

Math Foundations I 3130

Course Description:

Students who enter high school not ready for Algebra I will explore and apply concepts, processes, and skills that are essential to successfully completing the high school graduation requirements in mathematics. Students may receive mathematics credit for only one of the following courses:

Foundations I, Foundations II, and Mathematics for Technology I.

Through the investigation of meaningful problems individually or in cooperative groups, while using appropriate technology, students will strengthen their foundations of mathematics. Students will prepare for success in future mathematics courses by building content knowledge to meet standards in number and operations, algebra, geometry, measurement, and data analysis and probability. The processes of problem solving, reasoning, communication, connections, and representation are interwoven throughout the content standards.

Content Standard 1.0: Number and Operations

Students will develop number and operation sense needed to represent numbers and number relationships verbally, symbolically, and graphically and to compute fluently and make reasonable estimates in problem solving.

Learning Expectations:

The student will:

- 1.1 demonstrate an understanding of the subsets, elements, properties, and operations of the rational number system;
- 1.2 connect physical, graphical, verbal, and symbolic representations of rational numbers;
- 1.3 order and compare rational numbers;
- 1.4 informally describe and model the concept of additive and multiplicative inverses (e.g., opposites, reciprocals) in real life problem situations;
- 1.5 apply number theory concepts (e.g., primes, composites, factors, divisibility, and multiples) in mathematical problem situations;
- 1.6 use rational numbers to represent real-world applications (e.g., probability, proportionality);
- 1.7 use mathematical notations appropriately;
- 1.8 select and apply an appropriate method (i.e., mental arithmetic, paper and pencil, or technology) for computing with rational numbers, and evaluate the reasonableness of results;
- 1.9 apply estimation strategies in computation and in problem solving.

Student Performance Indicators:

At Level 1, the student is able to

- represent rational numbers in a variety of ways using concrete objects, pictures, the number line, and symbols;
- compute fluently with whole numbers, fractions, decimals, and percent;
- compare rational numbers using the appropriate symbol (<,>=);
- work flexibly with fractions, decimals, and percents in one-or two-step word problems.

At Level 2, the student is able to

represent quantitative relationships using ratios and proportions;
identify numbers less than 100 as prime or composite;
give the prime factorization for a number less than 100;
determine the greatest common factor and the least common multiple for up to three numbers;
apply order of operations in computing with rational numbers, using no more than two parentheses and exponents 1 and 2;
calculate rates involving cost per unit to determine the best buy;
demonstrate an understanding of percent in solving real-world problems;
describe relationships among operations
use estimation strategies to select a reasonable solution to a real-world problem involving rational number computation.

At Level 3, the student is able to

develop, analyze, and explain methods for solving problems involving proportions (i.e., scaling, finding equivalent ratios);
express a monomial written in expanded form using exponents;
identify the opposite and the reciprocal of a given rational number;
determine square roots of perfect squares (<169).

Sample Task:

Use newspapers to find examples of rational numbers and express them in alternate forms.

Linkages:

Make connections to other disciplines by listing examples of whole numbers, fractions, decimals, percents, and integers used in social studies (latitude/longitude), science (scientific notation), business (stock prices, mark down percents), and other disciplines or careers.

Content Standard 2.0: Algebra

Students will describe, extend, analyze, and create a wide variety of patterns and solve real-world problems using appropriate representations.

Learning Expectations:

The student will:

- 2.1 recognize, extend, and create geometric, spatial, and numerical patterns;
- 2.2 solve problems in number theory, geometry, probability and statistics, and measurement and estimation using algebraic thinking;
- 2.3 communicate the meaning of variables in algebraic expressions and equations;
- 2.4 apply the concept of variable in simplifying algebraic expressions and solving equations;
- 2.5 interpret graphs that depict real-world phenomena;
- 2.6 model real-world phenomena using graphs.

Student Performance Indicators:

At Level 1, the student is able to

extend geometric, spatial, and numeric patterns;
generalize a variety of patterns with symbolic rules.

At Level 2, the student is able to

represent situations and solve real-world problems using symbolic algebra;

generate equivalent forms for simple algebraic expressions;
solve one-step linear equations involving integers;
evaluate a first-degree algebraic expression given values for up to two variables;
apply given formulas to solve real-world problems;

At Level 3, the student is able to

use a variety of representations to solve real-world problems (i.e., graphs, tables, equations);
connect linear equations and the appropriate graphs of lines.
explain the meaning of intercept, slope, and rate of change in real-world problems;

Sample Task:

Use the Census Bureau website to find information regarding population patterns or economic data and display the results graphically.

Linkages:

Write about patterns in nature or other areas of science, and find and apply formulas in business or science.

Content Standard 3.0: Geometry

Students will investigate, model, and apply geometric properties and relationships.

Learning Expectations:

The student will:

- 3.1 apply geometric properties, formulas, and relationships to solve real-world problems;
- 3.2 communicate position using spatial sense with two-dimensional coordinate systems;
- 3.3 demonstrate an understanding of the properties and construction of geometric figures, including angles, parallel lines, perpendicular lines, triangles, circles, and quadrilaterals;

Student Performance Indicators:

At Level 1, the student is able to

use ordered pairs to describe given points in a coordinate system;
apply the given formula to determine the area or perimeter of a rectangle;

At Level 2, the student is able to

find the missing length of a side, given two similar triangles;
classify a quadrilateral, given its properties, as a square, a rectangle, a rhombus, a parallelogram, and/or a trapezoid;
calculate the area of a circle, a triangle, a parallelogram, a rhombus, or a trapezoid given the appropriate formula;

At Level 3, the student is able to

apply the Pythagorean Theorem in problem solving;
determine and justify the missing angle measures, given the measure of one angle, when two parallel lines are cut by a transversal.

Sample Task:

Students use tessellating polygons to design a floor covering.

Linkages:

Make connections of geometric concepts to careers such as design, art, and architecture.

Content Standard 4.0 Measurement

Students will become familiar with the units and processes of measurement in order to use various tools, techniques, and formulas to determine and estimate measurements in problem solving.

Learning Expectations:

The student will:

- 4.1 apply appropriate techniques, tools, and formulas to determine measurements;
- 4.2 communicate the concepts and strategies being to estimate measurements;
- 4.3 apply measurement concepts and relationships in geometric problem-solving situations.

Student Performance Indicators:

At Level 1, the student is able to

select units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.

At Level 2, the student is able to

use concepts of length, area, and volume to estimate and solve real- world problems (i. e., parallelograms, triangles, right rectangular prisms, circles, right cylinders);

solve real-world problems involving rate/time/distance (i.e., $d = rt$);

use estimation to make predictions and determine reasonableness of results.

At Level 3, the student is able to

choose appropriate techniques and tools to measure quantities in order to meet specifications for precision and accuracy;

estimate to find the area of irregular and complex shapes.

Sample Task:

Students will measure and make a scale drawing for a room and determine the amount of carpet or tile needed and the amount of paint needed for the walls.

Linkages:

Connect geometry and measurement concepts and relate measurement to construction, science, and other careers.

Content Standard 5.0 Data Analysis and Probability

Students will understand and apply basic statistical and probability concepts in order to organize and analyze data and to make predictions.

Learning Expectations:

The student will:

5.1 choose, construct, and analyze appropriate graphical representations for a data set including pie charts, histograms, stem and leaf plots, and scatterplots;

5.2 interpret a set of data using the appropriate measure of central tendency (mean, median, mode);

5.3 determine experimental and theoretical probabilities for simple experiments.

Student Performance Indicators:

At Level 1, the student will be able to

determine the mean, median, mode, and range for a given set of data;

determine the probability of an event (i.e., rolling a die or spinning a spinner).

At Level 2, the student will be able to

construct and interpret bar, circle, and line graphs of real-world data;

determine the number of possible outcomes for simple experiments using lists, tree diagrams, or the multiplication counting principle;

determine the median from a given stem-and-leaf plot.

At Level 3, the student will be able to

make predictions based on data;

develop meaning for lines of best fit.

Sample Task:

Students will conduct a survey, graph the results, and use the results to make predictions.

Linkages:

Connect analysis of data to examples from science, social studies, language arts, economics, politics, and other disciplines or careers. Use computer spreadsheets and graphing calculator lists to generate graphs of data sets.