

Reviewed by: D. Jones
Reviewed by: M. Martinez
Reviewed by: R. Payne
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Mathematics (MATH) 0240 Pre-algebra (5 Units)
[formerly Mathematics 56]

Prerequisite: Qualification by assessment process, or completion of Mathematics 0230, or one year of high school basic mathematics with a grade of "C" or better

Prerequisite knowledge/skills: Before entering the course, the student should be able to:

1. demonstrate proficiency in the basic skills of arithmetic by efficiently solving problems concerned with:
 - a. addition and subtraction of real numbers
 - b. multiplication and division of real numbers
 - c. multiplying and dividing fractions
 - d. adding and subtracting fractions
 - e. decimals
 - f. ratio and proportion
 - g. percent

2. Solve problems dealing with:
 - a. common mathematic applications in astronomy, auto mechanics, biology, business, chemistry, construction, demographics, domestic skills, economics, education, environmental science, finance, geometry, government, health, labor, social sciences, sports, entertainment, technology, and transportation,
 - b. consumer mathematics dealing with simple and compound interest, percent increase and decrease, taxes, and discounts.

Total Hours: 80 hours lecture

Catalog Description: This course reviews basic skills necessary for beginning algebra and provides an introduction to algebra. Topics include number systems, operations with signed numbers, integral exponents, order of operations, introduction to the idea of variables, introduction to inequalities, solutions to simple linear equations and substituting into formulas.

Type of Class/Course: Non-Degree Credit

Text: Lial, Margaret, and D. Hestwood. *Prealgebra*. 6th ed. Pearson, 2016.

Additional Instructional Materials:

Lial, Margaret, and Diane. Hestwood. *Student Solutions Manual*. New York: Pearson, 2006. Print.

Access to MyMathLab with videos

Course Objectives:

By the end of the course, a successful student will be able to:

1. describe the differences among the whole number, integer and rational number systems, identify numbers from those systems, and be able to graph these numbers on a number line,
2. add, subtract, multiply, and divide positive and negative integers,
3. substitute variable values into formulas and equations,
4. evaluate simple expressions using all of the properties of integral exponents,
5. solve simple linear equations,
6. evaluate mixed expressions involving order of operations,
7. solve application problems related to linear equations,
8. add, subtract, multiply, and divide rational number (positive and negative fractions and positive and negative decimals),
9. evaluate ratio and proportions,
10. solve percent problems,
11. convert measurements within the English and metric systems and between the English and metric systems,
12. be able to read and graph linear equations, and
13. find areas and volumes of various circles, triangles, and quadrilaterals, and solve application problems associated with these figures.

Course Scope and Content:

Unit I Introduction to Algebra: Signed Numbers

- A. Identify whole numbers when they appear,
- B. Determine the place value of a digit through hundred-trillion,
- C. Write a whole number in words or digits,
- D. Write and graph positive numbers,
- E. Graph positive and negative numbers on a number line,
- F. Compare integers by using inequality symbols,
- G. Find the absolute value of an integer,
- H. Find the opposite of an integer,
- I. Add and subtract integers,
- J. Round integers to their proper place value,
- K. Use front-end rounding to estimate answers in addition, subtraction, multiplication, and division of integers,
- L. Multiply and divide integers,
- M. Identify the various symbols used to show multiplication and division,
- N. Interpret remainders in application problems involving division,
- O. Use exponents to write repeated factors, and
- P. Simplify expressions using the order of operations.

Unit II Understanding Variables and Solving Equations

- A. Distinguish among constants, variables, and expressions,
- B. Evaluate variable expressions when given replacement values,
- C. Write and use the properties of operations using variables,
- D. Manipulate variables with exponents,

- E. Simplify expressions by combining like terms,
- F. Use the distributive property in simplifying expressions,
- G. Simplify equations by using the addition and multiplication properties of equality,
- H. Solve equations using the addition and multiplication properties of equality, and
- I. Determine whether a given number is a solution to an equation.

Unit III Solving Application Problems

- A. Use the formulas for the perimeter of a square, rectangle, parallelogram, triangle, and irregular shapes to find the length of an unknown side and to find the total perimeter,
- B. Use the formulas for the area of a square, rectangle, and parallelogram to find the total areas of these figures, and to find the length of an unknown side,
- C. Solve application problems involving perimeter and area of rectangles, squares, and parallelograms,
- D. Translate word phrases into algebraic expressions,
- E. Translate entire sentences into equations, and
- F. Solve application problems with both one and two unknown quantities.

Unit IV Rational Numbers: Positive and Negative Fractions

- A. Use a fraction to name the part of a whole that is shaded,
- B. Identify numerators, denominators, proper fractions, and improper fractions,
- C. Graph positive and negative fractions on a number line,
- D. Find the absolute value of a fraction,
- E. Write equivalent fractions,
- F. Identify and write fractions with both numbers and variables in lowest terms,
- G. Write a number as the product of prime factors,
- H. Write a fraction in lowest terms using prime factorization,
- I. Multiply and divide signed fractions that contain both numbers and variables,
- J. Find the lowest common denominator of a set of denominators that contain both numbers and variables,
- K. Add and subtract both like fractions and fractions with different denominators,
- L. Identify and graph mixed numbers on a number line,
- M. Write fractions both as mixed numbers and improper fractions,
- N. Estimate the answers when adding, subtracting, multiplying, or dividing mixed numbers,
- O. Add, subtract, multiply, and divide mixed numbers,
- P. Solve application problems involving adding, subtracting, multiplying, and dividing fractions,
- Q. Use exponents to simplify fractions,
- R. Use the order of operations to simplify expressions with fractions,
- S. Simplify complex fractions,
- T. Use the multiplication property to solve equations with fractions, and
- U. Solve application problems using equations containing fractions.

Unit V Positive and Negative Decimal Numbers

- A. Write parts of a whole using decimals,
- B. Identify the place value of a digit,
- C. Read and write decimal numbers,
- D. Round decimals to a pre-determined place value,

- E. Round money amounts to the nearest dollar or cent,
- F. Add, subtract, multiply, and divide both positive and negative decimal numbers,
- G. Estimate the answer when adding, subtracting, multiplying, and dividing decimal numbers,
- H. Use the order of operations with decimals,
- I. Write fractions as equivalent decimals,
- J. Compare the size of fractions and decimals,
- K. Find the mean, median, and mode of a list of numbers,
- L. Find the weighted mean of a set of values,
- M. Evaluate the variability of a set of data by finding the range of values,
- N. Find square roots of numbers using a calculator,
- O. Find the unknown length of any side of a right triangle,
- P. Solve application problems involving right triangles,
- Q. Solve equations containing decimals using both the addition and multiplication property, and
- R. Solve application problems involving equations with decimal values.

Unit VI Ratio and Proportion

- A. Write ratios in to form, colon form, and fractional form,
- B. Simplify ratios that contain decimals and/or fractions,
- C. Solve ratio problems after converting units,
- D. Write rates as fractions,
- E. Find unit rates; use these to find the best buy,
- F. Write and determine if proportions are true or false,
- G. Find the unknown value in a proportion, and
- H. Use proportions to solve application problems.

Unit VII Percent

- A. Write percent in decimal form and fraction form,
- B. Change from decimal or fraction form to percent form,
- C. Use a shortcut for finding 100%, 50%, 25%, 1%, and 200%,
- D. Identify the part, whole, and percent in an application,
- E. Solve percent problems using the percent proportion and the percent equation,
- F. Solve percent increase and percent decrease problems,
- G. Find sales tax and total cost given a percent,
- H. Estimate and calculate restaurant tips,
- I. Find the discount and sale price of an item given a percent, and
- J. Calculate simple interest and total amount due on a loan.

Unit VIII Measurement

- A. Learn to use the basic measurements in the English system,
- B. Convert among measurement units using dimensional analysis,
- C. Solve application problems using English measurements,
- D. Describe the basic metric units of length, volume, and mass,
- E. Use the “stair step-decimal point” method and dimensional analysis to convert among the various units, and
- F. Solve problems using both English and metric units of measurements.

Unit IX Graphing in the Rectangular Coordinate System

- A. Plot a point given the coordinates on a graph using the rectangular coordinate system,
- B. Identify the four quadrants of the rectangular coordinate system and determine which points lie within them,
- C. Graph linear equations in two variables, and
- D. Identify the slope of a line as positive or negative.

Unit X Exponents and Polynomials

- A. Apply the product, power-to-power, and distributive properties for exponents,
- B. Apply the zero power property,
- C. Use negative exponents,
- D. Use the quotient rule for exponents,
- E. Apply all of the properties to problems with negative exponents,
- F. Define and identify polynomials,
- G. Evaluate polynomials when given a replacement value,
- H. Add and subtract polynomials,
- I. Multiply monomials by polynomials, and
- J. Multiply two polynomials.

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 10 hours per week outside of the regular class time doing the following:

- 1. Studying
- 2. Practicing skills
- 3. Completing assignments
- 4. Working in the mathematics laboratory with a tutor as necessary
- 5. Completing assignments and quizzes using MyMathLab.com as assigned by the instructor

Methods of Instruction

- 1. Lecture-demonstrations and simple problems solved by the instructor,
- 2. Occasional lab activities on the computer and/or calculator, and
- 3. Demonstrations and interactive lessons from the Internet.

Methods of Evaluation:

- 1. Computational or non-computational problem solving demonstrations including:
- 2. exams,
- 3. homework problems,
- 4. quizzes,
- 5. projects, and
- 6. final examination.