MIDLAND ISD
ADVANCED PLACEMENT CURRIULUM STANDARDS

	MATHEMATICS – GRADE 8	
TEKS	**COLLEGE BOARD**	**COLLEGE AND CAREER READINESS STDS**
(1) Number, operation, and quantitative reasoning. The student understands that different forms of numbers are appropriate for different situations. The student is expected to: **(A)** compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals; **(B)** select and use appropriate forms of rational numbers to solve real-life problems including those involving proportional relationships; **(C)** approximate (mentally and with calculators) the value of irrational numbers as they arise from problem situations (such as p, Ö2); **(D)** express numbers in scientific notation, including negative exponents, in appropriate problem situations; and **(E)** compare and order real numbers with a calculator. **(2) Number, operation, and quantitative reasoning. The student selects and uses appropriate operations to solve problems and justify solutions. The student is expected to:** **(A)** select appropriate operations to solve problems involving rational numbers and justify the selections; **(B)** use appropriate operations to solve	**Standard MII.1: Integers and Rational Numbers** **MII.1.1** Student models operations, computes fluently, and solves problems with integers. **MII.1.2** Student computes fluently with rational numbers written in fraction and decimal forms, and student solves problems involving rational numbers. **MII.1.3** Student describes the real numbers as the set of all decimal numbers and uses scientific notation, estimation, and properties of operations to represent and solve problems involving real numbers. **MII.1.4** Student reasons with ratios, rates, percents, and proportional relationships to solve problems and interpret results. **Standard MII.2: Two- and Three-Dimensional Geometry** **MII.2.1** Student formulates general statements relating two- and three-dimensional figures using their relevant characteristics and geometric properties. **MII.2.2** Student identifies, justifies, and applies angle relationships in describing geometric figures and relationships. **MII.2.3** Student relates and applies knowledge of rigid transformations.	**I. Numeric Reasoning** **A. Number representation** **1.** Compare real numbers. **2**. Define and give examples of complex numbers. **B. Number operations** **1.** Perform computations with real and complex numbers. **C. Number sense and number concepts** **1.** Use estimation to check for errors and reasonableness of solutions. **II. Algebraic Reasoning** **A. Expressions and equations** **1.** Explain and differentiate between expressions and equations using words such as “solve,” “evaluate,” and “simplify.” **B. Manipulating expressions** **1.** Recognize and use algebraic (field) properties concepts, procedures, and algorithms to combine, transform, and evaluate expressions (e.g., polynomials, radicals, rational expressions). **C. Solving equations, inequalities, and systems of equations** **1.** Recognize and use algebraic (field) properties concepts, procedures, and algorithms to solve equations, inequalities, and systems of linear equations. **2.** Explain the difference between the solution

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problems involving rational numbers in problem situations; **(C)** evaluate a solution for reasonableness; and (**D**) use multiplication by a given constant factor (including unit rate) to represent and solve problems involving proportional relationships including conversions between measurement systems. **(3) Patterns, relationships, and algebraic thinking. The student identifies proportional or non-proportional linear relationships in problem situations and solves problems. The student is expected to:** **(A)** compare and contrast proportional and non-proportional linear relationships; and **(B)** estimate and find solutions to application problems involving percents and other proportional relationships such as similarity and rates. **(4) Patterns, relationships, and algebraic thinking. The student makes connections among various representations of a numerical relationship. The student is expected to generate a different representation of data given another representation of data (such as a table, graph, equation, or verbal description).**	**Standard MII.3: Similarity and Measurement** **MII.3.1** Student identifies, describes, and applies similarity relationships to find measures of corresponding parts in similar figures and applies scales to measurements in drawings and maps. **MII.3.2** Student develops and applies the Pythagorean theorem to solve measurement problems. **MII.3.3** Student applies the concepts of surface area and volume to measure three-dimensional figures. **Standard MII.4: Bivariate Data** **MII.4.1** Student formulates questions about a small population that can be answered through collection and analysis of bivariate data, designs related data investigations, and collects data. **MII.4.2** Student organizes and summarizes bivariate data, examining data on the two attributes separately and together, and classifies each attribute as a categorical variable or numerical variable. Student uses summary statistics and a variety of graphical displays to represent the data. **MII.4.3** Student interprets results and communicates conclusions from a bivariate data analysis to answer the formulated	set of an equation and the solution set of an inequality. **D. Representations** **1.** Interpret multiple representations of equations and relationships. **2.** Translate among multiple representations of equations and relationships. **III. Geometric Reasoning** **A. Figures and their properties** **1.** Identify and represent the features of plane and space figures. **2.** Make, test, and use conjectures about one-,two-,and three-dimensional figures and their properties. **3.** Recognize and apply right triangle relationships including basic trigonometry. **B. Transformations and symmetry** **1**. Identify and apply transformations to figures. **2.** Identify the symmetries of a plane figure. **3**. Use congruence transformations and dilations to investigate congruence, similarity, and symmetries of plane figures. **C. Connections between geometry and other mathematical content strands** **1.** Make connections between geometry and algebra. **2**. Make connections between geometry, statistics, and probability.

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(5) Patterns, relationships, and algebraic thinking. The student uses graphs, tables, and algebraic representations to make predictions and solve problems. The student is expected to: **(A)** predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations; and **(B)** find and evaluate an algebraic expression to determine any term in an arithmetic sequence (with a constant rate of change). **(6) Geometry and spatial reasoning. The student uses transformational geometry to develop spatial sense. The student is expected to:** **(A)** generate similar figures using dilations including enlargements and reductions; and **(B)** graph dilations, reflections, and translations on a coordinate plane. **(7) Geometry and spatial reasoning. The student uses geometry to model and describe the physical world. The student is expected to:** **(A)** draw three-dimensional figures from different perspectives; **(B)** use geometric concepts and properties to solve problems in fields such as art and architecture; **(C)** use pictures or models to demonstrate the	question using appropriate symbols, notation, and terminology. Student identifies flaws in faulty or misleading presentations of bivariate data found in the media. **Standard MII.5: Probabilities in One-Stage Experiments** **MII.5.1** Student determines the sample space for one-stage experiments and determines, where possible, the theoretical probabilities for events defined on the sample space. Student describes and applies the addition rule for probabilities. **Standard MII.6: Linear Equations and Inequalities** **MII.6.1** Student interprets rate of change in real-world and in mathematical settings and recognizes the constant rate of change associated with linear relationships. **MII.6.2** Student creates one- and two-step linear equations and solves such equations using tables, coordinate graphs, and symbolic manipulation. **MII.6.3** Student represents and interprets inequalities in one variable geometrically and symbolically.	**3.** Make connections between geometry and measurement. **D. Logic and reasoning in geometry** **1.** Make and validate geometric conjectures. **2.** Understand that Euclidean geometry is an axiomatic system. **IV. Measurement Reasoning** **A. Measurement involving physical and natural attributes** **1**. Select or use the appropriate type of unit for the attribute being measured. **B. Systems of measurement** **1.** Convert from one measurement system to another. **2.** Convert within a single measurement system. **C. Measurement involving geometry and algebra** **1.** Find the perimeter and area of two-dimensional figures. **2.** Determine the surface area and volume of three-dimensional figures. 3. Determine indirect measurements of figures using scale drawings, similar figures, the Pythagorean Theorem, and basic trigonometry. **D. Measurement involving statistics and probability** **1**. Compute and use measures of center and spread to describe data. **2.** Apply probabilistic measures to practical

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Pythagorean Theorem; and **(D)** locate and name points on a coordinate plane using ordered pairs of rational numbers. **(8) Measurement. The student uses procedures to determine measures of three-dimensional figures. The student is expected to:** **(A)** find lateral and total surface area of prisms, pyramids, and cylinders using concrete models and nets (two-dimensional models); **(B)** connect models of prisms, cylinders, pyramids, spheres, and cones to formulas for volume of these objects; and **(C)** estimate measurements and use formulas to solve application problems involving lateral and total surface area and volume. **(9) Measurement. The student uses indirect measurement to solve problems. The student is expected to:** **(A)** use the Pythagorean Theorem to solve real-life problems; and **(B)** use proportional relationships in similar two-dimensional figures or similar three-dimensional figures to find missing measurements.		situations to make an informed decision. **V. Probabilistic Reasoning** **A. Counting principles** **1.** Determine the nature and the number of elements in a finite sample space. **B. Computation and interpretation of probabilities** **1.** Compute and interpret the probability of an event and its complement. **2.** Compute and interpret the probability of conditional and compound events. **VI. Statistical Reasoning** **A. Data collection** **1**. Plan a study. **B. Describe data** **1**. Determine types of data. **2.** Select and apply appropriate visual representations of data. **3.** Compute and describe summary statistics of data. **4.** Describe patterns and departure from patterns in a set of data. **C. Read, analyze, interpret, and draw conclusions from data** **1.** Make predictions and draw inferences using summary statistics. **2.** Analyze data sets using graphs and summary statistics.

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(10) Measurement. The student describes how changes in dimensions affect linear, area, and volume measures. The student is expected to: **(A)** describe the resulting effects on perimeter and area when dimensions of a shape are changed proportionally; and **(B)** describe the resulting effect on volume when dimensions of a solid are changed proportionally. **(11) Probability and statistics. The student applies concepts of theoretical and experimental probability to make predictions. The student is expected to:** **(A)** find the probabilities of dependent and independent events; **(B)** use theoretical probabilities and experimental results to make predictions and decisions; and **(C)** select and use different models to simulate an event. **(12) Probability and statistics. The student uses statistical procedures to describe data. The student is expected to:** **(A)** use variability (range, including interquartile range (IQR)) and select the appropriate measure of central tendency to describe a set of data and justify the choice for		**3.** Analyze relationships between paired data using spreadsheets, graphing calculators, or statistical software. **4.** Recognize reliability of statistical results. **VII. Functions** **A. Recognition and representation of functions** **1.** Recognize whether a relation is a function. **2.** Recognize and distinguish between different types of functions. **B. Analysis of functions** **1.** Understand and analyze features of a function. **2.** Algebraically construct and analyze new functions. **C. Model real world situations with functions** **1.** Apply known function models. **2.** Develop a function to model a situation. **VIII. Problem Solving and Reasoning** **A. Mathematical problem solving** **1**. Analyze given information. **2**. Formulate a plan or strategy. **3.** Determine a solution. **4**. Justify the solution. **5.** Evaluate the problem-solving process. **B. Logical reasoning** **1.** Develop and evaluate convincing arguments. **2**. Use various types of reasoning.

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a particular situation; **(B)** draw conclusions and make predictions by analyzing trends in scatterplots; and **(C)** select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, stem and leaf plots, circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology. **(13) Probability and statistics. The student evaluates predictions and conclusions based on statistical data. The student is expected to:** **(A)** evaluate methods of sampling to determine validity of an inference made from a set of data; and **(B)** recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis. **(14) Underlying processes and mathematical tools. The student applies Grade 8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to:** **(A)** identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and		**C. Real world problem solving** **1.** Formulate a solution to a real world situation based on the solution to a mathematical problem. **2.** Use a function to model a real world situation. **3.** Evaluate the problem-solving process. **IX. Communication and Representation** **A. Language, terms, and symbols of mathematics** **1.** Use mathematical symbols, terminology, and notation to represent given and unknown information in a problem. **2.** Use mathematical language to represent and communicate the mathematical concepts in a problem. **3**. Use mathematics as a language for reasoning, problem solving, making connections, and generalizing. **B. Interpretation of mathematical work** **1.** Model and interpret mathematical ideas and concepts using multiple representations. **2.** Summarize and interpret mathematical information provided orally, visually, or in written form within the given context. **C. Presentation and representation of mathematical work** **1.** Communicate mathematical ideas, reasoning, and their implications using symbols, diagrams,

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with other mathematical topics; **(B)** use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness; **(C)** select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem; and **(D)** select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems. **(15) Underlying processes and mathematical tools. The student communicates about Grade 8 mathematics through informal and mathematical language, representations, and models. The student is expected to:** **(A)** communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models; and **(B)** evaluate the effectiveness of different representations to communicate ideas.		graphs, and words. **2.** Create and use representations to organize, record, and communicate mathematical ideas. **3.** Explain, display or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. **X. Connections** **A. Connections among the strands of mathematics** **1.** Connect and use multiple strands of mathematics in situations and problems. **2.** Connect mathematics to the study of other disciplines. **B. Connections of mathematics to nature, real world situations, and everyday life** **1.** Use multiple representations to demonstrate links between mathematical and real world situations. **2.** Understand and use appropriate mathematical models in the natural, physical, and social sciences. **3.** Know and understand the use of mathematics in a variety of careers and professions.

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(16) Underlying processes and mathematical tools. The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to: **(A)** make conjectures from patterns or sets of examples and nonexamples; and **(B)** validate his/her conclusions using mathematical properties and relationships.		