

MTH 098 - ELEMENTARY ALGEBRA - OBJECTIVES (revised 10/2013)

A comprehensive departmental final exam testing the degree of mastery of the following course objectives is required.

1. Sets of Numbers

1.1 Classify a given real number as being a counting or natural number, whole number, integer, rational or irrational number.

2. Properties of Real Numbers

2.1 Be able to use the Commutative, Associative, Distributive, Identity, and Inverse Properties.

3. Operations on Real Numbers

3.1 Review arithmetic operations on rational numbers.

3.2 Use the concept of absolute value as distance from zero on the real number line to determine the absolute value of real numbers.

3.3 Evaluate a given expression by applying the correct priority of operations.

4. Equation Solving Techniques

4.1 Solve first degree equations in one variable.

4.2 Solve literal equations and formulas for a single variable.

4.3 Solve quadratic equations by factoring.

5. Exponents and Polynomials

5.1 Simplify exponential expressions with integer exponents.

5.2 Define and identify polynomials and their degree.

5.3 Add and subtract polynomials.

5.4 Multiply polynomials up to and including a trinomial by a trinomial.

5.5 Divide a polynomial by a monomial.

6. Factoring

6.1 Factor a monomial GCF from a polynomial.

6.2 Factor a polynomial containing four terms by grouping.

6.3 Factor the difference of two squares.

6.4 Factor trinomials of the form $x^2 + bx + c$.

6.5 Factor trinomials of the form $ax^2 + bx + c$, where a is a nonzero integer using either the “ac factoring by grouping method” or the “trial and error method.”

6.6 Factor perfect square trinomials.

7. Inequalities in One and Two Variables

7.1 Solve a linear inequality in one variable, graph the solution on the real number line and express the solution using set notation and interval notation.

7.2 Solve compound linear inequalities, graph the solution on the real number line, and express the solution using set notation and interval notation.

7.3 Graph a linear inequality in two variables on the Cartesian coordinate system.

8. The Cartesian Coordinate System

- 8.1 Use the Cartesian coordinate system to describe the x- and y-axes, the origin and quadrants, and determine the positions of ordered pairs.
- 8.2 Graph linear equations in two variables by plotting points.
- 8.3 Determine the x- and y-intercepts and use them to graph a linear equation.
- 8.4 Understand the concept of the slope of a line and use the slope formula to determine the slope of the line through two given points.
- 8.5 Determine the slopes of horizontal, vertical, parallel and perpendicular lines.
- 8.6 Graph linear equations in two variables by the slope-intercept method.
- 8.7 Write the equation of a line in slope-intercept form and in point-slope form:
 - 8.7a Given the slope and the y-intercept
 - 8.7b Given a graph with integer x- and y-intercepts
 - 8.7c Given the slope and a point on the line
 - 8.7d Given two points on the line.

9. Systems of Equations

- 9.1 Solve a system of linear equations in two variables graphically.
- 9.2 Solve a system of linear equations in two variables algebraically using substitution and addition/elimination methods.

10. Applications

Creating open expressions and using those expressions to write equations involving one or two variables to solve applications will be integrated throughout this course. Examples from other disciplines will be incorporated whenever possible. The following types of applications are required.

- 10.1 Geometric formulas including perimeter of rectangles, squares, and triangles, and circumference of circles
- 10.2 Simple interest involving one rate and two rates
- 10.3 Motion problems solved with a linear equation involving one rate and two rates
- 10.4 Ratios
- 10.5 Proportions solved by cross-multiplication, including unit conversion
- 10.6 Linear inequalities
- 10.7 Number problems solved with a linear equation
- 10.8 Problems involving money
- 10.9 Percent problems including tax and commission
- 10.10 Mixture problems involving money and percent
- 10.11 Linear graphs including determining the equation of a line, using the graph for estimation at a given value, and using the equation to calculate a specific value
- 10.12 Systems of two linear equations solved algebraically