THE ACADEMY FOR GIFTED CHILDREN - P.A.C.E.
CURRICULUM OUTLINE
GRADE 8 PRE-AP MATH

OVERALL EXPECTATIONS
By the end of the year, students will:

Social-Emotional Learning Skills and the Mathematical Processes
• apply, to the best of their ability, a variety of social-emotional learning skills to support their use of the mathematical processes and their learning in connection with the expectations in theother five strands of the mathematics curriculum, *Ongoing throughout the year.

Number
• represent, compare, and order numbers, including integers;
• review an understanding of addition and subtraction of fractions and integers, and apply a variety of computational strategies to solve problems involving whole numbers and decimal numbers;
• demonstrate an understanding of proportional relationships using percent, ratio, and rate;
• represent, compare, and order equivalent representations of numbers, including those involving positive exponents;
• review problems involving whole numbers, decimal numbers, fractions, and integers, using a variety of computational strategies;
• solve problems by using proportional reasoning in a variety of meaningful contexts.

Algebra
• represent linear growing patterns (where the terms are whole numbers) using graphs, algebraic expressions, and equations;
• review modeling of linear relationships graphically and algebraically, and solve and verify algebraic equations;
• demonstrate an understanding of the point of intersections of the graphs of linear equations.

Linear Relations (Differentiated for P.A.C.E. students)
• apply data-management techniques to investigate relationships between two variables;
• demonstrate an understanding of the characteristics of a linear relation;
• connect various representations of a linear relation.

Spatial Sense
Geometric and Spatial Reasoning
• represent tessellations and transformations using the Cartesian coordinate plane, and make connections between transformations and the real world.
• review an understanding of the geometric properties of quadrilaterals and circles and the applications of geometric properties in the real world;
• review geometric relationships involving lines, triangles, and polyhedra, and solve problems involving lines and triangles;

Measurement
• report on research into real-life applications of measurements;
• review the relationships among units and measurable attributes, including the area of a trapezoid and the volume of a right prism;
• determine the relationships among units and measurable attributes, including the length, area and volume of 2- and 3-dimensional objects, using appropriate formulae.

Analytic Geometry (Differentiated for P.A.C.E. students)
• determine the relationship between the form of an equation and the shape of its graph with respect to linearity and non-linearity;
• determine, through investigation, the properties of the slope and y-intercept of a linear relation;
• solve problems involving linear relations.

Data – completed in grade 7

Financial Literacy
• demonstrate the knowledge and skills needed to make informed financial decisions

Specific Expectations
By the end of the year students will:

Number – 20 HOURS
Number Sense:
Rational and Irrational Numbers
– express repeated multiplication using exponential notation
– represent whole numbers in expanded form using powers of ten;
-describe, compare, and order rational and irrational numbers separately and in combination, in various contexts
– translate between equivalent forms of a number;
– determine common factors and common multiples using the prime factorization of numbers;

Fractions, Decimals, and Percents
– solve multi-step problems arising from real-life contexts and involving fractions, decimals, and percents using a variety of tools and strategies;
– solve problems involving percents expressed to one decimal place and whole-number percents greater than 100;
– use estimation when solving problems involving operations with whole numbers, decimals, percents, integers, and fractions, to help judge the reasonableness of a solution;

Operations:
Properties and Relationships
– solve problems involving operations with integers, using a variety of tools;
– evaluate expressions that involve integers, including expressions that contain brackets and exponents, using order of operations;
– estimate, and verify using a calculator, the positive square roots of whole numbers, and distinguish between whole numbers that have whole-number square roots (i.e., perfect square numbers) and those that do not;
– identify and describe real-life situations involving two quantities that are directly proportional;
– solve problems involving proportions, using concrete materials, drawings, and variables;
– solve problems involving percent that arise from real-life contexts;
– solve problems involving rates.

Math Facts
-understand and recall commonly used percents, fractions, and decimal equivalents

Mental Math
-drills involving decimals and percent

Addition and Subtraction
-solve problems involving addition and subtraction of integers;
– solve problems involving addition and subtraction with fractions.

Multiplication and Division
– represent the multiplication and division of integers, using a variety of tools;
– represent the multiplication and division of fractions, using a variety of tools and strategies;
– multiply and divide decimal numbers by various powers of ten

Algebra – 21 HOURS
Patterns and Relationships:
Patterns
– represent, through investigation with concrete materials, the general term of a linear pattern, using one or more algebraic expressions;
– represent linear patterns graphically (i.e., make a table of values that shows the term number and the term, and plot the coordinates on a graph), using a variety of tools;
– determine a term, given its term number, in a linear pattern that is represented by a graph or an algebraic equation;
– describe different ways in which algebra can be used in real-life situations;
– model linear relationships using tables of values, graphs, and equations, through investigation using a variety of tools;

Equations and Inequalities:
Variables and Expressions
– translate statements describing mathematical relationships into algebraic expressions and equations;

– evaluate algebraic expressions with up to three terms, by substituting fractions, decimals, and integers for the variables (e.g., evaluate 3x + 4y = 2z, where x = 1/2, y = 0.6, and z = –1);

Equalities and Inequalities
– solving and verify linear equations involving a one-variable term and having solutions that are integers, by using inspection, guess and check, and a "balance" model;
– graph two or more relations using a variety of tools and understand the significance of their points of intersection in a variety of meaningful contexts;
– explore graphs of two or more relations using a variety of tools and interpret their points of intersection**.**

Coding: Specialized class offered
-solve problems and create computational representations of mathematical situations using coding concepts and skills
Coding
-solve problems and create computational representations of mathematical situations by writing and executing efficient code, including code that involves event influenced by a defined count and/or sub-program and other control structures;
-read and alter existing code, including code that involves events influenced by a defined count and/or sub-program and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code.

<u>Linear Relations</u> – 21 HOURS (differentiated for P.A.C.E. students)
– interpret the meanings of points on scatter plots or graphs that represent linear relations, including scatter plots or graphs in more than one quadrant;
pose problems, identify variables, and formulate hypotheses associated with relationships between two variables;
– construct tables of values, graphs, and equations, using a variety of tools (e.g., graphing calculators, spreadsheets, graphing software, paper and pencil), to represent linear relations derived from descriptions of realistic situations;
– construct tables of values, scatter plots, and lines or curves of best fit as appropriate, using a variety of tools, for linearly related and non-linearly related data collected from a variety of sources;
– identify, through investigation, some properties of linear relations (i.e., numerically, the first difference is a constant, which represents a constant rate of change; graphically, a straight line represents the relation), and apply these properties to determine whether a relation is linear or non-linear;
– determine the equation of a line of best fit for a scatter plot, using an informal process;
– determine values of a linear relation by using a table of values, by using the equation of the relation, and by interpolating or extrapolating from the graph of the relation;
– describe a situation that would explain the events illustrated by a given graph of a relationship between two variables;
– determine other representations of a linear relation, given one representation;
– describe the effects on a linear graph and make the corresponding changes to the linear equation when the conditions of the situation they represent are varied;
– describe the meaning of the slope and y-intercept for a linear relation arising from a realistic situation;
– identify and explain any restrictions on the variables in a linear relation arising from a realistic situation;
– determine graphically the point of intersection of two linear relations, and interpret the intersection point in the context of an application.

<u>Spatial Sense</u> – 22 HOURS
Geometric and Spatial Reasoning:
Geometric Reasoning
-identify geometric properties of tessellating shapes and identify the transformations that occur in the tessellations
-review objects using appropriate scales, given their top, front, and side views or their perspective views
-use scale drawings to calculate actual lengths and areas, and reproduce scale drawings at different ratios

Location and Movement:
– graph the image of a point, or set of points, on the Cartesian coordinate plane after applying a transformation to the original point;
– review real-world movements that are translations, reflections, and rotations.

Measurement:
Metric System
Represent very large (mega, giga, tera) and very small (micro, nano, pico) metric units using models, base ten relationships and exponential notation

Line and Angles
– determine, through investigation using a variety of tools and strategies the angle relationships for intersecting lines and for parallel lines and transversals, and the sum of the angles of a triangle;
– solve angle-relationship problems involving intersecting lines, and parallel lines and transversals;

Length, Area, and Volume
-solve problems involving the perimeter, circumference, area, volume, and surface area of composite two-dimensional shapes and three-dimensional object, using appropriate formulae for rectangle, parallelograms, triangles, trapezoids, circles, prisms, and cylinders;
– determine the Pythagorean relationship, through investigation using a variety of tools and strategies;
– solve problems involving right triangles geometrically, using the Pythagorean relationship;

Analytic Geometry – 20 HOURS (differentiated for P.A.C.E. students)
– determine, through investigation, the characteristics that distinguish the equation of a straight line from the equations of nonlinear relations;
– identify, through investigation, the equation of a line in any of the forms y = mx + b, Ax + By + C = 0, x /a+y / b = 1;
– express the equation of a line in the form y = mx + b, given the form Ax + By + C = 0;
– determine, through investigation, various formulae for the slope of a line segment or to determine the slope of a line segment or a line;
– identify, through investigation with technology, the geometric significance of y, m, x and b in the equation y = mx + b;
– determine, through investigation, connections among the representations of a constant rate of change of a linear relation;
– identify, through investigation, properties of the slopes of lines and line segments (e.g., direction, positive or negative rate of change, steepness, parallelism, perpendicularity), using graphing technology to facilitate investigations, where appropriate, graph lines by hand, using a variety of techniques;
– determine the equation of a line from information about the line (e.g., the slope and y-intercept; the slope and a point; two points;).

Financial Literacy- 6 HOURS
-describe some advantages and disadvantages of various methods of payment that can be used when dealing with multiple currencies and exchange rates
- create a financial plan to reach a long-term financial goal, accounting for income, expenses, and tax implications
- identify different ways to maintain a balanced budget, and use appropriate tools to track all income and spending, for several different scenarios
- determine the growth of simple and compound interest at various rates using digital tools, and explain the impact interest has on long-term financial planning
- compare various ways for consumers to get more value for their money when spending, including taking advantage of sales and customer loyalty and incentive programs, and determine the best choice for different scenarios
- compare interest rates, annual fees, and rewards and other incentives offered by various credit card companies and consumer contracts to determine the best value and the best choice for different scenarios

ASSESSMENT AND EVALUATION

ASSESSMENT FOR LEARNING (ongoing throughout the year)

	Knowledge/ Understanding	Application	Thinking/ Inquiry	Communication
Checklist	✓			
Discussion		✓	✓	✓
Math/Verb Drills	✓	✓		
Observation		✓		
Group work(independent evaluation)		✓		
Homework Check	✓	✓	✓	✓
Questioning	✓	✓	✓	✓
Quiz	✓	✓	✓	✓

ASSESSMENT AS LEARNING (ongoing throughout the year)

	Knowledge/ Understanding	Application	Thinking/ Inquiry	Communication
Conversation	✓	✓	✓	✓
Self-reflection	✓	✓	✓	✓
Discussion				✓

ASSESSMENT OF LEARNING (EVALUATION)

	Term I	Term II	Term III
Knowledge/Understanding	**20%** • Conversations • Observations • Test	**20%** • Conversations • Observations • Test	**20%** • Conversations • Observations • Test • Rich Performance Task
Application	**35%** • Conversations • Observations • Test	**35%** • Conversations • Observations • Test • Rich Performance Task	**35%** • Conversations • Observations • Test • Rich Performance Task
Thinking/Inquiry	**25%** • Conversations • Observations • Test	**25%** • Conversations • Observations • Test • Rich Performance Task	**25%** • Conversations • Observations • Test • Rich Performance Task
Communication	**20%** • Conversations • Observations • Test	**20%** • Conversations • Observations • Test	**20%** • Conversations • Observations • Test • Rich Performance Task
Total	**100%**	**100%**	**100%**

Final evaluation will be comprised of (Term I + Term II + Term III)/3