

Course Description

8th Grade

Pre-Algebra

Philosophy Statement: In Mathematics, God has blessed His creation with the ability to count, tell time, and make change. This is not an accident; it is a reflection of God's goodness. As students learn to appreciate God's gift of numbers and use of addition, subtraction, multiplication, and division, they should concurrently develop a heart of praise and thanksgiving in their study of mathematics. In mathematics the student will see the order and truth God created. Just as the Bible says "precept upon precept, line upon line . . ." (Isaiah 28: 10), students will build concept upon concept in mathematics.

Course Objective: The students will explore and experience a variety of different concepts of mathematics including solving equations, slope, functions, transformations, congruence, volume and scatter plots. They will use manipulatives with geometry and graphing. They will work weekly on problem solving adjacent to the unit themes.

Textbook: Pre-Algebra 3rd Edition (BJU Press)

Biblical Integration: *Math is a way of describing the consistent way this universe operates. It is the language we use to express the quantities and consistencies around us; the quantities and consistencies God created and sustains. Creation is sustained by God's power. (Col. 1:16-17)*

Math provides perfection in calculations which challenge God's people to follow His commands and be fruitful to fill the Earth. God is provision which comes through obedience like Noah. (Genesis 6:14-16) "Make yourself an ark of gopher wood. Make rooms in the ark, and cover it inside and out with pitch. This is how you are to make it: the length of the ark 300 cubits, its breadth 50 cubits, and its height 30 cubits. Make a roof for the ark, and finish it to a cubit above, and set the door of the ark in its side. Make it with lower, second, and third decks."

Time Allotment: 45 minutes one day per week, 90 minutes two days per week

Course Content:

Weeks 1-9

- 1.1.1 Order integers by using number lines.
- 1.1.2 Explain that the usefulness of number lines depends on the assumption of an orderly world.
- 1.1.3 State the opposite of an integer.
- 1.1.4 Find the absolute value of an integer.

- 1.2.1 Evaluate a sum of integers by using a number line and by applying rules.
- 1.2.2 Evaluate a difference of integers as the sum of the opposite.
- 1.2.3 Explain what it means to number.
- 1.3.1 Identify the properties of addition.
- 1.3.2 Use the properties of addition to write equivalent expressions.
- 1.3.3 Determine whether a given set of numbers is closed under addition.
- 1.4.1 Evaluate a product of integers.
- 1.4.2 Evaluate a quotient of integers.
- 1.4.3 Explain how multiplication and division help people organize and predict.
- 1.5.1 Identify the properties of multiplication.
- 1.5.2 Apply the properties of multiplication to write equivalent expressions.
- 1.5.3 Determine whether a set of numbers is closed under multiplication.
- 1.PS.1 Apply the four-point checklist to solve problems involving the operations of arithmetic.
- 1.6.1 Write products with repeated factors in exponential form.
- 1.6.2 Expand exponential expressions.
- 1.6.3 Evaluate exponential expressions.
- 1.7.1 Apply product, power, and quotient properties of powers.
- 1.7.2 Interpret an exponent of 0 and negative integral exponents.
- 1.7.3 Simplify exponential expressions with integral powers.
- 1.8.1 Evaluate square roots of perfect squares.
- 1.8.2 Evaluate cube roots of perfect cubes.
- 1.8.3 Estimate other square and cube roots by determining the integers a root lies between
- 1.9.1 State the order of operations.
- 1.9.2 Apply the order of operations to evaluate numerical expressions.

Weeks 10-18

- 2.1.1 Evaluate algebraic expressions, given the value of each variable.
- 2.1.2 Identify the terms, coefficients, and the constant term in an algebraic expression
- 2.2.1 Apply the Distributive Property to write equivalent expressions.
- 2.2.2 Model a real-world situation with the Distributive Property
- 2.3.1 Simplify algebraic expressions by using the Commutative and Associative Properties.
- 2.3.2 Simplify algebraic expressions by using the Distributive Property to combine like terms.
- 2.4.1 Translate a word phrase into a numerical expression.
- 2.4.2 Translate a word phrase into an algebraic expression.
- 2.PS.1 Apply the strategy of selecting the operations to solve problems.
- 2.5.1 Convert numbers from standard form to scientific notation.
- 2.5.2 Convert numbers from scientific notation to standard form.
- 2.5.3 Determine the number of significant digits in a measurement.
- 2.5.4 Explain the purpose of scientific notation.
- 2.6.1 Round a number to an indicated place value.
- 2.6.2 Estimate a sum or a difference.
- 2.6.3 Estimate a product or a quotient.
- 2.AP.1 Calculate values related to physical fitness.
- 2.AP.2 Relate physical fitness to the command of exercising dominion.
- 3.1.1 Solve equations by adding or subtracting.
- 3.1.2 Solve real-world problems by using addition or subtraction equations.
- 3.2.1 Solve equations by multiplying or dividing.
- 3.2.2 Solve real-world problems by using multiplication or division equations.
- 3.3.1 Solve two-step equations.

3.3.2 Solve real-world problems by using two-step equations.

3.PS.1 Apply the strategy of guess and check to solve problems.

Weeks 19 - 26

3.4.1 Solve equations that have like terms.

3.4.2 Solve equations that have parentheses.

3.5.1 Translate real-world problems into equations.

3.5.2 Solve equations related to real-world problems.

3.5.3 Interpret the solution to an equation related to a real-world problem.

3.5.4 Explain why we are able to use equations to effectively model real-world relationships.

3.6.1 Determine whether a given number is a solution to an inequality.

3.6.2 Graph an inequality on a number line.

3.6.3 Solve simple inequalities algebraically.

3.7.1 Explain how modeling real-world relationships with inequalities imitates God's work.

BWS Knowledge: Creation (explain)

3.7.2 Translate real-world problems related to unequal quantities into inequalities.

3.7.3 Solve simple inequalities related to real-world problems.

3.7.4 Interpret the solution to an inequality related to a real-world problem.

3.AP.1 Calculate values related to pollution management.

3.AP.2 Relate pollution management to the biblical principle of exercising dominion

4.1.1 State the factors of a natural number.

4.1.2 Classify a natural number as prime, composite, or neither.

4.1.3 Determine the prime factorization of a natural number.

4.1.4 Explain why someone might think mathematics is objective truth.

4.2.1 Determine the greatest common factor of several natural numbers.

- 4.2.2 State whether 2 numbers or expressions are relatively prime.
- 4.2.3 Determine the greatest common factor of several simple algebraic expressions.
- 4.3.1 Determine the least common multiple of several natural numbers.
- 4.3.2 Determine the least common multiple of several algebraic expressions.
- 4.PS.1 Use patterns to find a solution.
- 4.4.1 Identify equivalent fractions.
- 4.4.2 Reduce fractions to lowest terms.
- 4.4.3 Convert between improper fractions and mixed numbers.
- 4.4.4 Compare fractions with different denominators.
- 4.5.1 Convert between equivalent fractional and decimal forms of a rational number.
- 4.5.2 Order a set of rational numbers containing terminating and repeating decimals.
- 4.6.1 Compare quantities by using ratios and rates.
- 4.6.2 Solve proportions.
- 4.6.3 Apply proportions to solve real-world problems.
- 4.7.1 Model the relationships between major subsets of the real numbers with a Venn diagram.
- 4.7.2 Classify real numbers as natural, whole, integer, rational, or irrational.
- 4.7.3 Identify the properties of addition and multiplication when applied to various real numbers.
- 4.7.4 Explain how our classifications of the real number system demonstrate elements of both God's creation and people's creative work.
- 4.AP.1 Calculate modulo values.
- 4.AP.2 Use modular arithmetic to encrypt and decrypt.

Weeks 27-36

- 5.1.1 Evaluate sums and differences of like and unlike fractions.
- 5.1.2 Evaluate sums and differences of mixed numbers.
- 5.1.3 Evaluate sums and differences of decimals.
- 5.2.1 Multiply fractions, mixed numbers, and integers.
- 5.2.2 Multiply decimals.
- 5.2.3 Evaluate powers of rational numbers.
- 5.3.1 Divide fractions, mixed numbers, and integers.
- 5.3.2 Divide decimals by an integer or a decimal.
- 5.3.3 Evaluate rational roots.
- 5.3.4 Estimate irrational square and cube roots to the nearest tenth.
- 5.PS.1 Use a diagram as an aid to solving a problem.
- 5.4.1 Evaluate algebraic expressions with rational values for the variables.
- 5.4.2 Explain how algebraic expressions help us model the real world.
- 5.5.1 Simplify algebraic expressions with rational coefficients.
- 5.6.1 Solve equations containing rational numbers.
- 5.6.2 Explain why we want to model the real world.
- 5.7.1 Translate the statement of a real-world problem into an equation.
- 5.7.2 Solve equations related to real-world problems involving rational numbers.
- 5.7.3 Interpret the solution to an equation related to a real-world problem.
- 5.7.4 Explain why mathematical models are so effective.
- 5.8.1 Evaluate products and quotients of numbers in scientific notation.
- 5.8.2 Evaluate sums and differences of numbers in scientific notation.
- 5.8.3 Apply operations in scientific notation to solve real-world problems.
- 5.AP.1 Calculate gear ratios and apply the ratios to real-life applications.
- 6.1.1 Convert between equivalent percents, decimals, and fractions.
- 6.2.1 Solve percent problems using the percent formula.

- 6.2.2 Solve percent problems using a proportion.
- 6.3.1 Solve real-world problems involving percents.
- 6.3.2 Explain how an accurate claim involving percents can be misleading.
- 6.PS.1 Use the “divide and conquer” strategy to solve real-world problems.
- 6.4.1 Find the original retail price, discount, discount rate, or sale price of items on sale.
- 6.4.2 Find the cost, markup, markup rate, or retail price for items marked up for resale.
- 6.4.3 Explain how a sales advertisement can use accurate percent statements in a misleading way.
- 6.5.1 Determine an appropriate tip or percent of the bill.
- 6.5.2 Find the commission rate, earnings, or sales amount.
- 6.5.3 Explain the importance of calculating tips and commission-based earnings.
- 6.6.1 Calculate the interest earned and final balance for simple interest problems.
- 6.6.2 Calculate the final balance and interest earned for compound interest problems.
- 6.7.1 Find the new amount when given an original amount and the percent change.
- 6.7.2 Find the percent change when given the original amount and the amount of change.
- 6.8.1 Find actual and modeled lengths.
- 6.8.2 Find the scale of models, given actual and modeled lengths.
- 6.8.3 Perform calculations related to enlargements and reductions.
- 6.AP.1 Apply the skills and concepts taught in Chapter 6 in business-related scenarios

Resources:

- Delta Math website
- Teacher-made materials
- Student calculators (Ti83/84 for 8th -10th Grades)
- Math manipulatives
- Pre-assessments