Texas Essential Knowledge and Skills (TEKS)

Mathematics | 8th Grade

1. **Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:**
   - A. apply mathematics to problems arising in everyday life, society, and the workplace;
   - B. 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;
   - C. 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;
   - E. create and use representations to organize, record, and communicate mathematical ideas;
   - F. analyze mathematical relationships to connect and communicate mathematical ideas; and
   - G. display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.
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:**
   - A. extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers;
   - B. 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;
   - C. convert between standard decimal notation and scientific notation; and
   - D. order a set of real numbers arising from mathematical and real-world contexts.
3. **Proportionality. The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:**
   - A. generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation;
   - B. 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.
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.
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:**
   - A. represent linear proportional situations with tables, graphs, and equations in the form of y = kx;
   - B. represent linear non-proportional situations with tables, graphs, and equations in the form of y = mx + b, where b ≠ 0;
   - C. 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;
   - E. solve problems involving direct variation;
   - F. 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.
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:**
   - A. describe the volume formula V = Bh of a cylinder in terms of its base area and its height;
   - B. 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
   - C. use models and diagrams to explain the Pythagorean theorem.
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
   - D. determine the distance between two points on a coordinate plane using the Pythagorean Theorem.
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:**
   - A. write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants;
   - B. 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.
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:**
   - A. 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.
10. **Two-dimensional shapes. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:**
    - A. generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane;
    - B. 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.
11. **Measurement and data. The student applies mathematical process standards to use statistical procedures to describe data. The student is expected to:**
    - A. construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data;
    - B. 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
    - C. 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.
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:**
    - A. solve real-world problems comparing how interest rate and loan length affect the cost of credit;
    - B. 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;
    - C. 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;
    - E. identify and explain the advantages and disadvantages of different payment methods;
    - F. analyze situations to determine if they represent financially responsible decisions and identify the benefits of financial responsibility and the costs of financial irresponsibility; and
    - G. 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.

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