Mathematics
Grade 5
Gifted and Talented

QUARTER 1:

Standard 7.0 – Processes of Mathematics: Students demonstrate the processes of mathematics by making connections and applying reasoning to solve problems and to communicate their findings.
(These processes serve as the foundation for the delivery of all mathematics content objectives.)

Objectives – The students will be able to:

a. Select and apply a variety of concepts, processes, and skills to solve problems. (Problem Solving)
b. Justify ideas or solutions with mathematical concepts or proofs. (Reasoning)
c. Present mathematical ideas using words, symbols, visual displays, or technology. (Communication)
d. Relate or apply mathematics within the discipline, to other disciplines, and to life. (Connections)

Unit 1 – Number Relationships and Computation (Number Theory and Place Value)
Standard 6.0 – Number Relationships and Computation/Arithmetic
Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil, or technology.
Objectives – The student will be able to:

a. Identify place value for base 5 numerals.
b. Convert base 5 to base 10 numerals.
c. Explore the operations of addition, subtraction, multiplication, and division in base 5.
d. Explore real world applications of the binary number system.
e. Express whole numbers in expanded form using powers of ten and exponential notation.
f. Calculate powers of whole numbers and square roots of perfect squares of whole numbers.
g. Identify and apply the law of exponents to simplify expressions.
h. Estimate the square root of a given number and justify in writing.
i. Identify and describe the characteristics of numbers divisible by 2, 3, 4, 5, 6, 9, and 10.
j. Identify and describe numbers as prime and composite.
k. Identify factors and prime factors using factor trees and prime factorization in exponential form.
l. Compare, contrast, and solve problems using factors and multiples.
m. Evaluate numerical expressions using order of operations involving whole numbers, fractions, and/or decimals.

Unit 2 – Number Relationships and Computation (Whole Numbers and Decimals)
Standard 6.0 – Number Relationships and Computation/Arithmetic
Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil, or technology.
Standard 3.0 – Measurement
Students will identify attributes, units, or systems of measurements or apply a variety of techniques, formulae, tools, or technology for determining measurements.

Objectives – The student will be able to:

a. Estimate and calculate sums and differences of decimals and whole numbers, including money using appropriate methods of computation (mental mathematics, use of a calculator, use and discovery of alternate algorithms).
b. Estimate and calculate products of decimals and whole numbers including money.
c. Estimate and calculate quotients using decimals and whole numbers with whole number and decimal divisors.
d. Divide a decimal by a decimal and annex zeros in the dividend.
e. Divide using short division, when appropriate.
f. Interpret quotients and remainders mathematically and in the context of a problem.
g. Apply identity, zero, commutative, associative, and distributive properties.
h. Calculate equivalent units of length, capacity, and mass within the metric system.
i. Solve problems involving sums, differences, products, and quotients including area and perimeter of problems.
j. Express whole numbers in scientific notation.

Unit 3 – Algebra, Patterns, and Functions
Standard 1.0 – Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.
Objectives – The student will be able to:

a. Identify, extend, analyze, and create numeric patterns and sequences.
b. Identify and extend arithmetic and geometric sequences.
c. Complete and extend one- and two-operation function tables.
d. Analyze and describe the relationship that generates a two-operation rule.
e. Determine the rule for a given function table involving 1 or 2 operations and write the rule in algebraic form.
f. Create one- and two-operation function tables to solve real world problems.
g. Explore number theory within patterns such as triangular numbers, Pascal's triangle, and the Fibonacci sequence.

QUARTER 2:

Standard 7.0 – Processes of Mathematics: Students demonstrate the processes of mathematics by making connections and applying reasoning to solve problems and to communicate their findings.
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Objectives – The student will be able to:

a. Select and apply a variety of concepts, processes, and skills to solve problems. (Problem Solving)
b. Justify ideas or solutions with mathematical concepts or proofs. (Reasoning)
c. Present mathematical ideas using words, symbols, visual displays, or technology. (Communication)
d. Relate or apply mathematics within the discipline, to other disciplines, and to life. (Connections)

Unit 4 – Number Relationships and Computation (Fractions and Measurement)
Standard 6.0 – Number Relationships and Computation/Arithmetic
Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil, or technology.
Standard 3.0 – Measurement
Students will identify attributes, units, or systems of measurements or apply a variety of techniques, formulae, tools, or technology for determining measurements.

Objectives – The student will be able to:

a. Express fractions as (terminating, repeating, or non-terminating/non-repeating) decimals and decimals as fractions.
b. Explore the concept of rational vs. irrational numbers.
c. Compare and order fractions and mixed numbers mathematically and on a number line.
d. Identify the least common multiple (LCM) and greatest common factor (GCF) using prime factorization.
e. Estimate and calculate the sums and differences of fractions, whole numbers, and mixed numbers in problem solving situations, expressing results in simplest form.
f. Estimate and calculate the product of fractions, whole numbers, and mixed numbers.
g. Explore the relationship between the fraction of a whole number and the percent of a whole number.
h. Estimate and calculate the quotients of fractions, whole numbers, and mixed numbers in problem solving situations, expressing results in simplest form.
i. Calculate equivalent units of length, capacity, and weight within the customary system.
j. Calculate equivalent units of time.
k. Determine start, elapsed, and end time.

Unit 5 – Probability
Standard 5.0 – Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.
Objectives – The student will be able to:

a. Find the probability of independent events and express as a fraction, decimal, or percent.
b. Compare the outcomes of theoretical probability with results of experimental probability.
c. Determine the possible outcomes of independent events using an organized list and tree diagram.
d. Express the probability of an event comprised of no more than two independent events as a fraction, a decimal, or a percent.
e. Express the probability of a second event that is dependent on a first event of equally likely outcomes as a fraction, a decimal, or a percent.
f. Describe the difference between independent and dependent events.

Unit 6 – Statistics
Standard 4.0 – Students will collect, organize, display, analyze, or interpret data to make decisions or predictions.
Objectives – The student will be able to:

a. Analyze, interpret, construct, and make predictions (in oral and written form) based on tables, frequency tables, stem-and-leaf plots, back-to-back stem-and-leaf plots, line plots, double bar graphs, line graphs, double line graphs, circle graphs, and histograms.
b. Determine the appropriate type of graph to effectively display data using tables (frequency tables), single and double bar graphs, single and double line graphs, stem-and-leaf plots, and line plots.
c. Describe the shape and important features of a data set (using terms such as cluster, range, and outlier).
d. Calculate and interpret measures of central tendency (mean, median, and mode) to interpret data sets.
e. Apply the range and measures of central tendency to solve a problem or answer a question.
f. Determine the effect of an outlier on the mean.
g. Determine the effect of changes in a data set on the mean.
h. Interpret, organize, construct, and display data to make box-and-whisker plots.

QUARTER 3:

Standard 7.0 – Processes of Mathematics: Students demonstrate the processes of mathematics by making connections and applying reasoning to solve problems and to communicate their findings.
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Objectives – The student will be able to:

a. Select and apply a variety of concepts, processes, and skills to solve problems. (Problem Solving)
b. Justify ideas or solutions with mathematical concepts or proofs. (Reasoning)
c. Present mathematical ideas using words, symbols, visual displays, or technology. (Communication)
d. Relate or apply mathematics within the discipline, to other disciplines, and to life. (Connections)

Unit 7 – Geometry
Standard 2.0 – Students will apply the properties of one-, two-, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects.
Objectives – The student will be able to:

a. Identify, describe, and classify lines as intersecting, parallel, or perpendicular.
b. Identify, describe, and measure angles formed by intersecting lines, line segments, and rays. (Vertical, adjacent, complementary, and supplementary angles.)
c. Identify angles formed when two parallel lines are cut by a transversal.
d. Use a protractor to measure and construct acute, right, and obtuse angles.
e. Identify regular polygons up to dodecagons.
f. Identify and classify triangles by sides and angles.
g. Find the sum of the interior angles of a triangle and calculate the measure of a missing angle.
h. Compare, classify, and analyze geometric relationships in quadrilaterals by length of sides and measure of angles.
i. Explore the relationship between the number of angles in a polygon and the measures of interior angles. Determine the measure of a missing angle.
j. Determine the relationship between the legs and hypotenuse of right triangles.
k. Use the Pythagorean theorem to determine the hypotenuse.
l. Identify and describe congruent and similar polygons and their corresponding parts.
m. Analyze translations, reflections, and rotations of geometric figures.
n. Locate points on a number line and on a coordinate graph in all four quadrants.
o. Identify, describe, and plot the results of transformations on a coordinate plane in all four quadrants.
p. Identify and describe the parts of a circle.
q. Identify and classify triangular and rectangular pyramids and prisms by the number of edges, faces, vertices, and base.
r. Explore Euler's Formula to show the relationship among the number of faces, vertices, and edges of 3-dimensional figures.
s. Compare a plane figure to the surfaces of solid geometric figures through the exploration of nets.

Unit 8 – Measurement
Standard 3.0 – Students will identify attributes, units, or systems of measurements or apply a variety of techniques, formulae, tools, or technology for determining measurements.
Objectives – The student will be able to:

a. Construct angle bisectors using the appropriate tools.
b. Construct perpendicular bisectors using the appropriate tools.
c. Describe the relationship between the parts of a circle.
d. Recognize and interpret π.
e. Find the circumference of a circle given the radius and diameter.
f. Construct a circle with a specific radius or diameter using a compass or ruler.
g. Discover and calculate the area of triangles, trapezoids, parallelograms, and circles using appropriate formulas.
h. Calculate the area and perimeter of composite figures consisting of rectangles, triangles, and/or circles.
i. Determine the lengths of the sides of a regular polygon given the perimeter.
j. Calculate the surface area of a rectangular prism, rectangular pyramid, and a cylinder using the appropriate formulas.
k. Calculate the volume of solid figures including cylinders, rectangular prisms, and triangular prisms.

Unit 9 – Number Relationships and Computation (Integers)
Standard 6.0 – Number Relationships and Computation/Arithmetic
Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil, or technology.
Objectives – The student will be able to:
a. Read, write, and represent integers and their absolute values.
b. Compare and order integers using relational symbols (<, >, =) and on a number line.
c. Add, subtract, multiply, and divide integers.
d. Calculate powers of integers.
e. Use order of operations to evaluate mathematical expressions with integers.

QUARTER 4:

Standard 7.0 – Processes of Mathematics: Students demonstrate the processes of mathematics by making connections and applying reasoning to solve problems and to communicate their findings.
(These processes serve as the foundation for the delivery of all mathematics content objectives.)

Objectives – The student will be able to:
a. Select and apply a variety of concepts, processes, and skills to solve problems. (Problem Solving)
b. Justify ideas or solutions with mathematical concepts or proofs. (Reasoning)
c. Present mathematical ideas using words, symbols, visual displays, or technology. (Communication)
d. Relate or apply mathematics within the discipline, to other disciplines, and to life. (Connections)

Unit 10 – Algebra, Patterns, and Functions
Standard 1.0 – Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.
Objectives – The student will be able to:
a. Write and evaluate algebraic expressions to represent unknown quantities using whole numbers, fractions, and decimals.
b. Simplify algebraic expressions represented by physical models by combining like terms.
c. Simplify algebraic expressions by combining like terms.
d. Write equations to represent relationships and real-life situations.
e. Solve for the unknown in one- and two-step equations.

f. Identify and write inequalities to represent relationships and real world situations.
g. Solve an inequality with one variable and graph solutions on a number line.
h. Graph linear data from a function table.
i. Identify and describe the change represented in a linear graph.
j. Translate the graph of a linear relationship on to a table of values that illustrates the type of change.
k. Explore the rate of change (slope) of a linear relationship using a table of values and a graph.
l. Apply linear equations and their function tables and graphs to real-life situations (d = rt).
m. Interpret and construct a scatter plot.
n. Analyze data to determine positive, negative, or no correlation.

Unit 11 – Number Relationships and Computation (Ratios, Proportions, and Percents)
Standard 6.0 – Number Relationships and Computation/Arithmetic
Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil, or technology.
Objectives – The student will be able to:

a. Represent ratios in a variety of ways.
b. Use rates and unit rates to solve problems.
c. Write a proportion with a missing element to solve a problem.
d. Use proportional reasoning to determine the missing dimension in scale drawings.
e. Use proportionality in determining similarity in plane figures.
f. Investigate the meanings of percents, less than 1%, and greater than 100%.
g. Estimate and compute a percent of a given number.
h. Apply the formula I=prt to calculate simple interest.
i. Calculate discounts, sale price, and sales tax.
j. Explore the construction of circle graphs as an application of percent.