# Math 8: Year at a Glance

## First Semester

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| **Unit** | **Let’s Get Real, Pythagoras ≈20 days** | **Ship Shape and Angles Away ≈25 days** | **Whose Line Is It, Anyway? ≈29 days** |
| **TEKS** | 8.2A, 8.2B, 8.2C, **8.2D** , 8.6C, **8.7C**, 8.7D | **8.3A** , 8.3B, **8.3C** , 8.8D, 8.10A, 8.10B, **8.10C**, 8.10D | **8.4A**, **8.4B**, **8.4C**, **8.5A**, **8.5B**, 8.5E, **8.5F**, **8.5H**, **8.5I** |
| **Stage One Snapshot** | * Convert between standard and Scientific Notation * Identify and group numbers according to their characteristics * Approximate irrational values with and without a number line * Compare and order rational and irrational numbers * Model the Pythagorean Theorem * Use the Pythagorean Theorem and its converse to solve problems. | * Translate, rotate, reflect and dilate figures on a coordinate plane * Write algebraic representations for transformation rules * Model the scale factor’s effect on linear measurements and area * Determine unknown measurements in similar figures using scale factors * Find missing angle measurements given parallel lines intersected by a transversal * Identify relationships between exterior and interior angles of a triangle | * Represent linear proportional situations with tables, graphs and equations * Determine the constant of   proportionality, 𝑘 =   * Graph a linear relationship * Classify a linear relationship as proportional or nonproportional * Determine the rate of change, from a table, graph, context, and an equation * Identify the slope & *y*-intercept of a linear function from table, graph, context or equation in the form 𝑦 = 𝑚𝑥 + 𝑏. |

## Second Semester

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| **Unit** | **Uptown FUNction**  **≈21 days** | **What’s Trending**  **≈ 10 days** | **Wrapping and Filling ≈20 days** |
| **TEKS** | 8.5G, **8.8A** , 8.8B, **8.8C**, 8.9 | 8.5C, **8.5D** , **8.11A** , 8.11B, 8.11C | 8.6A, 8.6B, **8.7A** , **8.7B** |
| **Stage One Snapshot** | * Identify a function when given a mapping, set of ordered pairs, table, and graph * Write and solve equations with variables on both sides to represent problem situations * Write linear equations inequalities with variables on both sides * Find the point of intersection using a graph | * Make predictions about relationships found in scatter plots using trend lines * Analyze a scatter plot and determining the association between the variables * Compare data sets * Calculate the mean absolute deviation for a data set up to ten values * Identify appropriate methods of generating random samples | * Find the volume of cones, cylinders, and spheres * Find the lateral and total surface area of rectangular prisms, triangular prisms, and cylinders * Use formulas to find missing measurements of a three-dimensional figure given the   volume |

| **Unit** | **Financial Freedom**  **≈11 days** | **Thinking with Math Models**  **≈14 days** |
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| **TEKS** | 8.12A, 8.12B, 8.12C, **8.12D** , 8.12E, 8.12F, 8.12G | **8.4C**, **8.5B**, 8.5D, **8.5I** , **8.8A** , **8.11A** |
| **Stage One Snapshot** | * Calculate simple interest and compound interest * Analyze the terms of a loan in order to make financially responsible decisions * Use online tools to determine the amount of time it takes to pay off loan, financial aid, or credit cards * Devise a personal plan for post-secondary education including a savings plan and loan options | * Describe linear patterns from verbal descriptions, tables & graphs * Use patterns to make predictions * Write and solve linear equations to represent linear patterns |

# Texas Essential Knowledge and Skills

8.1 **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

1. apply mathematics to problems arising in everyday life, society, and the workplace;
2. use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
3. select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems; Ⓡ **(D)** communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
4. create and use representations to organize, record, and communicate mathematical ideas;
5. analyze mathematical relationships to connect and communicate mathematical ideas; and
6. display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

8.2 **Number and operations**. The student applies mathematical process standards to represent and use real numbers in a variety of forms. The student is expected to:

1. extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers;
2. approximate the value of an irrational number, including π and square roots of numbers less than 225, and locate that rational number approximation on a number line;
3. convert between standard decimal notation and scientific notation; and

**(D)** order a set of real numbers arising from mathematical and real-world contexts.

8.3 **Proportionality**. The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:

1. generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation;
2. compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane; and

**(C)** use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation.

8.4 **Proportionality**. The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. The student is expected to:

**(A)** use similar right triangles to develop an understanding that slope, *m*, given as the rate comparing the change in *y*-values to the change in *x*-values, (y2 - y1)/ (x2 - x1), is the same for any two points (x1, y1) and (x2, y2) on the same line;

**(B)** graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship; and

**(C)** use data from a table or graph to determine the rate of change or slope and *y*-intercept in mathematical and real-world problems.

8.5 **Proportionality**. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

1. represent linear proportional situations with tables, graphs, and equations in the form of *y = kx*;
2. represent linear non-proportional situations with tables, graphs, and equations in the form of *y = mx + b*, where *b* ≠ 0;
3. contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation;

**(D)**  use a trend line that approximates the linear relationship between bivariate sets of data to make predictions;

1. solve problems involving direct variation;
2. distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form *y = kx* or *y = mx + b*, where *b* ≠0;

(G) identify functions using sets of ordered pairs, tables, mappings, and graphs;

**(H)** identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems; and

**(I)** write an equation in the form *y = mx + b* to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations.

8.6 **Expressions, equations, and relationships**. The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas. The student is expected to:

1. describe the volume formula *V = Bh* of a cylinder in terms of its base area and its height;
2. model the relationship between the volume of a cylinder and a cone having both congruent bases and heights and connect that relationship to the formulas; and
3. use models and diagrams to explain the Pythagorean theorem.

8.7 **Expressions, equations, and relationships**. The student applies mathematical process standards to use geometry to solve problems. The student is expected to:

**(A)** solve problems involving the volume of cylinders, cones, and spheres;

**(B)** use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders;

Ⓡ **(C)** use the Pythagorean Theorem and its converse to solve problems; and

1. determine the distance between two points on a coordinate plane using the Pythagorean Theorem.

8.8 **Expressions, equations, and relationships.** The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to:

1. write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants;
2. write a corresponding real-world problem when given a one-variable equation or inequality with variables on both sides of the equal sign using rational number coefficients and constants;

**(C)** model and solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems using rational number coefficients and constants; and

(D) use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

8.9 **Expressions, equations, and relationships**. The student applies mathematical process standards to use multiple representations to develop foundational concepts of simultaneous linear equations. The student is expected to identify and verify the values of *x* and *y* that simultaneously satisfy two linear equations in the form *y = mx + b* from the intersections of the graphed equations.

8.10 **Two-dimensional shapes.** The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:

1. generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane;
2. differentiate between transformations that preserve congruence and those that do not;

**(C)** explain the effect of translations, reflections over the *x*- or *y*-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation; and (D) model the effect on linear and area measurements of dilated two-dimensional shapes.

8.11 **Measurement and data.** The student applies mathematical process standards to use statistical procedures to describe data. The student is expected to:

1. construct a scatterplot and describe the observed data to address questions of association such as linear, nonlinear, and no association between bivariate data;
2. determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean using a data set of no more than 10 data points; and
3. simulate generating random samples of the same size from a population with known characteristics to develop the notion of a random sample being representative of the population from which it was selected.

8.12 **Personal financial literacy**. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one's life as a knowledgeable consumer and investor. The student is expected to:

1. solve real-world problems comparing how interest rate and loan length affect the cost of credit;
2. calculate the total cost of repaying a loan, including credit cards and easy access loans, under various rates of interest and over different periods using an online calculator;
3. explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time;

**(D)** calculate and compare simple interest and compound interest earnings;

1. identify and explain the advantages and disadvantages of different payment methods;
2. analyze situations to determine if they represent financially responsible decisions and identify the benefits of financial responsibility and the costs of financial irresponsibility; and
3. estimate the cost of a two-year and four-year college education, including family contribution, and devise a periodic savings plan for accumulating the money needed to contribute to the total cost of attendance for at least the first year of college.