

High Education Math Placement

Placement Assessment Problem Types

1. Whole Numbers, Fractions, and Decimals

1.1 Operations with Whole Numbers

- Addition with carry
- Subtraction with borrowing
- Multiplication with carry
- Introduction to multiplication of large numbers
- Division with carry
- Introduction to exponents
- Order of operations: Problem type 1
- Order of operations: Problem type 2
- Order of operations with whole numbers and exponents: Basic

1.2 Equivalent Fractions and Ordering

- Equivalent fractions
- Simplifying a fraction
- Fractional position on a number line
- Plotting fractions on a number line
- Writing an improper fraction as a mixed number
- Writing a mixed number as an improper fraction
- Ordering fractions with same denominator
- Ordering fractions

1.3 Operations with Fractions

- Addition or subtraction of fractions with the same denominator
- Introduction to addition or subtraction of fractions with different denominators
- Addition or subtraction of fractions with different denominators
- Product of a fraction and a whole number
- Introduction to fraction multiplication
- Fraction multiplication
- Fraction division
- Division involving a whole number and a fraction
- Mixed arithmetic operations with fractions

2.4 Volume and Surface Area

- Volume of a rectangular prism
- Volume of a cylinder
- Surface area of a cube or a rectangular prism
- Surface area of a cylinder

2.5 Angles and Triangles

- Solving equations involving vertical angles
- Sum of the angle measures of a triangle)
- Finding an angle measure for a triangle with an extended side

2.6 Similar Figures

- Similar polygons
- Indirect measurement

3. Signed Numbers, Linear Equations and Inequalities

3.1 Integers

- Absolute value of a number
- Integer addition: Problem type 1
- Integer addition: Problem type 2
- Integer subtraction: Problem type 1
- Integer subtraction: Problem type 2
- Integer subtraction: Problem type 3
- Integer multiplication and division

3.2 Signed Fractions and Decimals

- Signed fraction addition: Basic
- Signed fraction addition: Advanced
- Signed fraction multiplication: Basic
- Signed fraction multiplication: Advanced
- Signed decimal addition with three numbers

3.3 Signed Numbers and Exponents

- Exponents and integers: Problem type 1
- Exponents and signed fractions
- Exponents and order of operations

3.4 Algebraic Expressions

- Writing a simple variable expression for a real-world situation
- Evaluating a linear expression in two variables
- Evaluating a quadratic expression in one variable

3.5 Properties of Real Numbers

- Distributive property: Whole number coefficients
- Distributive property: Integer coefficients

Combining like terms: Integer coefficients

Combining like terms: Advanced

3.6 Solving a Linear Equation with One Occurrence of the Variable

Additive property of equality with decimals

Additive property of equality with integers

Additive property of equality with a negative coefficient

Multiplicative property of equality with whole numbers

Multiplicative property of equality with decimals

Multiplicative property of equality with integers

Multiplicative property of equality with signed fractions

Solving a two-step equation with integers

Solving a two-step equation with signed fractions

3.7 Solving a Linear Equation with Several Occurrences of the Variable

Solving a linear equation with several occurrences of the variable: Variables on the same side and distribution

Solving a linear equation with several occurrences of the variable: Variables on both sides and distribution

Solving a linear equation with several occurrences of the variable: Fractional forms with binomial numerators

Solving equations with zero, one, or infinitely many solutions

3.8 Applications with Linear Equations

Algebraic symbol manipulation: Problem type 1

Algebraic symbol manipulation: Problem type 2

4. Lines and Systems of Linear Equations

4.1 Graphing Lines

Plotting a point in the coordinate plane

Finding a solution to a linear equation in two variables

Graphing a line given its equation in slope-intercept form

Graphing a line given its equation in standard form

Graphing a vertical or horizontal line

4.2 Slope of a Line

Finding slope given the graph of a line on a grid

Finding slope given two points on the line

Finding the slope of a line given its equation

Slopes of parallel and perpendicular lines: Problem type 1

4.3 Equation of a Line

Finding x- and y-intercepts of a line given the equation: Advanced

Writing the equation of a line given the slope and a point on the line

Writing the equation of the line through two given points

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5. Relations and Functions

5.1 Sets and Intervals

- Set builder and interval notation
- Union and intersection of finite sets

5.2 Evaluating Functions

- Evaluating functions: Problem type 1
- Evaluating a piecewise-defined function
- Variable expressions as inputs of functions
- Sum, difference, and product of two functions

5.3 Domain and Range

- Domain and range from ordered pairs
- Domain and range from the graph of a continuous function
- Domain of a square root function
- Domain of a rational function

5.4 Graphs of Functions and their Transformations

- Vertical line test
- Finding local maxima and minima of a function given the graph
- Translating the graph of a function: One step
- Transforming the graph of a function by reflecting over an axis
- Transforming the graph of a function by shrinking or stretching
- Writing an equation for a function after a vertical translation
- Writing an equation for a function after a vertical and horizontal translation
- Graphing a simple cubic function
- Graphing a function involving a square root

5.5 Composition of Functions and Inverse Functions

- Composition of two functions: Basic
- Inverse functions: Problem type 1
- Inverse functions: Problem type 2

6. Inequalities and Factoring

6.1 Properties of Exponents

- Writing a positive number without a negative exponent
- Writing a negative number without a negative exponent
- Introduction to the product rule of exponents
- Product rule with positive exponents
- Product rule with negative exponents
- Introduction to the quotient rule of exponents
- Quotients of expressions involving exponents
- Quotient rule with negative exponents: Problem type 1
- Introduction to the power rule of exponents

- Power rule with positive exponents
- Power rule with negative exponents: Problem type 1
- Power rule with negative exponents: Problem type 2
- Using the power and product rules to simplify expressions with positive exponents

6.2 Scientific Notation

- Scientific notation with positive exponent
- Scientific notation with negative exponent

6.3 Operations with Polynomials

- Simplifying a sum or difference of two univariate polynomials
- Multiplying a monomial and a polynomial: Univariate with positive leading coefficients
- Multiplying a monomial and a polynomial: Multivariate
- Multiplying binomials with leading coefficients of 1
- Multiplying binomials that are a sum and a difference of two terms: Univariate
- Squaring a binomial: Univariate
- Multiplication involving binomials and trinomials in two variables

6.4 Factoring Polynomials

- Greatest common factor of two monomials
- Factoring out a monomial from a polynomial: Univariate
- Factoring out a monomial from a polynomial: Multivariate
- Factoring a quadratic with leading coefficient 1
- Factoring a quadratic with leading coefficient greater than 1
- Factoring a product of a quadratic trinomial and a monomial
- Factoring a difference of squares
- Factoring a polynomial by grouping: Problem type 1

7. Quadratic and Polynomial Functions

7.1 Solving a Quadratic Equation

- Solving equations written in factored form
- Completing the square
- Finding the roots of a quadratic equation with leading coefficient 1
- Finding the roots of a quadratic equation with leading coefficient greater than 1
- Solving a quadratic equation needing simplification

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8.5 Graphing Rational Functions

Sketching the graph of a rational function: Constant over linear

Sketching the graph of a rational function: Linear over linear

9. Radicals and Rational Expressions

9.1 Simplifying Expressions with Radicals

Square root of a rational perfect square

Square root simplification

Square root of a perfect square monomial

Simplifying a radical expression: Problem type 1

Simplifying a sum of radical expressions

Simplifying a product of radical expressions

Rationalizing the denominator of a radical expression

Rationalizing the denominator of a radical expression using conjugates

Simplifying a sum of rational expressions

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10.2 Solving Logarithmic and Exponential Equations

- Solving a logarithmic equation: Problem type 1
- Solving a logarithmic equation: Problem type 2
- Solving a logarithmic equation: Problem type 3
- Solving a logarithmic equation: Problem type 4
- Solving a logarithmic equation: Problem type 5
- Solving an exponential equation: Problem type 1
- Solving an exponential equation: Problem type 2
- Solving an exponential equation: Problem type 3

10.3 Graphing Logarithmic and Exponential Functions

- The graph, domain, and range of an exponential function
- The graph, domain, and range of a logarithmic function
- Translating the graph of a logarithmic or exponential function

10.4 Applications with Exponential Functions

- Evaluating an exponential function that models a real-world situation
- Solving a word problem using an exponential equation: Problem type 1

11. Trigonometry

11.1 Angles

- Converting between degree and radian measure: Problem type 1
- Sketching an angle in standard position
- Reference angles: Problem type 1
- Coterminal angles
- Arc length and central angle measure

11.2 Right Triangle Trigonometry

- Sine, cosine, and tangent ratios
- Using a trigonometric ratio to find a side length in a right triangle
- Using a trigonometric ratio to find an angle measure in a right triangle
- Finding trigonometric ratios given a right triangle
- Solving a triangle with the law of sines: Problem type 1
- Solving a triangle with the law of cosines

11.3 Unit Circle

- Finding coordinates on the unit circle for special angles
- Trigonometric functions and special angles: Problem type 1
- Trigonometric functions and special angles: Problem type 2
- Finding values of trigonometric functions given information about an angle: Problem type 1
- Finding values of trigonometric functions given information about an angle: Problem type 2

11.4 Graphing Trigonometric Functions

Amplitude and period of sine and cosine functions

Amplitude, period, and phase shift of sine and cosine functions

Sketching the graph of a sine or cosine function: Problem type 1

Sketching the graph of a sine or cosine function: Problem type 2

11.5 Inverse Trigonometric Functions

Values of inverse trigonometric functions

Composition of a trigonometric function and an inverse trigonometric function: Problem type 2

11.6 Trigonometric Identities

Simplifying trigonometric expressions

Sum and difference identities: Problem type 2

Double-angle identities: Problem type 2

11.7 Trigonometric Equations

Finding solutions in an interval for a basic equation involving sine or cosine

Finding solutions in an interval for a basic tangent, cotangent, secant, or cosecant equation

Finding solutions in an interval for a trigonometric equation using Pythagorean identities

Solving a basic trigonometric equation involving sine or cosine