

Math 7A

SCOPE OF COURSE

This course is divided into two semesters of study (A & B) comprised of five units each. The first-semester (A) is a study of whole numbers and integers; rational numbers; statistics; probability; and measurement.

SEQUENCE OF SKILLS

UNIT 1 – Whole Numbers and Integers

Whole numbers, integers, and absolute value

- Understand the definition of whole numbers and integers
- Use the number line to locate integers
- Find the absolute value of a number

Adding and subtracting integers

- Model single-sign addition and subtraction of integers with number line and integer chips
- Develop an algorithm for single-sign addition and subtraction of integers

Double-signed addition and subtraction

- Model double-sign addition and subtraction of integers with integer chips
- Develop an algorithm for double-sign addition and subtraction

Multiplying integers

- Represent integer multiplication with integer chips
- Develop and use an algorithm for integer multiplication

Dividing integers

- Understand the concept of division
- Algebraically perform division of positive and negative integers

Exponents

- Convert between exponents and repeated multiplication
- Simplify exponential expressions
- Develop and use the laws of exponents for multiplication and division

Square roots

- Understand the concept of a square root
- Find the square root of a given perfect square
- Estimate the square root of a non-perfect square using a number line

Order of operations

- Understand the importance of defining a particular order of math operations
- Use the correct order of operations

Properties of addition and multiplication

- Understand and identify the commutative, associative, identity, and inverse properties of addition and multiplication
- Understand and identify the zero property of multiplication

Mental math

- Understand rounding to a place value
- Estimate multiplying large numbers by rounding to the tens place and hundreds place

Prime factorization

- Understand that any whole number can be written as a product of its prime factors
- Express a given whole number as a product of its prime factors using exponents

The Least Common Multiple (LCM)

- Find the least common multiple of two whole numbers

Divisibility Rules and the Greatest Common Factor (GCF)

- Develop rules for dividing by 2, 3, 4, 5, 6, 9, and 10
- Find the greatest common factor of two numbers

Review and Problem Solving

- Solve applications involving different integer operations
- Solve applications involving arithmetic properties

Math 7A

SEQUENCE OF SKILLS

UNIT 2 – Rational Numbers

Ratios

- Understand ratios as a comparison of two or more numbers
- Understand the concept of equivalent ratios
- Express ratios in simplest form

Intro to fractions

- Understand fractions as rational numbers, and the meaning behind fraction notation
- Understand the concept of equivalent fractions, and express fractions in lowest terms
- Convert between mixed numbers and improper fractions

Addition and Subtraction with Fractions

- Understand the concept of adding and subtracting fractions
- Be able to add and subtract fractions with like and unlike denominators

Multiplication and Division with Fractions

- Understand the concept of multiplying and dividing fractions
- Understand division as the inverse of multiplication

Decimals

- Understand conceptually what decimal notation means
- Be able to convert from decimals to mixed numbers and fractions
- Order decimals, fractions, and mixed numbers

Fractions as decimals

- Convert from a fraction to a terminating or repeating decimal
- Understand the concept of an irrational number

Adding and subtracting decimals

- Understand decimal addition and subtraction
- Perform decimal addition and subtraction

Multiplying and dividing decimals

- Understand decimal multiplication and division
- Perform decimal multiplication and division

Negative exponents and scientific notation

- Understand the concept of scientific notation
- Convert large whole numbers into scientific notation

Percentage

- Convert between decimals and percents
- Solve problems involving percents

Application of percents

- Apply percents to real life situations
- Solve word problems involving percents

Putting numbers in order

- Correctly order any combination of fractions, decimals, mixed numbers, percents, or scientific notation using inequality symbols or a number line

Number sets

- Identify the number sets (Natural, whole, integers, rational, and irrational numbers)
- Recognize which set certain numbers fall into

Review and Problem Solving

- Solve applications involving rational numbers and scientific notation

Math 7A

SEQUENCE OF SKILLS

UNIT 3 – Statistics

Collecting Data

- Learn different sampling methods

Pie Graphs

- Interpret and read pie graphs
- Understand when pie graphs are used

Organizing Information: Frequency Tables

- Use tally to count frequency of data
- Organize data using a frequency table
- Interpret frequency tables
- Understand the concept of line plots

Stem-and-Leaf plots

- Create Stem-and-Leaf plots
- Interpret Stem-and-Leaf plots

Bar Graphs

- Use data to make bar graphs
- Interpret bar graphs

Pictographs

- Use data to make a pictograph
- Interpret pictographs

Histograms

- Use data to make a histogram
- Interpret histograms

Range, Mode, Mean, and Median

- Analyze data sets by finding the mean, median, mode, and range

Box-and-Whisker Plots

- Construct box-and-whisker plots
- Interpret box-and-whisker plots

Graphing Coordinates

- Plot points on a set of axes
- Identify coordinates of a point on the axes

Line Graphs

- Connect plotting points to data measurements
- Construct and interpret line graphs

Scatter Plots

- Plot points for scatter plots
- Determine the best fit line for a scatter plot

Using the Appropriate Data Display

- Understand when to use the correct graph
- Develop an understanding of how statistics can be misleading

Review and Problem Solving

- Solve applications involving different data displays
- Solve word problems with mean median and mode

Math 7A

SEQUENCE OF SKILLS

UNIT 4 – Probability

Sample spaces

- Understand the concept of Sets and Sample Spaces
- Use the Venn diagram model for sets

Counting with Venn diagrams

- Use a Venn diagram to find a missing quantity

Counting principle

- Determine how many ways certain events can occur
- Use tree diagrams to develop the counting principle

Intro to probability

- Understand the concept of probability
- Understand that probabilities range from 0% to 100%
- Find the probability a particular outcome in a simple experiment

A deck of cards

- Understand the suits and numbers in a standard deck of cards
- Understand basic probability in a standard deck of cards

Simple events and expected outcomes

- Find the theoretical probability of simple events
- Begin to develop an understanding of theoretical probability and experimental probability
- Predict the expected outcome of a string events

Compound Probabilities

- Understand how to find the probability of two or more independent events

This or that probability

- Solve probability problems involving operations with multiple events

This then that

- Find the probability of compound events when order is specified
- Observe the effects of dependent vs. independent events

This and that

- Find the probability of compound events when order is not specified

Dependent events

- Find the probability of compound events when order is specified
- Observe the effects of dependent vs. independent events

Probability experiments

- Determine the experimental probability of an event

Theoretical vs. experimental probability

- Understand the difference between theoretical and experimental probability
- Create probability experiments and compare data to theoretical probability

Review and Problem Solving

- Solve word problems involving probability

Math 7A

SEQUENCE OF SKILLS

UNIT 5 – Measurement

Reading a clock

- Read a clock

Operations with a clock

- Determine how much time has passed
- Determine the time after a certain number of hours and minutes have passed

Converting units of time

- Convert between seconds, minutes, hours, days, weeks, months, and years

Units of length

- Identify customary units of length
- Develop personal references for each unit
- Convert between units of length

Units of weight

- Identify customary units of weight
- Develop personal references for each unit
- Convert between units of weight

Units of capacity

- Identify customary units of capacity
- Develop personal references for each unit
- Convert between units of capacity

Metric system

- Understand metric units and what they represent
- Develop personal references for each unit
- Convert between different metric units

Tools of measurement

- Understand when and how to use appropriate tools for measurement

Temperature

- Understand how to read a thermometer
- Understand how to convert between Celsius and Fahrenheit

Angles

- Understand what an angle is
- Understand how to use a protractor

Rates

- Understand rates, unit rates, and equivalent rates
- Use unit rates to compare rates

Rates with changing units

- Compare rates with different units
- Solve rate word problems involving unit conversions

Operations with measurements

- Perform arithmetic with measurements

Review and Problem Solving

- Solve word problems involving measurement

Math 7B

SCOPE OF COURSE

This course is divided into two semesters of study (A & B) comprised of five units each. The second-semester (B) is a study of algebra; algebraic patterns and coordinate geometry; geometric figures; geometric solids; and transformational geometry.

SEQUENCE OF SKILLS

UNIT 1 – Algebra

Variables and substitution

- Understand that letters can be used to represent numbers
- Substitute a given value to simplify an algebraic expression More substitution
- Substitute for two or more variables in an expression
- Substitute for multiple variables to verify the equality of two expressions

Polynomials

- Recognize monomials and polynomials
- Write polynomials in descending order

Translating words to algebraic expressions

- Translate word phrases into algebraic expressions
- Solve word problems by translating sentences into algebraic expressions

Adding and subtracting polynomials

- Simplify polynomials by combining like terms
- Add and subtract polynomials

Properties of equality

- Determine whether quantities are equal
- Begin solving equations using rules of equality

Solving equations; Part One

- Given an equation, solve for a variable
- Check answer using substitution

Solving equations; Part Two

- Perform more than one operation to solve for a variable
- Check answer using substitution

Translating sentences to algebraic equations

- Translate a sentence into an algebraic equation, solve for an unknown, and check using substitution

Inequalities: Part One

- Determine what an inequality is
- Solve inequalities using steps for equations
- Solve inequalities with variables on both sides of the inequality sign

Inequalities: Part Two

- Solve inequalities involving negative numbers.

Graphing inequalities

- Graph inequalities on a number line using the method of testing values
- Solve and graph the solution of an inequality

Translating inequalities

- Translate sentences into algebraic inequalities
- Solve inequality word problems by translating them into algebraic inequalities and graphing

Review and Problem Solving

- Solve word problems using algebraic equations
- Solve word problems using algebraic inequalities

Math 7B

SEQUENCE OF SKILLS

UNIT 2 – Algebraic Patterns and Coordinate Geometry

Introduction to proportions

- Understand what a proportion is
- Find missing values in a proportion using equivalent fractions or cross multiplying

Proportion word problems

- Solve word problems using proportional thinking

Proportions with maps

- Solve word problems using proportional thinking

Proportions with similar triangles

- Understand the concept of similar triangles
- Use proportions to find one missing side in a pair of similar triangles

Proportions: scale drawings

- Use proportions to find dimensions in scale models
- Use proportional thinking to find the actual dimensions of objects

Proportions: percents

- Use proportions to solve percent problems

Patterns and sequences

- Use a table to complete a sequence of numbers
- Create a rule for finding numbers in a sequence
- Create a sequence based on a list of rules

Exploring visual patterns

- Use a table to continue a pattern
- Analyze a table to create a rule for finding any step of a pattern

Introduction to functions

- Given a function, generate a sequence using an input-output table
- Given an input-output table, generate a function

Graphing lines

- Use a table to plot points
- Graph a linear function by creating a table of values

Investigating the graph of a line

- Find the slope and y-intercept of a line given a graph
- Apply the slope formula to find the slope of a line given two points
- Find the y-intercept of a line given the equation

Slope-intercept form of a line

- Find the equation of a line given its graph
- Determine what happens to a line graph if you change the slope or the y-intercept

Systems of linear equations

- Solve a system of equations graphically and algebraically
- Model a situation using a system of linear equations
- Determine the number of solutions to a system of linear equations

Review and Problem Solving

- Solve word problems involving rates and proportions
- Solve problems involving sequences and linear functions

Math 7B

SEQUENCE OF SKILLS

UNIT 3 – Geometric Figures

Classifying angles

- Understand the concept of angles and the different classifications of angles
- Identify the type of angle based on its measurement
- Understand and identify parallel and perpendicular lines

Properties of parallel lines

- Understand the property of parallel lines being cut by a transversal

Polygons

- Distinguish between different types of polygons
- Understand the concept of a regular polygon

Triangles

- Distinguish between different types of triangles
- Use the angle sum of a triangle to find missing values

Pythagorean theorem

- Use the Pythagorean Theorem to find missing sides in a right triangle
- Determine if a set of numbers is a Pythagorean triple

Quadrilaterals

- Understand what a quadrilateral is
- Distinguish between different types of quadrilaterals

Angle properties of polygons

- Determine the interior angle sum for a polygon
- Determine the measure of each interior and exterior angle in a regular polygon

Perimeter and area of quadrilaterals

- Understand the concepts of area and perimeter
- Derive formulas for, and be able to compute area and perimeter of a square, rectangle, and parallelogram

Perimeter and area of triangles

- Understand how to find the perimeter of different types of triangles
- Understand how to find the area of different types of triangles

Perimeter and area of polygons

- Find the perimeter of regular and irregular polygons
- Find the area of regular and irregular polygons

Congruence and similarity

- Determine which polygons are congruent
- Determine which polygons are similar

Introduction to circles

- Understand the concepts of radius and diameter
- Determine what percent of a circle a central angle takes up

Area and circumference of circles

- Determine the area of a circle based on the diameter and radius
- Determine the circumference of a circle based on the diameter and radius

Review and Problem Solving

- Solve word problems involving area, circumference, and perimeter
- Develop problem solving skills by drawing pictures

Math 7B

SEQUENCE OF SKILLS

UNIT 4 – Geometric Solids and Constructions

Introduction to 3-dimensional solids

- Classify different 3-dimensional solids

Properties of solids

- Understand the parts that make a 3-dimensional solid

Volume of prisms

- Calculate the volume of rectangular and triangular prisms
- http://www.learner.org/interactives/geometry/3d_prisms.html

Volume of pyramids

- Calculate the volume of rectangular and triangular pyramids

Surface and lateral area of prisms

- Calculate the surface and lateral area of rectangular and triangular prisms using nets and perspective drawing
- http://www.learner.org/interactives/geometry/3d_prisms.html

Surface and lateral area of pyramids

- Calculate the surface and lateral area of rectangular and triangular pyramids using nets and perspective drawing
- http://www.learner.org/interactives/geometry/3d_pyramids.html

Dimensions of a solid

- Use algebraic equations to find missing dimensions of a solid

Slicing 3-dimensional solids

- Describe plane sections
- http://www.learner.org/courses/learningmath/geometry/session9/part_c/

Constructing geometric shapes

- Use a protractor to draw and measure angles
- Draw geometric shapes with given conditions
- <http://www.mathsisfun.com/geometry/protractor-using.html>

Technology and geometric solids

- Use technology to investigate geometric solids
- <http://illuminations.nctm.org/Activity.aspx?id=3521>

Applications of area

- Solve real-world problems involving area of 2-dimensional figures

Applications of volume

- Solve real-world problems involving volume of 3-dimensional solids

Applications of surface and lateral area

- Solve real-world problems involving surface and lateral area of 3-dimensional solids

Review and Problem Solving

- Solve applications involving 3-dimensional solids

Math 7B

SEQUENCE OF SKILLS

UNIT 5 – Transformations and Economic Applications of Proportions

Similar figures

- Identify and describe similarity of two-dimensional shapes using side and angle measurements

Lines of symmetry

- Identify lines of symmetry for a reflection

Transformations

- Use technology to investigate transformations on a coordinate plane
- <http://www.shodor.org/interactivate/activities/Transmographer/>

Reflections

- Perform reflections on a given preimage in the coordinate plane
- Use reflection notation
- <http://www.mathwarehouse.com/transformations/reflections-in-math.php>

Translations

- Perform translations on a given preimage in the coordinate plane
- Use translation notation
- <http://www.mathwarehouse.com/transformations/translations-in-math.php>

Rotations

- Perform rotations on a given preimage in the coordinate plane
- Use rotation notation
- <http://www.mathwarehouse.com/transformations/rotations-in-math.php>

Compositions of transformations

- Perform multiple transformations on a given preimage in the coordinate plane

Sales and income tax

- Calculate the sales tax for a given purchase and income tax for earned wages

Budgets

- Identify the components of a personal budget, including income, savings, taxes, and expenses
- Calculate the percentage of each category

Financial assets

- Create and organize a financial assets and liabilities record
- Construct a net worth statement

Family budget estimator

- Determine the minimum household budget and average hourly wage
- Family budget calculator: <http://www.epi.org/resources/budget/>

Simple and compound interest

- Calculate and compare simple and compound interest earnings

Monetary incentives

- Analyze and compare sales, rebates, and coupons

Review and Problem Solving

- Solve applications involving proportions, taxes, budgets, interest, and monetary incentives