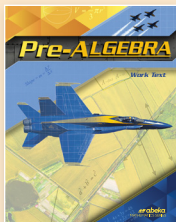


MATHEMATICS: Pre-Algebra



Pre-Algebra presents a brief yet complete review of arithmetic with applications to daily life. Once grounded in arithmetic, students can advance to other branches of mathematics. The topics of geometry, algebra, probability, statistics, and radicals are expanded, and trigonometry and systems of equations are introduced. These topics provide the foundation students need to enjoy success in future mathematics courses.

Practice and review problems in each lesson give sufficient opportunity for students to develop and maintain their skills while learning to work quickly and accurately. Word problems and problem-solving strategies throughout the text ensure that students can apply their mathematical skills to everyday situations and encourage students to connect varying types of mathematical knowledge. Level Up sections allow for further expansion of the concepts covered.

Features

- Flexible pacing options in curriculum:
 - Level Up sections (32)
- Review exercises in every section (79)
- Mid-chapter reviews (17)

- Chapter reviews (12)
- Nine-weeks reviews (2)
- Semester review
- Final review

Evaluation

- Quizzes (47)
- Tests (8)
- 9-weeks exam (2)
- Semester exam
- Final exam

► **RED** indicates first introduction of content.

Numbers

- Arabic system
- Place value
 - Decimal system/powers of ten
 - Whole numbers up to 100 millions place
 - Decimals up to ten thousandths place
- Rounding: whole numbers, decimals, money
- Types of numbers
 - Counting (natural), whole, positive, negative, integer
 - Real
 - Rational/irrational numbers
 - Absolute value
- Comparing numbers
- Law of trichotomy
- Number line
- Scientific Notation
 - Standard form
 - Metric: large, small
- Sequences, numerical
 - Arithmetic, geometric
 - Common difference
 - Common ratio
 - Finding the next term
 - Increasing difference
 - Exponential
- Sequences, visual

Factoring

- Rules of divisibility
- Prime Factoring
 - Prime/Composite numbers
 - Prime to each other
 - Fundamental theorem of arithmetic
 - Division by primes/Factor Tree
- Greatest common factor
- Least common multiple
- Exponent/base/power
- Factorial

Arithmetic

- Estimation
- Order of operation
 - Parentheses
 - Brackets, braces, fraction bar
- Addition
 - Addend, sum, annex
 - Whole numbers, fractions, decimals
 - Signed numbers
 - Additive inverse
 - Scientific notation
- Subtraction
 - Minuend, subtrahend, difference
 - Whole numbers, fractions, decimals
 - Signed numbers
 - Scientific notation
- Multiplication
 - Factor, partial product, product
 - Whole numbers, fractions, decimals
 - Powers of ten
 - Signed numbers
 - By zero
 - Scientific notation
- Division
 - Dividend, divisor, quotient, remainder
 - Whole numbers, fractions, decimals
 - Signed numbers
 - Powers of ten
 - Scientific notation
- Word problems
 - Problem Solving Strategies
- Properties of arithmetic
 - Commutative
 - Associative
 - Distributive
 - Applying properties
 - Estimation

MATHEMATICS: Pre-Algebra cont.

Fractions

- Numerator, denominator
- Types:
 - Proper, improper, mixed number
 - Complex, reciprocal
- Addition, subtraction, multiplication, division
 - Least common denominator
- Simplifying complex fractions
- Changing a fraction to a decimal
- Word problems
- Ratios
 - Antecedent, consequent
 - Expressing/reading
 - Word problems

Decimals

- Types:
 - Terminating, repeating
 - Rational, irrational
- Changing a decimal to a fraction

Percent, Percentage, Base

- Expressing:
 - Percent as a decimal
 - Decimal as a percent
 - Fraction as a percent
 - Percent as a fraction
 - Fractional percent as a decimal
- Percentage
 - Simple interest
 - Discount and sale price
 - More or less in percent
- Percent
 - Rate of discount
 - Percent of change
- Base

Measures

- Linear
 - U.S. customary: inch, foot, yard, mile
 - Metric: millimeter, centimeter, decimeter, meter, decameter, hectometer, kilometer
- Capacity
 - U.S. customary: fluid ounce, cup, pint, quart, gallon, peck, bushel, teaspoon, tablespoon
 - Metric: milliliter, centiliter, deciliter, liter, decaliter, hectoliter, kiloliter
- Weight
 - U.S. customary: ounce, pound, ton
- Mass:
 - Metric: milligram, centigram, decigram, gram, decagram, hectogram, kilogram
- Historical Measures
 - Linear: cubit, **span, palm, finger**
 - **Capacity: log, hin, bath, homer, measure, cor, ephah, omer**
 - Weight: shekel, **talent**
 - Money: talent (gold), **quadran (farthing), shekel (silver), denarius (penny), lepton (mite)**
- Converting between U.S. customary measures
 - Single conversion factor
 - Multiple conversion factors
- Converting between metric measures
- Converting between square measures/**cubic measures**
- Time
 - Second, minute, hour, day, week, month, year, decade, score of years, century, millennium

- solar year, calendar year, leap year
- 24-hour time
- Elapsed time
- Mixed measures
 - Express a mixed measure as a single measure
 - Add, subtract, multiply, divide
- Dimensional analysis
 - Express conversion factor as a ratio
 - Convert between U.S. customary or time measures

► Precision

► Accuracy

► Significant digits

Equations/Inequalities

- Solving, isolating
- Inverse operation
- Solving equations
 - Addition property of equality
 - Multiplication property of equality
 - Both properties
 - **Eliminating fractions/decimals**
 - **Conditional, identity, contradiction**
- Word problems
 - Addition property of equality
 - Multiplication property of equality
 - Both properties
 - With multiple unknowns
 - **Mixture problems**
- Proportions
 - Means, extremes
 - **Fundamental property of proportions:**
 - Cross multiplication
 - Scale drawings, maps
 - Word problems
- Similarity
 - Similar polygons
 - Word problems
- Pure quadratic equation
- Pure cubic equations
- Pythagorean theorem
 - Hypotenuse, leg
 - Finding hypotenuse, leg
 - **Testing triangles**
 - **Distance on Cartesian plane**
 - **Word problems**
- Inequality graphing
 - $<$, $>$, \leq , \geq , \neq
 - Open dot, closed dot
 - Solution
 - Compound inequality
- Solving inequalities
 - Addition property of inequality
 - Multiplication property of inequality
 - Both properties
- Compound inequalities
- **Inequality word problems**

MATHEMATICS: Pre-Algebra *cont.*

Geometry

- Plane figure notation
- Plane figures
 - Plane, point, line, line segment, ray, angle
 - Intersecting, parallel, or perpendicular lines
- Polygon, closed figures
 - Side, vertex
 - Triangle, pentagon, hexagon, octagon, heptagon, **nonagon**, **decagon**
 - Quadrilateral, rectangle, square, rhombus, trapezoid
 - **Regular**, equilateral, equiangular
 - Similar polygons
- Congruent polygons
 - SSS, SAS, ASA
- Line symmetry
 - Rotational, symmetry
 - Asymmetrical
- Perimeter: polygon, rectangle, square, any polygon with equal sides, unknown lengths
- Angles: acute, obtuse, right, straight, reflex
- Pairs of angles: vertical, adjacent, complementary, supplementary
 - Transversal
 - Alternate interior, alternate exterior, corresponding
 - Parallel lines
- Measuring and drawing angles with a protractor
- Constructing equal line segments
- Constructing equal angles
- Triangles: acute, obtuse, right, equiangular, equilateral, isosceles, scalene
- Drawing triangles
 - ASA, SAS
- Triangles formed: 0, 1, 2, or infinitely many
 - Ambiguous case
 - Constructing triangles
 - SAS, ASA, SSS
- Circles
 - Center, radius, diameter, arc, semicircle, chord, central angle, subtended, sector
 - Sum of central angles: 360°
- Circumference with radius or diameter
- Area
 - rectangle, square, parallelogram, triangle, circle, trapezoid
 - using a grid and scale
 - Complex figures using addition or subtraction
- Polyhedra
 - Face, edge, base
 - Prisms, pyramids
 - Nets
- Three dimensional curved figures
 - Cylinder, cone, sphere, **torus**
 - Rectangular prism, cube, triangular prism, square pyramid, cylinder, cone, sphere
- Surface area
 - Rectangular prism, cube, square pyramid, cylinder, **sphere**
- Lateral surface area
 - Rectangular prism, cube, cylinder
- Volume
 - Rectangular prism, cube, cylinder, cone, **pyramids**, **sphere**
- Cross Sections

Graphing on the Cartesian Plane

- Cartesian plane, origin, x-axis, y-axis, quadrants, point, ordered pair
- x-intercept, y-intercept
- Plotting points
- Coordinate geometry, transformations
 - Translation
 - Preimage, image,
 - Rigid transformation
 - Reflection
 - Rotation: 90° , 180°
 - Dilation
 - Reduction, enlargement
 - Center of Dilation at origin
 - Superposition
- Slope
 - Rise, run,
 - Positive, negative, zero, **undefined**
 - Parallel and perpendicular slopes
- Graphing a line
 - Using two points
 - Using a point and a slope
 - Using a table of values
 - Using slope-intercept form
 - Writing equation from graph
- Linear equations
 - Input, output, independent variable, dependent variable, equation
 - Slope-intercept form
- Direct Variation
 - Constant of variation
 - Proportional/nonproportional
 - Word problems
- Functions
 - Relations
 - Domain, range
 - Mapping diagram
 - Vertical line test
 - Function notation
 - Evaluation
 - Linear, nonlinear
 - Increasing, decreasing
 - Continuous, discrete
 - Comparing functions by graphing
- Parabolas
 - Nonlinear
 - Graphing by tables

Probability and Statistics

- Counting
 - Outcome
 - **Sample space**
 - Exhaustive list, tree diagram
 - Fundamental theorem of counting
 - Permutation
- Basic probability
 - Outcome, event,
- Properties of probability
 - Each probability $0 \leq x \leq 1$
 - Sum = 1
 - Complement

► **RED** indicates first introduction of content.

MATHEMATICS: *Pre-Algebra* cont.

Probability and Statistics cont.

- Compound probability
 - Compound events
 - Mutually exclusive
 - Independent
 - Dependent
- Theoretical probability
- Experimental probability
- Relative frequency table
- One way, **two way**
- Data, statistic, statistics
- Frequency table
- Population, sample, random sample
- Measures of center: Mean, median, mode
 - Range
 - Outliers, sensitive
 - Ranked data
 - Dot plot

Statistical Representation

- Chart title, scale, category label, axis title, major/minor gridlines, legend
- Bar graph, stacked bar graph
 - Interpreting
- Circle graph
 - Interpreting
- Box-and-whisker plot
 - Dispersion, range
 - Five-number summary
 - Finding five-number summary of data
 - Minimum, first quartile, median, third quartile, maximum
 - Interpreting/constructing
 - Comparing two plots
- Stem-and-leaf plot
 - Stem, leaf, class
 - Interpreting/constructing
- Histogram
 - Class, frequency
 - Interpreting/constructing
- Line graph
 - Comparing two lines on the same graph
 - Interpreting
 - Straight, curved, or broken
- Scatter plots
 - Association: positive, negative, none
 - Clustering, outlier
- Trend line
 - Finding the equation
 - Interpolation, extrapolation

Algebra

- Variable, constant
- Notation

- Raised dot, side-by-side, parentheses
- Fraction bar
- Factors
 - Numerical coefficient
- Term
 - Constant term
 - Variable term
- Polynomial
 - Monomial, binomial, trinomial
- Evaluation
- Algebraic translation
- Polynomial arithmetic
 - Combining like terms
 - Multiplying/dividing like bases
 - Power rule, quotient rule
 - Negative exponents
 - Raising a power to a power, **product to a power, and quotient to a power**
 - Multiplying/dividing monomials
 - Multiplying a polynomial by a monomial
 - **Multiplying binomials**
 - **FOIL**
 - Dividing a polynomial by a monomial
 - Factoring out a monomial
 - **Factoring by grouping**

Radicals

- Perfect square, perfect cube
- Radical symbol, index (indices), radicand
- Square root, cube root
- Expressing a radical as a fractional exponent
- Finding rational roots using fractional exponents
- Estimating irrational roots
- **Product rule for radicals**
- **Finding irrational roots**
- **Like radicals**
- **Addition**

Trigonometry

- **Sine, cosine, tangent**
- **Opposite, adjacent**
- **Formulas**

System of Equations

- Solving: Graphing, substitution, elimination
- Solutions: one, infinitely many, none
- Lines: parallel, intersecting, coinciding
- System: consistent, inconsistent
- Equations: dependent, independent
- Writing repeating decimals as fractions