BROWARD COLLEGE
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Course Outline

Course Title: Developmental Mathematics Combined
Common Course Title: MAT0022
Effective Term: Fall 2020 (Aug 7, 2020)
Credit Hours: 4 Units

Next Review : Aug 6, 2025
Contact Hour Breakdown: *(Per 16 week Term)*
Total: 64
Lecture: Lab:
Clinic: Other:

Requirements

This course does not have any required pre-requisites or co-requisites.

Course Description:

MAT0022 prepares students for college-level mathematics and mathematics-based courses. Topics include operations with whole numbers, integers, fractions, decimals, rational, polynomial, and radical expressions, linear equations and inequalities in one variable, factoring, and basic linear graphing with the aid of a calculator. Problem solving involving real-life scenarios is an integral part of this course. This course teaches students to understand and communicate concepts of algebra in the language of mathematics. This course is non-transferable.

Course Outline

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Unit 1 Whole Numbers: Operations and Applications

General Outcome

1.0 Perform operations involving whole numbers and solve appropriate word problems with the aid of a calculator.

Specific Learning Outcomes

1.1 Graph whole numbers on a number line.

1.2 Round whole numbers to a given place value.

1.3 Identify words/phrases associated with the operations of addition, subtraction, multiplication, division, and exponentiation of whole numbers (e.g. sum, quotient, less than, a multiple of, cubed).

1.4 Translate word phrases into mathematical expressions, and vice versa (e.g. five less than twice a number = $2n - 5$).

1.5 Add, subtract, multiply, divide, and exponentiate whole numbers.

1.6 Simplify numerical expressions containing whole numbers using the order of operations, including absolute value.

1.7 Define the terms “prime number” and “composite number.”

1.8 Determine all factors of whole numbers.

1.9 Solve appropriate word problems using operations on whole numbers, including perimeter and area.

Unit 2 Integers: Operations and Applications

General Outcome

2.0 Perform operations involving integers and solve appropriate word problems with the aid of a calculator.

Specific Learning Outcomes

2.1 Graph integers on a number line.

2.2 Define the term “absolute value.”

2.3 Evaluate the absolute value of numbers and of numerical expressions (e.g.|3 - 6 2 |)

2.4 Determine which of two integers is greater using inequality symbols.

2.5 Identify words/phrases associated with the operations of addition, subtraction, multiplication, division, and exponentiation of integers.

2.6 Translate word phrases into mathematical expressions, and vice versa.

2.7 Add, subtract, multiply, divide, and exponentiate integers.

2.8 Simplify numerical expressions containing integers using the order of operations.

2.9 Solve appropriate word problems using operations on integers.

Unit 3 Fractions and Mixed Numbers: Operations and Applications

General Outcome

3.0 Perform operations involving fractions and mixed numbers with the aid of a calculator.

Specific Learning Outcomes

3.1 Identify the numerator and denominator of fractions, and explain what each represents.

3.2 Determine when a fraction is undefined.

3.3 Define the terms “proper fraction,” “improper fraction,” and “mixed number.”

3.4 Identify fractions as proper or improper.

3.5 Write improper fractions as mixed numbers, and vice versa.

3.6 Reduce fractions and mixed numbers to lowest terms.

3.7 Determine the least common denominator of two fractions.

3.8 Determine the reciprocal of integers, fractions, and mixed numbers.

3.9 Add, subtract, multiply, divide, and exponentiate fractions and mixed numbers.

Unit 4 Decimal Numbers: Operations and Applications

General Outcome

4.0 Perform operations involving decimal numbers with the aid of a calculator.

Specific Learning Outcomes

4.1 Identify the place values of each digit of a decimal number.

4.2 Round a decimal number to a given place value.

4.3 Define the terms “rational number,” “irrational number,” and “real number.”

4.4 Add, subtract, multiply, and divide, decimal numbers.

Unit 5 Linear Equations and Inequalities in One Variable

General Outcome

5.0 Solve linear equations and inequalities in one variable, and express solutions to linear inequalities in one variable using inequality notation, interval notation, and a number-line graph.

Specific Learning Outcomes

5.1 Write an algebraic expression and simplify.

5.2 Identify the associative, commutative, distributive, identity, and inverse properties of numbers, and manipulate numerical and algebraic expressions using these properties.

5.3 Simplify and evaluate algebraic expressions involving one variable.

5.4 Determine if a given variable value is a solution to an equation in one variable.

5.5 Solve one-step and multi-step linear equations in one variable. Include equations that involve any mixture of numbers (i.e. integers, fractions, mixed numbers and decimals).

5.6 Determine if a given variable value is a solution to an inequality in one variable.

5.7 Solve one-step and multi-step linear inequalities in one variable.

5.8 Present solutions to linear inequalities in one variable in three ways: inequality notation, interval notation, and graphically on a number line.

5.9 Solve linear equations and inequalities in one variable with variables on both sides of the equal sign.

5.10 Solve linear equations and inequalities in one variable requiring use of the distributive property.

5.11 Identify linear equations in one variable as conditional, a contradiction, or an identity and identify the solutions as a real number, the empty set, or all real numbers.

5.12 Solve appropriate algebraic word problems by modeling them with linear equations in one variable.

5.13 Solve literal equations for a specified variable.

Unit 6 Ratios, Rates, Proportions, and Percents

General Outcome

6.0 Write, simplify, and manipulate ratios, rates, and percentages, (2) create and solve proportions, and (3) solve appropriate word problems with the aid of a calculator.

Specific Learning Outcomes

6.1 Define the terms “ratio,” “rate,” and “proportion.”

6.2 Write ratios using reduced-fraction notation.

6.3 Set up and solve proportions.

6.4 Set up and solve appropriate word problems using ratios, rates, and proportions.

6.5 Define the term “percent.”

6.6 Rewrite a percent as a decimal number and as a fraction, and vice versa.

6.7 Solve basic percent problems using linear equations in one variable and/or proportionalities. For example: Twelve is 15% of what number? What percent of 10 is 35?

Unit 7 Rules of Integer Exponents

General Outcome

7.0 Simplify product and quotient expressions incorporating variables with integer exponents using appropriate rules of integer exponents.

Specific Learning Outcomes

7.1 Apply the product rule for exponents to simplify appropriate variable expressions.

7.2 Apply the quotient rule for exponents to simplify appropriate variable expressions.

7.3 Apply the power rules for exponents to simplify appropriate variable expressions.

7.4 Apply the zero-exponent rule to simplify appropriate variable expressions.

7.5 Apply the negative-exponent rule to simplify appropriate variable expressions.

7.6 Apply any combination of exponent rules to simplify appropriate variable expressions.

Unit 8 Polynomial Expressions, Quadratic Expressions, and Quadratic Equations

General Outcome

8.0 Identify, perform operations on, and factor polynomial expressions; (2) solve quadratic equations in one variable; and (3) solve appropriate word problems.

Specific Learning Outcomes

8.1 Identify polynomial expressions.

8.2 Define the terms “leading term (of a polynomial)” and “degree (of a polynomial).”

8.3 Identify the leading term and the degree of polynomials.

8.4 Recognize if a given polynomial is a monomial, binomial, or trinomial.

8.5 Evaluate the numerical value of polynomial expressions given the value of the variable.

8.6 Add, subtract, and multiply polynomials.

8.7 Divide polynomials by monomials.

8.8 Factor out the GCF of polynomials’ terms.

8.9 Factor polynomial expressions by grouping.

8.10 Factor binomial expressions that are differences of perfect squares.

8.11 Factor non-prime quadratic (mono and multivariable) trinomials, including perfect square trinomials.

8.12 Solve non-prime polynomial equations in one variable by factoring.

8.13 Solve appropriate algebraic and geometric word problems by modeling them with non-prime quadratic equations in one variable.

Unit 9 Rational Expressions

General Outcome

9.0 Identify, simplify, and perform operations on rational expressions.

Specific Learning Outcomes

9.1 Determine value(s) of the variable for which rational expressions are undefined.
9.2 Simplify rational expressions by canceling common monomial and binomial factors of the numerator and denominator.
9.3 Multiply rational (monomial, binomial, and trinomial) expressions.
9.4 Divide rational (monomial, binomial, and trinomial) expressions.
9.5 Find the LCD for rational expressions (monomial and binomial denominators).
9.6 Write equivalent rational expressions (monomial and binomial denominators).
9.7 Add and subtract rational expressions with monomial and linear binomial like denominators.
9.8 Add and subtract rational expressions with monomial and linear binomial unlike denominators.

Unit 10 Radical Expressions

General Outcome

10.0 Identify, simplify, and perform operations on radical expressions.

Specific Learning Outcomes

10.1 Define the terms “square root,” “radical,” and “radicand.”
10.2 Estimate the value of radicals by comparing two perfect square roots, and use a calculator for finding the value rounded to the nearest thousandth.
10.3 Simplify square root numerical expressions.
10.4 Simplify the *n*th root of perfect *n*th powers (square and cubic roots).
10.5 Identify the square root of a negative number as not real.
10.6 Simplify square root variable expressions.
10.7 Add and subtract square root expressions.
10.8 Multiply square roots (including monomial square roots).
10.9 Solve for the sides of a right triangle using the Pythagorean Theorem.
10.10 Solve appropriate word problems using the Pythagorean Theorem.
10.11 Rationalize the denominator (monomial denominators only)

Unit 11 Geometric Calculations

General Outcome

11.0 Name and calculate various measurements associated with basic two-dimensional shapes with the aid of a calculator.

Specific Learning Outcomes

11.1 Identify and define a triangle, parallelogram, rectangle, and square.

11.2 Define the terms “perimeter” and “area.”

11.3 Calculate the perimeter of triangles, rectangles, squares with appropriate units.

11.4 Solve geometric applications involving the area of triangles, rectangles, and squares with appropriate units.

11.5 Solve appropriate geometric word problems by modeling them with linear equations in one variable.

Unit 12 The Rectangular Coordinate System

General Outcome

12.0 Identify the quadrants of the rectangular coordinate system, (2) plot points corresponding to ordered-pair coordinates, and (3) identify the ordered-pair coordinates of points plotted on the rectangular coordinate system.

Specific Learning Outcomes

12.1 Identify and draw the rectangular coordinate system axes.

12.2 Identify and name each quadrant of the rectangular coordinate system.

12.3 Define the term “origin,” and identify the origin of the rectangular coordinate system.

12.4 Plot points on the rectangular coordinate system (including points on the axis) representing given ordered-pair coordinates.

12.5 Give the ordered-pair coordinates of points plotted on the rectangular coordinate system.

Unit 13 Slopes and Lines

General Outcome

13.0 Evaluate and interpret the slope of a line, (2) graph lines given two points or a point and the slope, (3) use the slope to determine additional points on a line, and (4) graph horizontal and vertical lines.

Specific Learning Outcomes

13.1 Explain what it means to be a solution to an equation in two variables.

13.2 Determine if a given ordered pair is a solution to an equation in two variables.

13.3 Define the terms “x- (or horizontal) intercept” and “y- (or vertical) intercept.”

13.4 Sketch the graphs of linear equations in two variables given any two points.

13.5 Sketch the graphs of linear equations in two variables given the x- and y- intercepts.

13.6 Sketch the graphs of linear equations in two variables using slope-intercept form.

13.7 Identify and determine the x- and y-intercepts of graphs of linear equations of two variables.

13.8 Sketch horizontal and vertical lines using their equations.

13.9 Determine the equations of horizontal and vertical lines.

13.10 Evaluate the slopes of horizontal, vertical, and diagonal lines from a graph, an equation, and using the slope formula.

13.11 Sketch graphs of linear equations in two variables given any point and the slope.

13.12 Use the slope to determine additional points on the graph of a line.