines the experimental probability and makes a prediction given experimental data in a table when the total is not given.	• Estimates and predicts events using given experimental data and provides justifications for reasoning.

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7.1.6.D Make predictions and determine solutions using theoretical probability for simple and compound events.	• Determines the theoretical probability of simple events to make predictions given a real-world situation.	• Determines the theoretical probability of simple events to make predictions given a table, where the total is given. • Determines the theoretical probability of simple events to make predictions when the sample is greater than or less than the original sample space by a whole number factor.	• Determines the theoretical probability of simple events to make predictions given a table, where the total is not given. • Determines the theoretical probability of simple events to make predictions when the sample is greater than or less than the original sample by a rational number factor.	• Determines the theoretical probability of compound events to make predictions given a real-world situation or table.
7.1.6.E Find the probabilities of a simple event and its complement and describe the relationship between the two.	• Identifies the probability of the complement of an event given the probability of the event.	• Determines and justifies the probability of a simple event and its complement, with no fraction simplification required, given a list or table of all outcomes in the sample space.	• Determines the probability of a simple event and its complement expressed as a percent given a list or table of all outcomes in the sample space.	• Justifies the probability of a simple event and its complement given a list or table of all outcomes in the sample space.

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7.1.6.H Solve problems using qualitative and quantitative predictions and comparisons from simple experiments.	• Uses frequencies from a table to determine the likelihoods of two events as less likely, more likely, or equally likely.	• Uses frequencies from a table to compare the likelihood of an event as *n* times as likely as another event. • Uses frequencies from a table to determine the likelihoods of more than two events as less likely, more likely, or equally likely.	• Generalizes the likelihoods of events in a sample to populations that are greater than the sample size by a whole number factor. • Uses frequencies from a sample to make quantitative predictions about the population.	• Generalizes the likelihoods of events in a sample to populations that are greater than the sample size by a rational number factor. • Compares the likelihoods of events in a sample to populations that are greater than the sample size by a rational number factor. • Makes predictions from a sample while recognizing that sample size can lead to incorrect conclusions. • Identifies outcomes as certain, likely, unlikely, or impossible.

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7.1.6.I Determine experimental and theoretical probabilities related to simple and compound events using data and sample spaces.	• Determines the probability of a simple event with frequencies in the ones place.	• Determines the probability of a simple event with frequencies in the tens place and reduces the fraction or converts it to a percent. • Identifies probability after a change is made to the sample space.	• Determines the probability of a compound event with frequencies in the ones place. • Calculates the probability of a compound event composed of two different events (e.g., roll a number cube and spin a spinner). • Calculates the probability of a compound event based on two or more trials of the same experiment.	• Calculates the probability of a compound event without replacement. • Identifies the probability of a compound event composed of more than two events (e.g., roll a number cube, spin a spinner, and flip a coin).
7.2.3.A Add, subtract, multiply, and divide rational numbers fluently.	• Adds, subtracts, multiplies, and divides rational numbers with absolute values less than 10 without context.	• Adds, subtracts, multiplies, and divides rational numbers with absolute values greater than 10 without context. • Subtracts a greater number from a lesser number. • Determines the product of two mixed numbers, expressed as a mixed number. • Multiplies integers with or without negative signs.	• Adds, subtracts, multiplies, and divides rational numbers with absolute values greater than 10 with context. • Adds or subtracts decimals and fractions with denominators that are factors of 100 in real-world contexts. • Multiplies decimals and mixed numbers with or without negative signs.	• Subtracts decimals and mixed numbers with negative signs. • Divides decimals and mixed numbers with negative signs.

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7.2.3.B Apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers.	• Determines the solution to a problem requiring two operations with integer values.	• Determines the solution to a problem in the context of money requiring at least two operations.	• Determines the solution to a problem involving at least three operations with rational values.	• Calculates the solution to a problem involving operations with more than three rational values. • Solves a problem involving two operations with non-integer values.
7.2.4.A Represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including $d = rt$.	• Identifies a table that represents a scenario with a given rate of change.	• Identifies a graph or equation that represents a given rate of change from context. • Writes an equation to represent a real-world scenario with a constant rate of change.	• Identifies a rate of change and writes an equation from real-world context, including $d = rt$.	• Calculates a rate of change and writes a linear equation that models a real-world context. • Represents a single real-world context using multiple representations (graph, table, and equation). • Creates a graph or table to represent a single real-world context.
7.2.4.B Calculate unit rates from rates in mathematical and real-world problems.	• Determines a unit rate by dividing the total amount by a whole number of units.	• Determines the unit rate from a real-world situation by dividing two values expressed as decimals.	• Calculates the unit rate from a real-world situation by dividing a mixed number by a unit fraction (e.g., 1 1/4 ÷ 1/2).	• Calculates the unit rate from a real-world situation by dividing two values expressed as mixed numbers.

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7.2.4.C Determine the constant of proportionality ($k = y/x$) within mathematical and real-world problems.	• Determines the constant of proportionality (k) from a graph or table where the point (1, k) is shown.	• Determines the constant of proportionality from a given context, where fraction simplification is not required. • Calculates k in scenarios involving division by a whole number.	• Calculates the constant of proportionality from a given context, where fraction simplification is required. • Determines the constant of proportionality in the form of a reduced fraction from a graph or table.	• Calculates the constant of proportionality of a part to the whole when given two parts. • Calculates k in the form of a decimal or a reduced fraction from a real-world scenario.
7.2.4.D Solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems.	• Solves one-step problems involving ratios, rates, or percents.	• Solves multi-step problems involving ratios, rates, or percents, where rounding of the answer is not required. • Determines the part of the whole given part-to-whole ratios.	• Solves for percent increase or decrease, including problems involving financial literacy. • Solves multi-step problems given in fraction and decimal form, including problems in which rounding of the answer is required.	• Interprets information from context to solve problems involving ratios. • Determines the part of the whole given part-to-part ratios.
7.2.7.A Represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form $y = mx + b$.	• Writes a linear equation in the form $y = mx + b$. • Interprets the initial value and rate of change of a linear equation with real-world context.	• Identifies a linear equation from a graph. • Represents a linear equation in a graph or table. • Identifies a table of values to match a linear equation of y in terms of x. • Writes a linear equation given a verbal description in real-world context.	• Represents a linear equation in a graph or a table of values. • Creates a table of values to represent a linear relationship from a verbal description. • Identifies the equation that represents a linear relationship from a verbal description or a table of values.	• Writes a linear equation from a table of values or a verbal description. • Graphs a linear relationship from a table of values or a verbal description.

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7.2.10.A Write one-variable, two-step equations and inequalities to represent constraints or conditions within problems.	• Determines the initial value and rate of change from context to write an equation or inequality.	• Determines the equation or inequality in any form that represents a scenario.	• Completes an equation to represent a scenario, where additional calculations are necessary (e.g., calculates the constant value based on given information).	• Writes an inequality from a description (e.g., 3 less than 2 times a number is at least 10), which may include a description in a geometric context.
7.2.10.B Represent solutions for one-variable, two-step equations and inequalities on number lines.	• Determines the solutions of one-step equations and inequalities represented on number lines. • Distinguishes between an equation and an inequality.	• Determines solutions of two-step equations and inequalities represented on number lines with integral solutions or endpoints.	• Determines solutions of two-step equations and inequalities represented on number lines with decimal or fractional solutions or endpoints. • Represents solutions for two-step equations and inequalities on number lines, where combining like terms is required.	• Solves equations and inequalities containing fractional coefficients and/or constants and represents solutions on number lines.
7.2.10.C Write a corresponding real-world problem given a one-variable, two-step equation or inequality.	• Determines corresponding real-world contexts for one-variable, two-step equations that contain only whole numbers. • Identifies the values of the constant and rate from an equation.	• Determines corresponding real-world contexts for one-variable, two-step equations and inequalities with integer coefficients and constants.	• Identifies corresponding real-world contexts for one-variable, two-step equations and inequalities with decimal or fractional coefficients and constants.	• Identifies corresponding real-world contexts for one-variable, two-step equations and inequalities with distribution over a sum or difference.

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7.2.11.A Model and solve one-variable, two-step equations and inequalities.	• Identifies solutions of one-variable, two-step equations given a model.	• Identifies solutions of one-variable, two-step inequalities given a model. • Identifies solutions of equations with integral constants and coefficients requiring combination of like terms.	• Solves one-variable, two-step equations. • Uses a model to solve one-variable, two-step equations and inequalities. • Identifies solutions of inequalities requiring division by negative values, with integral endpoints.	• Solves one-variable, two-step equations and inequalities with rational constants and coefficients. • Creates a model of a one-variable, two-step equation or inequality. • Solves real-world two-step equations and inequalities from context.
7.2.11.B Determine if the given value(s) make(s) one-variable, two-step equations and inequalities true.	• Verifies integral solutions of equations with integral constants and coefficients.	• Verifies solutions of equations with fractional coefficients that simplify to integers when multiplied by the solution.	• Verifies solutions of an inequality with the variable term(s) on the right side. • Verifies solutions of inequalities with fractional and decimal constants and coefficients. • Identifies a subset of values that satisfies an inequality.	• Identifies a value that falls outside the solution set of an inequality.
7.3.4.E Convert between measurement systems, including the use of proportions and the use of unit rates.	• Performs a one-step conversion between measurement systems.	• Calculates a unit of measurement equivalent to a given unit of measurement, where two conversions are required.	• Calculates a unit of measurement equivalent to a given unit of measurement by dividing by a rational number.	• Calculates a unit of measurement equivalent to a given unit of measurement, where three conversions between measurement systems are required.

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7.3.5.A Generalize the critical attributes of similarity, including ratios within and between similar shapes.	• Identifies the characteristics of similar figures. • Defines similar figures. • Identifies a proportion of side lengths of similar figures that are translated, given a similarity statement and a diagram of the image and pre-image.	• Identifies corresponding parts of similar figures that are reflected, given a diagram of the image and pre-image.	• Identifies a proportion of side lengths of similar figures given a similarity statement. • Identifies corresponding parts of similar figures that are translated, given a similarity statement and a diagram of the image and pre-image.	• Identifies a proportion of side lengths of similar figures that are rotated, given a similarity statement and a diagram of the image and pre-image.
7.3.5.B Describe π as the ratio of the circumference of a circle to its diameter.	• Identifies the ratio used to obtain an approximation of π.	• Identifies a ratio that simplifies to π, with factors less than or equal to 24 (e.g., 12.56/4).	• Identifies the definition of π in the form of a verbal description. • Identifies a ratio that simplifies to π, with factors greater than 24 (e.g., 37.68/12). • Identifies a ratio that approximates π given a numeric value for the circumference of a circle and a variable representing either the radius or the diameter. • Identifies a ratio that approximates π given an image of a circle with the radius labeled. • Constructs a ratio of the circumference of a circle to its diameter to represent an approximation of π.	• Identifies a ratio that approximates π given a numeric value for the radius or diameter and a variable representing the circumference.

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7.3.5.C Solve mathematical and real-world problems involving similar shape and scale drawings.	• Determines the scale factor of a scale drawing, where the scale factor is 1:*x*.	• Identifies a missing side length given a picture of two similar figures with all sides labeled and the same orientation. • Determines a missing side length of a scale drawing given an image and the scale factor, where the scale factor is *x*:*y*.	• Determines a missing side length given a picture of two similar figures with one pair of corresponding sides labeled and different orientations. • Determines a missing side length given a description of the scale factor and a corresponding side length.	• Solves scale factor problems that involve multiple steps (e.g., determines the perimeter of a triangle given a similar triangle and the scale factor between the two triangles). • Determines the non-integer value of a missing side length given a picture of two similar figures and the scale factor.
7.3.9.A Solve problems involving the volume of rectangular prisms, triangular prisms, rectangular pyramids, and triangular pyramids.	• Determines the volume of a rectangular prism with whole number dimensions given a labeled image or a description.	• Determines the volume of a rectangular prism with non-integer dimensions given a labeled image or a description. • Determines a missing dimension (height, length, or width) of a rectangular prism given the volume and the other two dimensions. • Determines the volume of a triangular prism, rectangular pyramid, or triangular pyramid with whole number dimensions.	• Determines the volume of a triangular prism, rectangular pyramid, or triangular pyramid with whole number dimensions, where extraneous information (such as slant height) is provided. • Determines the volume of a triangular prism, rectangular pyramid, or triangular pyramid given a labeled diagram of the figure. • Determines a missing dimension of a triangular prism, rectangular pyramid, or triangular pyramid given the volume and a side length or the height.	• Determines the volume of a triangular prism, rectangular pyramid, or triangular pyramid given an image of the net of the figure. • Determines a missing dimension of a triangular prism, rectangular pyramid, or triangular pyramid, including the area of the base, given the volume and a side length or the height.

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7.3.9.B Determine the circumference and area of circles.	• Determines the circumference of a circle given its diameter.	• Determines the area of a circle given the radius of the circle. • Determines the circumference of a circle given its radius. • Determines the diameter of a circle given its circumference. • Determines the circumference of a circle given the context of a real-world problem.	• Determines the radius of a circle given its circumference. • Determines the circumference of a circle, in terms of π, given the diameter or radius of the circle. • Determines the area of a circle given its diameter or radius, where the area may be in terms of π. • Determines the difference in area or circumference between two circles. • Determines the area of a semicircle given the radius of the circle. • Determines the area of a circle given its circumference, where the area may be in terms of π. • Determines the radius or diameter of a circle given its area.	• Determines the area of a quarter circle given the non-integer value of the circle's radius. • Determines the perimeter of a partial circle given the diameter. • Determines the radius or diameter of a semicircle given the area of the semicircle. • Determines the area of a circle using the relationships between overlapping circles and inscribed circles.

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7.3.9.C Determine the area of composite figures containing combinations of rectangles, squares, parallelograms, trapezoids, triangles, semicircles, and quarter circles.	• Determines the area of composite figures containing combinations of rectangles and squares.	• Determines the area of composite figures made up of two figures, which may include triangles, parallelograms, rectangles, or squares, with no more than one figure being a rectangle or square.	• Determines the area of composite figures made up of two figures, which may include trapezoids, circles, semicircles, quarter circles, triangles, parallelograms, rectangles, or squares, with no more than one figure being a triangle, parallelogram, rectangle, or square. • Determines the area of composite figures made up of three figures, which may include trapezoids, circles, semicircles, quarter circles, triangles, parallelograms, rectangles, or squares, with no more than two figures being rectangles or squares. • Determines the area of a shaded region of a composite figure made up of two figures.	• Determines the area of composite figures made up of four or more figures, which may include rectangles, squares, parallelograms, trapezoids, triangles, circles, semicircles, and quarter circles, with at least one figure being something other than a rectangle or square. • Determines the area of a shaded region of a composite figure made up of three or more figures.

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7.3.9.D Solve problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prism, and triangular pyramid by determining the area of the shape's net.	• Determines the total surface area of a rectangular prism given a net.	• Determines the surface area of a square pyramid given a net. • Determines the total surface area of a triangular prism given a net.	• Determines the lateral surface area of a square pyramid, triangular pyramid, rectangular prism, or triangular prism given a net. • Identifies the net that could represent a figure with a given total surface area.	• Calculates the total surface area of a figure given an unlabeled net and a written description of its dimensions.

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7.3.11.C Write and solve equations using geometry concepts, including the sum of the angles in a triangle, and angle relationships.	• Identifies an equation that represents angle relationships, including supplementary and complementary angles. • Solves an equation for the value of a variable when given the angle relationships and the equation.	• Solves an equation for the value of a variable when given the diagram of a triangle with two angles labeled with numeric expressions and one angle labeled with an algebraic expression. • Solves an equation for the value of a variable when given the diagram of supplementary or complementary angles. • Identifies an equation that represents the perimeter of a quadrilateral or triangle given expressions for the side lengths.	• Solves an equation for the value of a variable when given the side lengths and perimeter of a quadrilateral or triangle in a diagram. • Solves an equation for the value of a variable when given a diagram of vertical angles. • Solves an equation for the value of a variable when given a diagram of a triangle with two angles labeled with two different algebraic expressions and one angle labeled with a numeric expression. • Determines the measurements of complementary, supplementary, and vertical angles when given two algebraic expressions that represent the angle measurements. • Determines the value of a variable in an expression that represents an angle measurement in an isosceles triangle when given one angle.	• Applies knowledge of angle relationships and the sum of the angles in a triangle to calculate the value of a variable or of an unknown angle measurement given complex diagrams that require multiple steps. • Applies knowledge of angle relationships and the sum of the angles in a triangle to calculate the value of a variable or of an unknown angle measurement given verbal descriptions of the relationships.

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7.4.6.G Solve problems using data represented in bar graphs, dot plots, and circle graphs, including part-to-whole and part-to-part comparisons and equivalents.	• Determines frequencies for categorical data from bar graphs where each bar is on a gridline. • Determines relative frequencies from circle graphs.	• Determines the relative frequency of a category from a bar graph where the total frequency is a factor of 100. • Multiplies the relative frequency from a circle graph by the whole value up to 100 to find the value of a part.	• Determines the relative frequency of a category from a bar graph where some bars are not on gridlines. • Multiplies the relative frequency from a circle graph by the whole value greater than 100 to find the value of a part. • Determines the relative frequency of a category from a dot plot where the total frequency is a factor of 100.	• Calculates the relative frequency of a category as a percent from a representation where the total frequency is a factor of 100. • Calculates the value of a part from a circle graph by multiplying the whole value by the relative frequency of the category or categories.
7.4.12.A Compare two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads.	• Identifies true comparisons of median, range, minimum, and maximum of data sets represented in multiple box plots.	• Identifies true comparisons of median, mode, range, minimum, and maximum of data sets represented in multiple dot plots.	• Compares symmetry of multiple data sets represented by dot plots or box plots. • Identifies and compares first and third quartiles and interquartile range of data sets represented by multiple box plots.	• Identifies and compares first and third quartiles and interquartile range of multiple data sets represented by dot plots.
7.4.12.B Use data from a random sample to make inferences about a population.	• Determines the minimum and maximum values from various representations of data.	• Determines which statement is best supported by the given data from various representations.	• Interprets data from various representations to compare subsets of the population measured.	• Analyzes data from various representations to make inferences about portions of the population (e.g., half, quarter, most).

Range Performance Level Descriptors

Grade 7 Math

	(1) Does Not Meet Grade Level: Students in this category do not demonstrate a sufficient understanding of the assessed knowledge and skills. A student not meeting grade level . . .	**(2) Approaches Grade Level:** Students in this category generally demonstrate the ability to apply the assessed knowledge and skills in familiar contexts. A student approaching grade level . . .	**(3) Meets Grade Level:** Students in this category generally demonstrate the ability to think critically and apply the assessed knowledge and skills in familiar contexts. A student meeting grade level . . .	**(4) Masters Grade Level:** Students in this category demonstrate the ability to think critically and apply the assessed knowledge and skills in varied contexts, both familiar and unfamiliar. A student mastering grade level . . .
7.4.12.C Compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations.	• Identifies differences between population subsets or between categories from a clustered bar graph with two data sets.	• Identifies the statement that best represents the relationship between data sets or between categories from a clustered bar graph with two data sets and three or more categories.	• Makes quantitative and qualitative comparisons about differences in population subsets and totals by category.	• Creates clustered bar graphs and generates inferences about the populations.
7.4.13.A Calculate the sales tax for a given purchase and calculate income tax for earned wages.	• Determines amount of tax, where the tax rate is a whole-number percent.	• Determines amount of tax, where the tax rate is a percent that can be represented by a decimal to the tenths or hundredths place.	• Calculates the tax rate as a percent given the amount of tax and the value being taxed.	• Calculates the amount of tax by multiplying rate by the amount taxed. • Identifies the tax rate from a representation of data such as an earnings statement.
7.4.13.B Identify the components of a personal budget, including income; planned savings for college, retirement, and emergencies; taxes; and fixed and variable expenses, and calculate what percentage each category comprises of the total budget.	• Identifies the dollar amount of a line item in the budget given the percentage of the budget, where the percentage is a multiple of 5% and the total amount of the budget is a multiple of $100.	• Compares the cost of line items in the budget to fractions, such as 1/2, 1/3, and 1/4, of the entire budget.	• Determines the total budget when given the dollar amount of a line item of the budget and the corresponding percentage of the budget. • Makes percentage comparisons between two or more line items within the budget and between line items and the total budget amount.	• Calculates the percentage of the budget allocated to line items in a budget given the amounts of the line items and the total budget.

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7.4.13.C Create and organize a financial assets and liabilities record and construct a net worth statement.	• Identifies the total of either assets or liabilities expressed in multiples of $1,000.	• Determines net worth from an assets and liabilities record when subtotals of assets and liabilities are given. • Determines net worth by adding assets and subtracting liabilities from a net worth statement with no more than four items.	• Identifies the value of a single asset or liability on an assets and liabilities record when given the net worth. • Classifies assets and liabilities.	• Calculates the net worth from an assets and liabilities record. • Calculates the value of a single asset or liability on an assets and liabilities record when given the net worth.
7.4.13.D Use a family budget estimator to determine the minimum household budget and average hourly wage needed for a family to meet its basic needs in the student's city or another large city nearby.	• Identifies amount of money earned by working a given number of hours when given the hourly wage.	• Identifies the hourly wage needed to pay for monthly expenses given a budget and the number of hours worked per month. • Determines how much money remains, given the number of hours worked, an hourly wage, and a monthly budget.	• Determines the weekly salary needed to meet a monthly budget. • Identifies an equation that can be used to determine the hourly wage or yearly income that is needed to satisfy a monthly budget.	• Determines the yearly income needed to cover expenses given a monthly budget and contextual information. • Calculates the hourly wage needed to pay for monthly expenses given a budget and the number of hours worked per month.

Range Performance Level Descriptors

Grade 7 Math

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7.4.13.E Calculate and compare simple interest and compound interest earnings.	• Recognizes that interest earned increases the value of an account.	• Distinguishes between simple interest and compound interest.	• Identifies the simple interest earned by an account and/or the ending account balance over a period of 1 to 3 years. • Identifies the compound interest earned by an account over a period of 1 to 3 years.	• Compares simple interest earned by two separate accounts with different interest rates and/or different starting balances over the same period. • Calculates the simple interest earned by an account or the ending account balance over a period of 1 to 3 years.
7.4.13.F Analyze and compare monetary incentives, including sales, rebates, and coupons.	• Recognizes that a discount, sale, or coupon will decrease the price of an item.	• Determines the discounted price of an item given a percent discount.	• Identifies the lowest- or highest-priced item from a list of items given the original price and the description of the sale, rebate, or coupon.	• Orders and compares the sale prices of three or more discounted items.