

Pre-Algebra to Pre-Calculus

11,000 free-response questions for middle and high school math

This document shows the table of contents and number of questions in EducAide's database module called "Pre-Alg to Pre-Calc". It is current as of December 15, 2016, though subject to change. The database is available to Problem-Attic school subscribers. For more information, please go to www.problem-attic.com.

Note: *free-response* is used broadly to mean all question types except multiple-choice. The database includes, for example, short tasks, geometry proofs, column matching, and multi-select questions.

Pre-Algebra

Numbers and operations

Classify numbers	20
Order of operations	6
Factors and divisibility	20
Rational numbers: convert	46
Rational numbers: compare	8
Law of exponents: positive integers	30
Law of exponents: negative integers	28
Scientific notation: convert	24
Scientific notation: applications	68
Radicals: simplify	14
Radicals: operations	34
Numeric patterns	60
Geometric/visual patterns	22

Expressions, Equations, Inequalities

Write expressions	20
Write equations	24
Given an equation, write a problem	12
What additional information is needed	10
Inequalities, solve and graph	12
Inequalities, applications	24
Absolute value equations	10
Properties of algebra	14

Integers and rational numbers

Integers	80
Fractions	36
Decimals	84
Percent	86
Estimation	44
Averages (simple)	40
Averages (find missing value)	12
Ratios	70
Proportions	84
Average rate of change, slope/intercept	16

Monomials	34
Polynomials	80
Formulas	72
Time	12
Measurement and conversion	56
Area, perimeter, volume (simple)	90
Time, distance, rate (simple)	50
Data Analysis, Probability	
Data analysis	66
Mean, median, mode, range	50
Make predictions	18
Probability: basic counting principle	28
Probability: single event	68
Probability: compound event	38
Probability: expected value	16
Algebra I	
First degree equations: applications	
Interest and investment (simple)	92
Number problems (simple)	128
Number problems (advanced)	74
Consecutive integers	80
Coins and stamps	48
Age problems	48
Time, distance, rate (advanced)	64
Mixture problems	68
Interest and investment (advanced)	44
Area, perimeter, volume (advanced)	72
Other first degree problems	36
Rational, Quadratic, Systems of Equations	
Rational equations (applications)	92
Quadratic expressions: factors, models	40
Quadratic equations: roots	78
Quadratic equations: solve	56
Quadratic equations: multiply binomials	10
Quadratic equations: applications, factorable	120
Quadratic formula: applications	80
Systems: algebraic	66
Systems: graphical	32
Systems: maximum value	12
Linear inequalities: graph	14
Systems of linear inequalities	6

Functions

Introduction to functions	24
Linear: applications	32
Linear: graph	10
Absolute value: properties of graphs	10
Quadratic: write equation	14
Quadratic: graph properties	70
Transformations, parent functions	56
Quadratic: applications	14
Quadratic: applications, min/max	66

Geometry**Geometry: Introductory Topics**

Geometric terms	76
Characteristics of geometric figures	52
Naming figures	46
Identifying parts of figures	18
Intersections	28
Properties of algebra	8
Logic, forms of argument	70
Symbolic logic, truth tables	20
Logic applications	20

Angles and Parallel Lines

Characteristics of angles	24
Sketching angles	8
Identifying types of angles	44
Angle measures	18
Angle addition and subtraction	26
Angle measurement problems	28
Angle bisectors	42
Complementary and supplementary angles	66
Characteristics of parallel lines	40
Tests for parallel lines	36
Angle relationships	16
Problem solving	60

Triangles and Polygons

Characteristics of triangles	46
Angle measures	52
Side lengths	50
Points of concurrence	44
Supplements/complements, applications	24
Characteristics of polygons	36
Trapezoids	34
Parallelograms	44
Special parallelograms	44
Regular polygons	10

Interior angles of polygons	40
Exterior angles of polygons	30
Similarity and Congruence	
Characteristics of similar figures	38
Tests for similarity	36
Segment proportionality	20
Triangle proportionality	48
Angle bisectors and opposite sides	10
Golden ratio problems	16
Problem solving with similar polygons	58
Characteristics of congruent polygons	22
Tests for congruence	56
Congruence statements	26
Establishing congruence	10
Corresponding parts of congruent triangles	16
Problem solving with congruence	26
Right Triangles	
Geometric mean	38
Altitude to hypotenuse of right triangle	28
Pythagorean Theorem converse	22
Pythagorean Triples	12
Special right triangles: 45-45-90	50
Special right triangles: 30-60-90	60
Pythagorean theorem I	68
Pythagorean theorem II	80
Applications	76
Area	
Rectangles and squares	42
Area of triangles	46
Hero's Formula	28
Parallelograms	30
Area of trapezoids	40
Rhombuses	22
Other polygons	52
Ratio of area for similar polygons	14
Circles	
Characteristics of circles	16
Central angles	16
Inscribed angles	68
Arcs and angles; chords, secants, and tangents	52
Chord lengths	50
Radii, diameters, and circumferences	46
Arc lengths	28
Secant and tangent lengths	54
Areas of circles	50
Areas of sectors, segments, and annuli	42

Solids, Volume, and Surface Area

Characteristics of solids	30
Volumes of prisms	54
Surface areas of prisms	24
Volumes of cylinders	32
Surface areas of cylinders	20
Volumes of pyramids and cones	48
Surface areas of pyramids and cones	34
Volumes of spheres and hemispheres	30
SA and cross sections of spheres/hemispheres	42
Platonic solids	28
Solids contained in solids	22
Ratio of volume for similar solids	44
Spatial reasoning	10

Coordinate Geometry

Graphs of ordered pairs	14
Midpoint	64
Distance	52
Slope between 2 points	50
Points on a line	58
Equations of lines	90
Effects of change in slope and intercept	12
Parallel and perpendicular lines	74
Systems	52
Mixed practice	62
Segment lengths and shapes	42
Segment lengths and area	38
Geometric reasoning	54

Constructions, Transformations and Symmetry

Characteristics of transformations	52
Transformations and the coordinate plane	78
Mapping	92
Symmetry	48
Tessellations	12
Sketching Geometric Figures	90
Constructions	72
Labeling, assumptions from drawings	16
Loci	50
Networks	20

Geometric Proof

Properties	28
Number properties	24
Segments	30
Angle measurement	48
Complementary and supplementary angles	42
Parallel lines	56
Triangles	30
Isosceles triangles	70
Triangle congruence (SSS/SAS/HL)	30
Triangle congruence (ASA/AAS)	24
Triangle congruence (CPCTC I)	62
Triangle congruence (CPCTC II)	52
Similarity	54
Quadrilaterals	70
Inequalities	50
Three dimensional figures	30
Circles	54
Coordinate geometry	18
Indirect proof	24
Fill-in-the-blank	54

Algebra II**General**

Rational exponents: expressions and equations	14
Rational exponents: applications	8
Solve equations for specific variable	32
Defined operations	4
Complex Numbers	28

Non-linear Expressions and Equations

Polynomials: roots	58
Polynomials: operations	58
Polynomials: factor	56
Polynomials: applications	16
Rational: simplify	20
Rational: operations	16
Rational: equations	26
Radical: equations	4
Radical: applications	14
Variation: equations	40
Variation: applications	28
Non-linear inequalities	26

Systems

3+ equations/inequalities: solve	14
3+ equations/inequalities: applications	8
Non-linear equations: equations	38
Non-linear equations: applications	16
Non-linear inequalities: equations	8

Sequence and Series

Sequences	106
Series	94
Sigma notation	24
Arithmetic and geometric means	48
Applications	68
Binomial expansion	38

Functions

Identify type	22
Domain and range	48
Evaluate	14
Combine and compose	12
Inverse and reciprocal	26
Effects of transformations	20
Polynomial graph properties	22
Rational graph properties	14
Radical graph properties	4

Conics

Graph, identify	22
Points on the curve	10
Write equations	82
Convert between standard and general form	18
Graph properties	52
Tangent and secants	4
Effects of transformations	8
Applications	40

Logarithmic and Exponential

Convert between log and exponential form	18
Properties of logarithms	54
Exponential equations	8
Logarithmic equations	22
Applications	90

Trigonometry/Pre-Calculus

Right Triangle Trigonometry

Trig. values: given sides	42
Trig. values: given angles	16
Find angle measures given trig. values	30
Given one trig. value, find another	10
Triangles: find sides and angles	72
Applications	50

Non-right Triangle Trigonometry

Sine and cosine laws: triangles	46
Sine and cosine laws: applications	14
Area using trig values	16

Circular Trigonometry

Convert degrees and radians	12
Coterminal and reference angles	12
Angle, arc length, area	6
Trig. values	18
Standard position	58
The wrapping function	6
Identities	16
Equations	6
Applications	48

Trigonometric Functions

Graph properties	56
Effects of transformations	20
Equations	62
Identities	34
Applications	38
Periodic function applications	16

Polar Coordinates

Convert coordinates	10
Convert equations	12
Operations	4

Introduction to Calculus

Limit of a sequence	10
Slope of secant and tangent lines	14
Evaluate derivatives	38
Increasing and decreasing functions	18
Maximum and minimum values	12
Velocity and acceleration	14