R-Review of Basic Algebraic Concepts

Section R.2

Ordering integers
Plotting integers on a number line
Fractional position on a number line
Plotting rational numbers on a number line
Integers and rational numbers
Rational and irrational numbers
Graphing a linear inequality on the number line
Writing an inequality
Writing a compound inequality
Writing an inequality for a real-world situation
Set builder notation
Set builder and interval notation

Section R.3

Absolute value of a number
Integer addition: Problem type 2
Integer subtraction
Integer multiplication and division
Mixed arithmetic operations with integers
Operations with absolute value
Simple addition and subtraction of signed fractions
Signed fraction addition: Advanced
Signed fraction multiplication: Advanced
Signed decimal addition
Exponents and integers: Problem type 1
Exponents and integers: Problem type 2
Exponents and signed fractions
Exponents and order of operations
Square root of a perfect square
Perimeter of a square or a rectangle
Area of a square or a rectangle
Volume of a cube or a rectangular prism
Circumference and area of a circle
Volume of a cylinder
Square root of a rational perfect square
Section R.4
Distributive property: Basic
Distributive property: Advanced
Combining like terms: Basic
Combining like terms: Advanced
Combining like terms in a quadratic expression
Properties of addition
Properties of real numbers
Chapter R Supplementary Topics
Ordering fractions with variables

1-Linear Equations and Inequalities in One Variable
Section 1.1
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 signed fractions
Multiplicative property of equality with integers
Solving a two-step equation with integers
Solving a two-step equation with signed fractions
Solving a linear equation with several occurrences of the variable: Problem type 1
Solving a linear equation with several occurrences of the variable: Problem type 2
Solving a linear equation with several occurrences of the variable: Problem type 3
Solving a linear equation with several occurrences of the variable: Problem type 4
Solving a linear equation with several occurrences of the variable: Problem type 5
Solving equations with zero, one, or infinitely many solutions
Section 1.2
Writing a mathematical expression
Translating sentences into equations
Translating sentences into two-step expressions
Solving a fraction word problem using a simple linear equation
- Solving a word problem using a linear equation: Problem type 1
- Solving a word problem using a linear equation: Problem type 3
- Solving a value mixture problem using a linear equation
- Solving a percent mixture problem using a linear equation
- Solving a rate problem using a linear equation
- Word problem on percentage: Problem type 1
- Word problem on percentage: Problem type 2
- Simple interest

**Section 1.3**
- Evaluation of a linear expression in two variables
- Introduction to algebraic symbol manipulation
- Algebraic symbol manipulation: Problem type 1
- Algebraic symbol manipulation: Problem type 2
- Finding the side length of a rectangle given its perimeter or area
- Perimeters and side lengths with variables
- Word problem involving area and perimeter of a rectangle
- Angle measures of right or isosceles triangles with variables
- Word problem on rates

**Section 1.4**
- Solving a linear inequality: Problem type 1
- Solving a linear inequality: Problem type 2
- Solving a linear inequality: Problem type 3
- Solving a linear inequality: Problem type 4
- Solving a linear inequality: Problem type 5
- Word problem with linear inequalities: Problem type 1
- Word problem with linear inequalities: Problem type 2
- Finding the value for a new score that will yield a given mean

**Section 1.5**
- Solving a compound linear inequality: Problem type 1
- Solving a compound linear inequality: Problem type 2
- Graphing a compound linear inequality on the number line
- Union and intersection of finite sets
- Union and intersection of intervals

**Section 1.6**
Choosing a graph to fit a narrative

3-Systems of Linear Equations and Inequalities

Section 3.1
- Classifying systems of linear equations from graphs
- Graphically solving a system of linear equations

Section 3.2
- Solving a simple system using substitution

Section 3.3
- Solving a system of linear equations
- Solving a system that is inconsistent or consistent dependent

Section 3.4
- Solving a word problem using a system of linear equations: Problem type 1
- Solving a word problem using a system of linear equations: Problem type 2
- Solving a word problem using a system of linear equations: Problem type 3
- Solving a word problem using a system of linear equations: Problem type 4
- Solving a word problem using a system of linear equations: Problem type 5

Section 3.5
- Translating sentences into inequalities
- Graphing a linear inequality in the plane: Problem type 1
- Graphing a linear inequality in the plane: Problem type 2
- Graphing a linear inequality in the plane: Problem type 3
- Graphing a system of linear inequalities
- Solving a word problem using a system of linear inequalities

Section 3.6
- Solving a system of 3 equations in 3 unknowns
- Solving a word problem using a 3 by 3 system of linear equations

Section 3.7
- Gauss-Jordan elimination with a 2x2 matrix
- Augmented matrix and solution set of a system of linear equations

Chapter 3 Supplementary Topics
- Creating an inconsistent system of linear equations
- Interpreting the graphs of two functions
- Linear programming
- Solving a word problem using linear programming
Multiplying monomials

Multiplying a monomial and a polynomial: Problem type 1

Multiplying a monomial and a polynomial: Problem type 2

Multiplying binomials: Problem type 1

Squaring a binomial

Multiplying binomials: Problem type 2

Multiplying binomials: Problem type 3

Multiplying polynomials

Section 4.4

Dividing a polynomial by a monomial: Problem type 1

Dividing a polynomial by a monomial: Problem type 2

Polynomial long division: Problem type 1

Polynomial long division: Problem type 2

Polynomial long division: Problem type 3

Synthetic division

Section 4.5

Introduction to the GCF of two monomials

Greatest common factor of two monomials

Factoring out a monomial from a polynomial: Problem type 1

Factoring out a monomial from a polynomial: Problem type 2

Factoring a multivariate polynomial by grouping: Problem type 1

Factoring a multivariate polynomial by grouping: Problem type 2

Section 4.6

Factoring a quadratic with leading coefficient 1

Factoring a quadratic with leading coefficient greater than 1

Factoring a quadratic polynomial in two variables

Factoring a perfect square

Factoring a product of a quadratic trinomial and a monomial

Section 4.7

Factoring a difference of squares

Factoring with repeated use of the difference of squares formula

Factoring a sum or difference of two cubes

Section 4.8

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
Solving equations written in factored form
Roots of a product of polynomials
Solving a word problem using a quadratic equation with rational roots
Writing a quadratic equation given the roots and the leading coefficient

Chapter 4 Supplementary Topics
Ordering numbers with positive exponents
Ordering numbers with negative exponents
Degree of a multivariate polynomial checked in 10022

5-Rational Expressions and Rational Equations
Section 5.1
Ratio of multivariate polynomials
Simplifying a ratio of polynomials: Problem type 1
Simplifying a ratio of polynomials: Problem type 2
Domain of a rational function
Section 5.2
Multiplying rational expressions: Problem type 1
Multiplying rational expressions: Problem type 2
Dividing rational expressions: Problem type 1
Dividing rational expressions: Problem type 2
Section 5.3
Introduction to the LCM of two monomials
Least common multiple of two monomials
Adding rational expressions with common denominators
Adding rational expressions with different denominators: ax, bx
Adding rational expressions with different denominators: Multivariate
Adding rational expressions with different denominators: x+a, x+b
Adding rational expressions with different denominators: Quadratic
Section 5.4
Complex fractions without variables: Problem type 1
Complex fractions without variables: Problem type 2
Complex fraction: Problem type 1
Complex fraction: Problem type 3
Complex fraction: Problem type 4

Section 5.5

Solving a rational equation that simplifies to a linear equation: Problem type 1
Solving a rational equation that simplifies to a linear equation: Problem type 2
Solving a rational equation that simplifies to a linear equation: Problem type 3
Solving a rational equation that simplifies to a linear equation: Problem type 4
Solving a rational equation that simplifies to a quadratic equation: Problem type 1
Solving a rational equation that simplifies to a quadratic equation: Problem type 2
Solving a rational equation that simplifies to a quadratic equation: Problem type 3

Section 5.6

Solving a proportion: Advanced
Word problem on proportions: Problem type 1
Word problem on proportions: Problem type 2
Word problem involving multiple rates
Solving a word problem using a rational equation

Similar polygons

Section 5.7

Word problem on direct variation
Word problem on inverse variation
Word problem on combined variation

Chapter 5 Supplementary Topics

Complex fraction: Problem type 2
Word problem on inverse proportions
Sketching the graph of a rational function: Problem type 1

6-Radicals and Complex Numbers

Section 6.1

Square root of a perfect square
Square root of a rational perfect square
Square root of a perfect square monomial
Pythagorean Theorem
Cube root of an integer
Domain of a square root function

Section 6.2

Rational exponents: Basic
Rational exponents: Negative exponents and fractional bases
Rational exponents: Products and quotients
Rational exponents: Powers of powers
Converting between radical form and exponent form
Section 6.3
Square root simplification
Simplifying a radical expression: Problem type 1
Simplifying a radical expression: Problem type 2
Simplifying a higher radical: Problem type 1
Simplifying a higher radical: Problem type 2
Section 6.4
Square root addition
Simplifying a sum of radical expressions
Section 6.5
Square root multiplication
Simplifying a product of radical expressions
Simplifying a product of radical expressions using the distributive property
Special products with square roots: Conjugates and squaring
Simplifying products or quotients of higher index radicals with different indices
Section 6.6
Rationalizing the denominator of a radical expression
Rationalizing the denominator of a radical expression using conjugates
Rationalizing the denominator of a higher index radical with variables
Section 6.7
Solving an equation with radicals: Problem type 1
Solving an equation with radicals: Problem type 2
Solving an equation with radicals: Problem type 3
Solving an equation with radicals: Problem type 4
Solving an equation with a root index greater than 2
Section 6.8
Using \( i \) to rewrite square roots of negative numbers
Simplifying a product or quotient involving roots of negative numbers
Adding and subtracting complex numbers
Multiplying complex numbers
Dividing complex numbers
Simplifying a power of i
Chapter 6 Supplementary Topics
Simplifying a product of radical expressions: Advanced

7-Quadratic Equations and Functions
Section 7.1
Even root property
Solving an equation with exponent using the even-root property
Completing the square
Solving a quadratic equation by completing the square
Section 7.2
Solving a quadratic equation using the quadratic formula
Solving a quadratic equation with complex roots
Determinant of a quadratic equation
Solving a word problem using a quadratic equation with irrational roots
Section 7.3
Solving a rational equation that simplifies to a quadratic equation: Problem type 1
Solving a rational equation that simplifies to a quadratic equation: Problem type 2
Solving equations that can be written in quadratic form: Problem type 1
Solving equations that can be written in quadratic form: Problem type 2
Section 7.4
Graphing a parabola: Problem type 2
How the leading coefficient affects the shape of a parabola
Writing an equation for a function after a vertical translation
Writing an equation for a function after a vertical and horizontal translation
Section 7.5
Word problem using the maximum or minimum of a quadratic function
Graphing a parabola: Problem type 3
Finding the x-intercept(s) and the vertex of a parabola
Section 7.6
Solving a rational inequality: Problem type 1
Solving a quadratic inequality written in factored form
Solving a quadratic inequality
Chapter 7 Supplementary Topics
Range of a real-valued function
Discriminant of a quadratic equation with parameter
Odd root property
Solving an equation with exponent using the odd-root property
Solving an equation with positive rational exponent
Solving an equation with negative rational exponent

-Exponential and Logarithmic Functions and Applications
  - Section 8.1
    - Sum, difference, and product of two functions
    - Quotient of two functions
    - Composition of two functions: Basic
  - Section 8.2
    - Horizontal line test
    - Inverse functions: Problem type 1
    - Inverse functions: Problem type 2
  - Section 8.3
    - Solving a word problem using an exponential equation: Problem type 1
    - Sketching the graph of an exponential function: Basic
  - Section 8.4
    - Converting between logarithmic and exponential equations
    - Evaluating a logarithmic expression
    - Sketching the graph of a logarithmic function: Basic
  - Section 8.5
    - Basic properties of logarithms
    - Writing expressions as a single logarithm
  - Section 8.6
    - Compound interest
    - Change of base for logarithms: Problem type 1
    - Sketching the graph of an exponential function: Advanced
  - Section 8.7
    - Solving a logarithmic equation: Problem type 1
    - Solving a logarithmic equation: Problem type 2
    - Solving an exponential equation: Problem type 1
    - Solving an exponential equation: Problem type 2
    - Solving an exponential equation: Problem type 3
Solving a word problem using an exponential equation: Problem type 2
Solving a word problem using an exponential equation: Problem type 3
Solving a word problem using an exponential equation: Problem type 4
Change of base for logarithms: Problem type 2
Composition of two functions: Domain and range
Composition of two functions: Advanced
Sketching the graph of a logarithmic function
Translating the graph of a logarithmic or exponential function

9-Conic Sections
Section 9.1
Midpoint of a line segment in the plane
Distance between two points in the plane
Graphing a circle given its equation in standard form
Graphing a circle given its equation in general form
Writing an equation of a circle given its center and a point on the circle
Writing an equation of a circle given the endpoints of a diameter
Section 9.2
Graphing a parabola with a horizontal or a vertical axis
Section 9.3
Graph of an ellipse centered at the origin
Graphing an ellipse given its equation in standard form
Graph of a hyperbola centered at the origin
Graphing a hyperbola given its equation in standard form
Section 9.4
Solving a system of nonlinear equations
Section 9.5
Graphing a quadratic inequality
Graphing a system of nonlinear inequalities: Problem type 1
Graphing a system of nonlinear inequalities: Problem type 2

Chapter 9 Supplementary Topics
Writing an equation of a parabola given the vertex and the focus
Finding the focus of a parabola
Graphing an ellipse given its equation in general form
Graphing a hyperbola given its equation in general form
Caution: You may have removed too many lower-level topics from the course; this is not usually recommended.

For students who have not yet mastered lower-level topics, learning/reviewing these topics is essential for success in learning more advanced topics that are central to the course. We recommend that you put some of these topics back into the course, even though they are only review for the core topics.

The ALEKS Assessment determines the exact topics each student already knows, doesn't know, and is ready to learn. Only those students who need to work on a given topic will be asked to do so. Students who have already mastered topics (including prerequisite topics) will not be prompted to learn them again.