Grade 10 Integrated Mathematics 2
Annual Curriculum Map

Overview: The 10th grade math program integrates Algebra, Geometry, Statistics and Probability, Logical Reasoning, Measurement, and Discrete mathematics. The math program is spiraled and incorporates skills within its frameworks: Number Sense and Operations; Patterns, Relations, and Algebra; Geometry; Measurement; and Data Analysis, Statistics, and Probability. Emphasis is placed on problem solving, critical thinking, communication, and connections among the mathematical topics and other subject areas. Through the integration of different strategies including visual and hands-on approaches, real life applications, exploratory activities and projects, use of technology, group work and open-ended problem solving, students develop stronger conceptual and problem skills.

	September-November (Term 1)	November-January (Term 2)	January-March (Term 3)	March-June (Term 4)	July-August (Term 5)
Units/Big Ideas	**Sampling and Reasoning** **1-1 Surveys and Samples** Exploring how surveys and samples can be used to make predictions. **1-2 Simulation** Experimenting to simulate surveys and to estimate probabilities. **1-3 Sampling Methods** Investigating types of samples and some ways of selecting a random sample. **1-4 Cautions in Using Statistics** Recognizing factors that influence statistics and survey results. **1-5 Inductive Reasoning** Making conjectures and finding counterexamples to disprove generalizations. **1-6 Deductive Reasoning** Using if-then statements, Venn diagram, and deductive reasoning. **1-7 Errors in Reasoning** Reasoning in a variety of situations. Recognizing mistakes in reasoning. Models of Variation and Growth **-Project**	**Linear Systems and Matrices** **3-1 Systems and Graphs** Solving systems of linear equations and inequalities by graphing. Applying systems to solve real-world problems. **3-2 Solving Systems by Substitution** Using substitution to solve systems of equations and real-world applications. **3-3 Slopes and Systems** Exploring the relationship between slopes and the number of solutions of a system. Investigating the relationship between the slopes of parallel and perpendicular lines. **3-5 Matrix Operations** Analyzing real-world data using scalar multiplication, matrix, addition and subtraction, and technology. **3-6 Matrices and Transformations** Investigating changes in the size or position of a polygon using matrices. **3-7 Matric Multiplication** Using matrix multiplication and technology in real-world situations.	**Quadratic Functions and Graphs** **4-1 Graphing Quadratic Functions** Graphing quadratic functions using technology. Finding the vertex, line of symmetry, and intercepts of a parabola. **4-2 Translating Parabolas** Using technology to explore how changes in the equation of a quadratic function affect its graph. **4-3 Solving Equations Using Square Roots** Solving quadratic equations by using square roots and by graphing. Solving problems using quadratic equations. **4-4 Solving Equations Using Factoring** Factoring trinomials using algebra tiles, trial-and-error, and special patterns. Solving quadratic equations and real-world problems by factoring. **4-5 The Quadratic Formula** Using the quadratic formula to solve quadratic equations and real-world problems. **4-6 The Discriminant and Complex Numbers** Exploring the discriminant of a quadratic equation and operations with complex numbers. Solving quadratic equations with complex	**Similar and Congruent Triangles** **8-1 Converses and Parallel Lines** Exploring and proving theorems about parallel and perpendicular lines. **8-2 The Triangle Sum Theorem** Using technology and manipulatives to explore angles relates to triangles and quadrilaterals. **8-3 Similar Triangles** Investigating similarity in both geometric and real-world settings. Writing proofs involving similarity. **8-4 Congruent Triangles: ASA and AAS** Exploring two theorems about congruent triangles. Showing that corresponding parts are equal in measure. **8-5 Congruent Triangles: SAS and SSS** Investigating and using two triangle congruence postulates. Exploring bisectors of angles and segments. **8-6 Congruence and Isosceles Triangles** Using the properties of isosceles triangles and the perpendicular bisector to reach conclusions in mathematical and real-life situations.	**Logic and Proof** **7-1 Using *And, Or, Not*** Using *and, or and not* with a database. Graphing mathematical statements involving these words. **7-3 Valid and Invalid Arguments** Using rules of logic, symbols, and Venn diagrams to reach conclusions and to decide if an argument is valid or invalid. **7-4 Biconditionals and Good Definitions** Writing good definitions and making valid arguments using "if and only if" statements. **7-5 Introduction to Proof** Analyzing a real-world situation to introduce proofs in a two-column form, paragraph form, and flow form. **7-6 Postulates and Proofs in Algebra** Writing proofs using properties of algebra. **7-7 Proofs for Angles** Using postulates, definitions, given information, and proven theorems to write proofs about angles. **7-8 Proofs about Parallel Lines** Exploring angles formed by parallel lines. Writing proofs about parallel lines and angles.

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Units/Big Ideas	**Models of Variation and Growth** **2-1 Functions and Graphs** Recognizing and interpreting graphs of functions, including growth and decay graphs. Finding the domain and range. **2-2 Linear Models and Direct Variation** Modeling real-world situations using linear functions and equations. Exploring direct variation and slope-intercept form. **2-3 Inverse Variation** Exploring hyperbolas and modeling real-world situations involving constant products. **2-4 Surface Area and Volume of Spheres** Applying formulas related to spheres and the similarity of spheres to solve real-world problems. *** Note: Use Study Guides from Integrated Mathematics 1 Chapter 9 to review area, volume, and surface** **-Project**	**3-8 Using Technology and Matrices with Systems** Finding inverse matrices, solving systems of equations, and modeling real-world problems using technology. **Coordinate Geometry and Quadrilaterals** **5-1 Quadrilaterals** Exploring the characteristics of special quadrilaterals. Classifying quadrilaterals. **5-2 The Distance Formula and Quadrilaterals** Using the formulas for slope and distance to explore quadrilaterals and their properties on the coordinate plane. **10-5 The Distance Formula in Three Dimensions** Exploring the length of a diagonal of a box. Using the distance formula for points in space in real-world applications. **10-6 Circles and Spheres** Graphing circles. Using the equations for a circle and a sphere in real-life situations **5-3 Midpoints** Using the formula for the midpoint of a segment in a variety of situations. **10-4 Coordinates in Three Dimensions** Using a three-dimensional coordinate system to locate points in a space and to find the midpoint of a segment in space. **5-4 Coordinates and Transformations** Investigating the effects of reflections, translations, rotations, and dilations on	solutions. **4-7 Quadratic Systems** Solving quadratic systems by substitution and by graphing. Modeling real-world problems using quadratic systems. **3-4 Solving Systems by** Addition-or-Subtraction Using addition-or-subtraction to solve systems and real-world problems. Choosing the most appropriate method of solution. **9-3 Solving Rational Equations** Using cross products and common multiples to solve rational equations in real-world contexts. Recognizing extraneous roots. **Counting Strategies, probability, Binomials** **6-1 Exploring Counting Problems** Using tree diagrams, tables, and systematic lists to count outcomes, choices, and possibilities. **6-2 Counting and Permutations** Using the multiplication counting principle to find the number of different arrangements of a group of items. **6-3 Probability and Odds** Investigating the probability of an event, of mutually exclusive events, and of complementary events. Computing the odds in favor and against an event. **6-4 Compound Events** Using area models and formulas to find the probability of independent and dependent events.	**8-7 Similarity in Right Triangles** Exploring properties of right triangles, including the Pythagorean theorem. Finding geometric means. **8-8 Special Right Triangles and Trigonometry** Using trigonometry and properties of special right triangles to find angle measures and segment lengths. Polynomial and Rational Functions **7-2 Implications** Representing if-then statements and their converses with symbols and Venn diagrams. ***Note: Use Skills 20, 30, and 31 to review right triangle trigonometry.** **Polynomial and Rational Numbers** **9-1 Polynomial and Rational Models** Modeling real-world situations with equations. Exploring polynomial and rational equations. **9-2 Power and Quotient Rules** Exploring and using rules of exponents. Factoring polynomials. **9-4 Graphing Cubic Functions** Exploring the zeros and the graphs of cubic functions written in factored form. **9-5 Solving Cubic Equations** Solving cubic equations using graphs, formulas, and factoring. Using cubic equations to solve real-world problems.	**5-6 Exploring Properties** Exploring and verifying properties of polygons using coordinate geometry and deductive reasoning. **Coordinates and Figures in Space** **10-1 Figures in Space** Visualizing space figures and their cross sections. Building models for space figures. **10-2 Rotations in Space** Investigating space figures formed by rotating a place figure around a line. **10-3 Points That Fit Conditions** Describing sets of points in a plane and in space that meet one or more conditions. **-Project**

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		geometric figures on the coordinate plane. **5-5 Coordinates for Triangles and Quadrilaterals** Placing polygons on the coordinate plane in standard position to simplify coordinates. **5-6 Exploring Properties** Exploring and verifying properties of polygons using coordinate geometry and deductive reasoning. **-Project**	**6-5 Combinations** Finding the number of ways to make a selection from a group of items. **6-6 Pascal's Triangle** Exploring properties of PASCAL's triangle. **6-7 Binomial Experiments with P = 1/2** Investigating probabilities for special binomial experiments using PASCAL's triangle and tree diagrams. **6-8 Binomial Experiments with P≠ 1/2** Investigating probabilities for any binomial experiment using PASCAL's triangle and tree diagrams. **6-9 The Binomial Theorem** Using PASCAL's triangle and the binomial theorem to expand (a + b)n. Using area and volume models to represent $(a + b)^2$ and $(a + b)^3$ **-Project**	**9-6 Parametric Equations** Using tables and technology to solve equations that give x and y in terms of a third variable. Using these equations to solve real-world situations. **2-5 Direct Variation with Powers** Modeling real-world situations in which one quantity is proportional to the square or the cube of another quantity. **2-6 Using Powers** Investigating negative, zero, and fractional exponents. Using exponents in real-world situations **2-7 Doubling and Halving** Modeling exponential growth and decay using tables, graphs, and equations. **3-4 Solving Systems by Addition-or-Subtraction** Using addition-or-subtraction to solve systems and real-world problems. Choosing the most appropriate method of solution. **4-1 Graphing Quadratic Functions** Graphing quadratic functions using technology. Finding the vertex, line of symmetry, and intercepts of a parabola. **-Project**	
Major Projects	*Suggested projects for review:* *-Disposal Proposal* *-Be a Park Guide*	*-Suggested Project:* *-Design Your Own Home* ***(See Science and Technology/Engineering)***	*Suggested Project:* *-Design a Fountain*	*Suggested project:* *-Air Your Opinion* *-Debate* ***(See Science and Technology/Engineering)***	*Suggested Project:* *-Design and Build a Container* ***(See Science and Technology/Engineering)***

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Materials	McDougal Littell *Integrated Mathematics 2* *Study Guide* *Assessment Book* *Warm-up Transparencies* *Skills Bank* *Teacher's Resource for Transfer Students* *Explorations Lab Manual* *Activity Bank* *Practice Bank* *Project Book* www.mcdougallittell.com	McDougal Littell *Integrated Mathematics 2* *Study Guide* *Assessment Book* *Warm-up Transparencies* *Skills Bank* *Teacher's Resource for Transfer Students* *Explorations Lab Manual* *Activity Bank* *Practice Bank* *Project Book* www.mcdougallittell.com	McDougal Littell *Integrated Mathematics 2* *Study Guide* *Assessment Book* *Warm-up Transparencies* *Skills Bank* *Teacher's Resource for Transfer Students* *Explorations Lab Manual* *Activity Bank* *Practice Bank* *Project Book* www.mcdougallittell.com	McDougal Littell *Integrated Mathematics 2* *Study Guide* *Assessment Book* *Warm-up Transparencies* *Skills Bank* *Teacher's Resource for Transfer Students* *Explorations Lab Manual* *Activity Bank* *Practice Bank* *Project Book* www.mcdougallittell.com	McDougal Littell *Integrated Mathematics 2* *Study Guide* *Assessment Book* *Warm-up Transparencies* *Skills Bank* *Teacher's Resource for Transfer Students* *Explorations Lab Manual* *Activity Bank* *Practice Bank* *Project Book* www.mcdougallittell.com
Assessment	-Journals -Projects -Demonstration /Performance -Problem Solving -Portfolio	-Journals -Projects -Demonstration/ Performance -Problem Solving -Portfolio	-Journals -Projects -Demonstration/ Performance -Problem Solving -Portfolio	-Journals -Projects -Demonstration/ Performance -Problem Solving -Portfolio	-Journals -Projects -Demonstration/ Performance -Problem Solving -Portfolio

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Grade 9-Learning Standard Checklist (Also used for MCAS Alternative Assessment)

Strand/Standard	Essence of the Standard(s)	Learning Standards as written	
Strand: **Number Sense and Operations** *-Understand numbers, ways of representing numbers, relationships among numbers, and number systems* *-Understand meanings of operations and how they relate to one another* *-Compute fluently and make reasonable estimates*	-Use properties of operations on real numbers, including: • Associative, commutative and distributive properties • Identify and inverse elements • n^{th} roots, including the inverse relationship between the n^{th} root and the n^{th} power -Simplify expressions involving: • Positive integer exponents • Absolute value -Continue to solve problems with accuracy, efficiency, and simplicity	☐ 10.N.1 Identify and use the properties of operations on real numbers, including associative, commutative, and distributive properties; the existence of the identity and inverse elements for addition and multiplication; the existence of the n^{th} roots of positive real numbers for any positive integer n; and the inverse relationship between taking the n^{th} root and the n^{th} power of a positive real number.	☐ 10.N.2 Simplify numerical expressions, including those involving positive integer exponents or the absolute value; apply such simplifications in the solution of problems.
Strand: **Patterns, Relations, and Algebra** *-Understand patterns, relations, and functions* *-Represent and analyze mathematical situations and structures using algebraic symbols* *-Analyze change in various contexts*	-Identify, reproduce, create, continue, represent, and extend patterns (e.g. "What comes next?) with fluency and increased complexity of patterns -Understand the relationship between number operations and patterns (using number lines, tables, graphs) -Relate various representations of a line	☐ 10.P.2 Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line. Find a linear equation describing a line from a graph or a geometric description of the line. Explain the significance of a positive, negative, zero, or undefined slope.	☐ 10.P.4 Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and collecting terms; factoring; identify and canceling factors in rational expressions; and applying the properties of positive integer exponents.
	-Solve quadratic equations -Demonstrate the symbolic manipulation of polynomial rational expressions	☐ 10.P.5 Find solutions to quadratic equations (with real roots) by factoring, completing the square, or using the quadratic formula. Demonstrate an understanding of the equivalence of the methods.	☐ 10.P.7 Solve everyday problems that can be modeled using linear, reciprocal, quadratic, or exponential functions. Apply appropriate tabular, graphical, or symbolic methods to the solution. Include compound interest, and direct and inverse variation problems. Use technology when appropriate.

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Strand/Standard	Essence of the Standard(s)	Learning Standards as written	
Strand: **Geometry** *-Analyze characteristics and properties of two-and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships*	***Learning Standard for: Characteristics of Geometric Shapes*** -Identify more complex figures and determine types of symmetry -Draw congruent and similar figures using a variety of tools -Recognize and solve problems associated with radii, chords, and arcs -Use congruence and similarity to find missing quantities in geometric figures -Justify answers/prove results	☐ 10.G.1 Identify figures using properties of sides, angles, and diagonals. Identify the figures' type(s) of symmetry. ☐ 10.G.2 Draw congruent and similar figures using a compass, straightedge, protractor and other tools such as computer software. Make conjectures about methods of construction. Justify the conjectures by logical arguments.	☐ 10.G.3 Recognize and solve problems involving angles formed by transversals of coplanar lines. Identify and determine the measure of central and inscribed angles and their associated minor and major arcs. Recognize and solve problems associated with radii, chords, and arcs within or on the same circle. ☐ 10.G.4 Apply congruence and similarity correspondences and properties of the figures to find missing parts of geometric figures, and provide logical justification.
–Specify locations and describe spatial relationships using coordinate geometry and other representational systems	***Learning Standard for: Spatial Relationships/Coordinate Geometry*** -Apply coordinate geometry -Perform calculations involving: • Midpoints of segments • Slopes of lines/segments • Distances between two points -Solve problems using above calculations -Find linear equations for lines	☐ 10.G.7 Using rectangular coordinates, calculate midpoints of segments, slopes of lines and segments, and distances between two points, and apply the results to the solutions.	☐ 10.G.8 Find linear equations that represent lines either perpendicular or parallel to a given line and through a point e.g. by using the "point-slop" form of the equation.
-Apply transformations and use symmetry to analyze mathematical situations	***Learning Standard for: Transformation/Symmetry*** -Identify types of symmetry using properties of : • Sides • Angles • Diagonals -Interpret and draw transformations on figures using a coordinate plane -Apply transformations to the solutions of problems	☐ 10.G.1 Identify figures using properties of sides, angles, and diagonals. Identify the figures' type(s) of symmetry.	☐ 10.G.9 Draw results and interpret transformations on figures in the coordinate plane e.g. translations, reflections, rotations, scale factors, and the results of successive transformations. Apply transformation to the solutions of problems.
-Use visualization, spatial reasoning, and geometric modeling to solve problems	***Learning Standard for: Visualization/Spatial Reasoning/Geometric Modeling*** -Solve simple triangle problems -Use properties of special triangles (i.e. isosceles, equilateral) when solving problems _Visualize solid objects and recognize cross sections and projections -Solve problems using vertex-edge graphs	☐ 10.G.5 Solve simple triangle problems using the triangle sum property and/or the Pythagorean theorem. ☐ 10.G.6 Use the properties of special triangles to solve problems. (Must show at least 30°-60°-90°and 45°-45°-90°)	☐ 10.G.10 Demonstrate the ability to visualize solid objects and recognize their projections and cross sections. ☐ 10.G.11 Use vertex-edge graphs to model and solve problems (i.e. network).

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Strand/Standard	Essence of the Standard(s)	Learning Standards as written	
Strand: **Measurement** *-Understand measurable attributes of objects and the units, systems, and processes of measurement* *-Apply appropriate techniques, tools, and formulas to determine measurements*	-Determine surface area, perimeter, circumference, and volume of more complex shapes -Describe how a change in one attribute causes changes in other attributes of an object -Estimate measurements and determine situations in which to apply estimations	☐ 10.M.1 Calculate perimeter, circumference, and area of common geometric figures such as parallelograms, trapezoids, circles, and triangles. (Include a variety of figures). ☐ 10.M.2 Given the formula, find the lateral area, surface area, and volume of prisms, pyramids, spheres, cylinders, and cones, e.g. find the volume of a sphere with a specified surface area.	☐ 10.M.3 Relate changes in the measurement of one attribute of an object to changes in other attributes, e.g. how changing radius or height of a cylinder affects area or volume.
Strand: **Data Analysis, Statistics, & Probability** *-Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them* *-Select and use appropriate statistical methods to analyze data* *-Develop and evaluate inferences and predictions that are based on data* *-Understand and apply basic concepts of probability*	-Select, create, and interpret the appropriate graphical representation for a set of data -Compare sets of data using different graphical representations -Identify the trend line for a set of data -Use technology to represent data in graphical format(s)	☐ 10.D.1 Select, create, and interpret an appropriate graphical representation (e.g. scatterplot, table, stem-and-leaf plots, box- and –whisker plot, circle graph, line graph, line plot) for a set of data and use appropriate statistics (e.g. mean, median, range, mode) to communicate information about the data. Use these notions to compare different sets of data. ☐ 10.D.2 Approximate a line of best fit (i.e. **draw a trend line**) given a set of data (e.g. scatterplot). Use technology when appropriate.	