CAREER MATHEMATICS

Career Mathematics is a course that provides students with a bridge to mathematical empowerment needed to make responsible financial and economic decisions while applying mathematic concepts into a career setting. The course is designed for integrating mathematics and career and technical curriculum. Students are given the opportunity to utilize math concepts that are integrated into career and technical education. This course is designed to be taught by mathematics teachers or career and technical teachers.

Career Mathematics extends the scope of content for integrating topics from algebra, geometry, measurement, and probability and statistics with an emphasis on career and technical applications. This course provides opportunities to incorporate the use of technology through its emphasis on using functions to make real-life predictions and to calculate outcomes. The wide range of applied problems lends itself to organizing the content into modular units.

Career Mathematics is a one-credit course that may be taught in Grades 9-12. This course may be taught as two one-credit courses consisting of Career Mathematics A and Career Mathematics B. Standards 1-6 must be taught in Career Mathematics A. Standards 7-14 must be taught in Career Mathematics B. Career Mathematics A is a prerequisite to Career Mathematics B.

Career and technical student organizations are integral, co-curricular components of each career and technical education course. These organizations serve as a means to enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and broaden opportunities for personal and professional growth.

Students will:

MEASUREMENT

1. Critique the appropriateness of measurements in terms of precision, accuracy, and approximate error.
   a. Determine dimensions by scaling plans or blueprints.
   b. Apply knowledge of fractions for reading a ruler to 1/16 inch.
   c. Convert decimals to fractions for interpreting blue prints and measuring materials.
   d. Compare Metric and English systems of measurements used in industry.
   e. Identify various measuring tools and demonstrate their use to verify precision, accuracy, and approximate error.

2. Use ratios of perimeters, areas, and volumes of similar figures to solve applied problems.
   a. Calculate area utilizing the Pythagorean Theorem.
   b. Demonstrate an understanding of blueprints and drawings.
   c. Calculate estimates for construction or repair projects.
      Examples: Use a blueprint or scale drawing of a house to determine the amount of materials to be purchased.
      Identify functions of various plumbing components.
      Utilize perimeters, areas, and volumes to solve applied problems for a specific project.
      Calculate general lighting loads of a dwelling or commercial property.

ENTREPRENEURIAL ECONOMICS AND FINANCES

3. Use algebraic and geometric reasoning and problem-solving skills to make informed financial and economic decisions, including those involving banking and investments, insurance, personal budgets, credit purchases, recreation, and deceptive and fraudulent pricing and advertising.

   Examples: Determine the best choice of certificates of deposit, savings accounts, checking accounts, and loans of various financial institutions.

   Compare the costs of fixed- or variable-rate mortgage loans and compare the costs associated with various credit cards.

   a. Create graphs and tables related to personal finance and economics. The use of appropriate technology is encouraged for numerical and graphical investigations.

      Examples: Use computer software to create an amortization table for a mortgage loan or a circle graph for a personal budget.

   b. Analyze job opportunities and career pathways related to business or industry.
   c. Evaluate the economics of establishing and owning a business.
   d. Make inferences and justify conclusions from economic conditions that can affect hiring and layoff decisions.

4. Use formulas or equations of functions to calculate outcomes and analyze models of exponential growth or decay.

   a. Interpret depreciation cost of decay relationships.

      Example: Analyze the depreciation cost of owning your own business.

5. Approximate rates of change of nonlinear relationships from graphical and numerical data.

   Example: Determine the relationship between the sales weight of cattle and the amount of feed provided.

   a. Graph functions expressed in tables, equations, or classroom-generated data to model consumer costs and to predict future outcomes.
   b. Analyze interest rates, depreciation, and tax rates in order to determine how each affects the cost of owning and/or operating a business.

6. Summarize and interpret data represented in tables or graphs in order to make predictions.

   a. Predict trends about population change that will affect employment rate.
   b. Calculate pay scale based on occupational outlook projections.
   c. Calculate operating costs, including cost of materials, supplies, equipment, license fees, and insurance fees.
   d. Construct charts that reflect current demographics in various industries.
   e. Forecast growth and decline of various career fields by interpreting data from charts and graphs.

ALGEBRA

7. Analyze and solve application-based problems relating to direct, inverse, and joint variation.
   a. Utilize mathematical skills for trouble-shooting in business and industrial applications.
      Examples: Calculate the proper size of a water service line and drainage fixture units for a given pipe size.
      Calculate wattage consumed by energized units, solve problems in electrical circuits using Ohm's law, and determine voltage/amperage for various welding applications.

8. Calculate the maximum and minimum values of a function using linear programming procedures.
   Examples: Calculate the optimal material thickness for various projects.
   Calculate the load capacity in various applications.
   Calculate the fitting allowances and thread makeup using dimension tables.
   Calculate the grade and elevation of a trench for a sewer line.
   Demonstrate and contrast the variables for heat input and welding effects.
   Calculate unknown electrical values based on Ohm's law and the Power Law.

9. Use the maximum value of a given quadratic function to solve applied problems.
   a. Calculate operation cost to maximize profit.
   b. Calculate appropriate materials to use for an application.
      Examples: Select the correct electrode for an application to maximize efficiency.
      Solve resistive-capacitive-inductive circuits.
      Calculate electrical loads for a variety of commercial applications.

GEOMETRY

10. Solve application-based situations by using the properties of right triangles, including trigonometric ratios.
    Example: Determine bending angles and distance between bends of piping or conduit.

    a. Determine overall angles or dimensions while working with various materials.
    b. Use trigonometric ratios to apply properties of a right triangle to drawings or blueprints.

11. Analyze and interpret the aesthetics of real-life situations using line symmetry, rotational symmetry, or the golden ratio.
    Examples: Identify the symmetry found in nature, art, or architecture.
    Determine symmetry of fixture layout.

    a. Design drawings or blueprints to include pictorial, top, front, sides, back, and detailed views.
    b. Construct a project from designed drawings.

12. Apply arc lengths and areas of sectors of circles to solve problems.
    a. Determine allowable geometric tolerance in various industrial applications.
       Examples: Calculate pipe travel in an arc or radius.
       Use mathematical formulas to determine conduit bends.
       Interpret welding specifications with the use of mathematical arc lengths and areas of sectors of circles.

DATA ANALYSIS AND PROBABILITY

13. Estimate the equation of a curve of best fit from tables of values or scatter plots to model a set of data.
    a. Formulate tables from occupational outlook data to predict employment rates in various industrial areas.
    b. Construct scatter plots to analyze data and develop a plan that is most suitable for the application.

14. Estimate probabilities given a frequency distribution.
    a. Make decisions basis on probabilities.
       Example: Utilize risk analysis to develop a job safety analysis plan.