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Reza Nazari

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2026

The Most Comprehensive Review of Algebra I

By

Reza Nazari

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9-10.AR.6 Solve linear equations and inequalities (to include compound inequalities) in one variable.
9-10.AR.7 Solve a system of linear equations graphically and algebraically. Create and solve a system of linear equations in context.
9-10.AR.8 Graph the solution set to a two-variable system of linear inequalities. Create and graph the solution set to a two-variable system of linear inequalities in context.
9-10.AR.9 Solve absolute value equations and inequalities in one or two variables.
9-10.AR.10 Solve quadratic equations in one variable by inspection (e.g., for $x^2 = 49$) taking square roots, the quadratic formula, and factoring, as appropriate to the initial form of the equation.
9-10.AR.11 Add, subtract, and multiply polynomials.
Functions (F) Learners will develop a foundational knowledge of functions and use them to model relationships between quantities.
9-10.AR.F.1 Determine whether a relationship is a function given a table, graph, or words, identifying x as an element of the domain and $f(x)$ as an element in the range. Determine the domain and range of a function in context.
9-10.AR.F.2 Use function notation, evaluate functions for inputs in their domains and interpret statements that use function notation in context.
9-10.AR.F.3 Sketch the key features (to include intercepts, maximums, minimums, and lines of symmetry, where applicable) of linear, exponential, and quadratic functions modeling the relationship between two quantities using tables, graphs, written descriptions, and equations.
9-10.AR.F.4 Relate the domain of a linear, quadratic, or exponential function to its graph and, where applicable, to the quantitative relationship it describes.
9-10.AR.F.5 Calculate and interpret the rate of change of linear, quadratic, or exponential functions (presented algebraically or as a table) over specified intervals. Focus on linear, quadratic, and exponential functions whose domains are a subset of the integers. Estimate the rate of change from a graph.
9-10.AR.F.6 Write a function defined by an expression in different but equivalent forms to reveal and explain the different properties of the function. a. Use appropriate forms of linear, quadratic, and exponential functions to show zeros, extreme values, and symmetry (where applicable) and interpret them in context. b. Use the properties of an exponential function to classify it as growth or decay.
9-10.AR.F.7 Compare key features of two linear, exponential, or quadratic functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
9-10.AR.F.8 Identify situations that can be modeled with linear, quadratic, and exponential functions. Justify the most appropriate model for a situation based on the rate of change over equal intervals. Include situations in which a quantity grows or decays.
9-10.AR.F.9 Identify the effect of transformations on the graph of a linear, absolute value, or quadratic function by replacing $f(x)$ with $af(x)$, $f(x - h)$, and $f(x) + k$, for specific values of a, h, and k (both positive and negative). Find the value of a, h, and k given the graph of the function.
9-10.AR.F.10 Find the inverse of a linear function and describe the relationship between the domain, range, and graph of the function and its inverse in context.
9-10.AR.F.11 Interpret the parameters in a linear, quadratic, or exponential function in context.

9-10.AR.F.12 Identify, using graphs or tables, the solution(s) to linear and exponential functions $f(x) = g(x)$ as x-value(s) that result in equivalent y-values.
Geometry and Measurement (GM) Learners will use visualization, spatial reasoning, geometric modeling, and measurement to investigate the characteristics of figures, perform transformations, and construct logical arguments.
9-10.GM.1 Know precise definitions and notations of angle, circle, perpendicular line, parallel line, and line segment based on the undefined notions of point, line, and plane.
9-10.GM.2 Represent transformations in the plane. Describe transformations as functions taking points in the plane as inputs and giving other points as outputs. Compare transformations that preserve distance and angle to those that do not (i.e., rigid versus non-rigid motion).
9-10.GM.3 Describe the rotations and reflections of a triangle, rectangle, parallelogram, trapezoid, or regular polygon that map each figure onto itself or another figure.
9-10.GM.4 Develop or verify the characteristics of rotations, reflections, and translations in angles, circles, perpendicular lines, parallel lines, and line segments.
9-10.GM.5 Draw the image of a figure that has undergone a series of transformations [rotation(s), reflection(s), or translation(s)] of a geometric figure using a variety of methods (e.g., graph paper, tracing paper, or geometry software).
9-10.GM.6 Predict the effect of a specified rigid motion on a given figure using geometric descriptions of rigid motions. Determine whether two figures are congruent using the definition of congruence in terms of rigid motions.
9-10.GM.7 Use the definition of congruence, based on rigid motions, to show two triangles are congruent if and only if their corresponding sides and corresponding angles are congruent.
9-10.GM.8 Prove two triangles are congruent using the congruence theorems.
9-10.GM.9 Prove and apply theorems about lines and angles.
9-10.GM.10 Prove and apply theorems about triangles.
9-10.GM.11 Prove and apply theorems about parallelograms.
9-10.GM.12 Make basic geometric constructions (e.g., segment, angle, bisectors, parallel and perpendicular lines) with a variety of tools and methods.
(+) 9-10.GM.13 Apply basic constructions to create polygons such as equilateral triangles, squares, and regular hexagons inscribed in circles.
9-10.GM.14 Verify experimentally and justify the properties of dilations given by a center and a scale factor.
9-10.GM.15 Use transformations to decide if two given figures are similar. Apply the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
9-10.GM.16 Prove similarity theorems about triangles.
9-10.GM.17 Apply knowledge of congruence and similarity criteria for triangles to solve problems and to prove relationships in various geometric figures.
9-10.GM.18 Recognize how the properties of similar right triangles allow the trigonometric ratios to be defined and determine the sine, cosine, and tangent of an acute angle in a right triangle.
(+) 9-10.GM.19 Explain and use the relationship between the sine and cosine of complementary angles.
9-10.GM.20 Solve applied problems involving right triangles using trigonometric ratios, the Pythagorean Theorem, and special right triangles (30°-60°-90° and 45°-45°-90°).

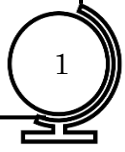
(+) 9-10.GM.21 Solve unknown sides and angles of non-right triangles using the Laws of Sines and Cosines.
9-10.GM.22 Apply theorems about relationships between line segments and circles or angles and circles formed by radii, diameter, secants, tangents, and chords to find unknown lengths or angles.
(+) 9-10.GM.23 Construct the incenter and circumcenter of a triangle. Relate the incenter and circumcenter to the inscribed and circumscribed circles.
(+) 9-10.GM.24 Construct a tangent line from a point outside a given circle to the circle.
9-10.GM.25 Explain and use the formulas for arc length and area of sectors of circles.
9-10.GM.26 Recognize that the radian measure of an angle is the ratio of the length of the arc to the length of the radius of a circle.
9-10.GM.27 Develop and verify the slope criteria for parallel and perpendicular lines. Apply the slope criteria for parallel and perpendicular lines to solve problems.
9-10.GM.28 Verify simple geometric theorems algebraically using coordinates. Verify algebraically, using coordinates, that a given set of points produces a particular type of triangle or quadrilateral.
9-10.GM.29 Determine the midpoint or endpoint of a line segment using coordinates. (+) Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
9-10.GM.30 Compute perimeters of polygons and areas of triangles, parallelograms, trapezoids, and kites using coordinates.
9-10.GM.31 Explain derivations of the formulas for the circumference of a circle, area of a circle, and volume of a cylinder, pyramid, and cone.
9-10.GM.32 Calculate the surface area for prisms, cylinders, pyramids, cones, and spheres to solve problems.
9-10.GM.33 Know and apply volume formulas for prisms, cylinders, pyramids, cones, and spheres to solve problems.
9-10.GM.34 Identify the shapes of two-dimensional cross-sections of three-dimensional objects and identify three-dimensional objects generated by rotations of two-dimensional objects.
9-10.GM.35 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
9-10.GM.36 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; scaling a model).
Data, Probability, and Statistics (DPS) Learners will ask and answer questions by collecting, organizing, and displaying relevant data, drawing inferences and conclusions, making predictions, and understanding and applying basic concepts of probability.
9-10.DPS.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).
9-10.DPS.2 Compare the center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets using statistics appropriate to the shape of the data distribution.
9-10.DPS.3 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. a. Fit a linear function to the data (with or without technology) if appropriate. b. Compute (using technology) and interpret the correlation coefficient of a linear fit.

Chapter 1: Fundamentals and Building Blocks



Math Topics that you'll learn in this Chapter:

- ✓ Adding and Subtracting Integers
- ✓ Multiplying and Dividing Integers
- ✓ Translate Phrases into an Algebraic Statement
- ✓ Order of Operations
- ✓ Integers and Absolute Value
- ✓ Proportional Ratios
- ✓ Similarity and Ratios
- ✓ Percent Problems
- ✓ Percent of Increase and Decrease
- ✓ Discount, Tax, and Tip
- ✓ Simple Interest
- ✓ The Distributive Property
- ✓ Approximating Irrational Numbers



Adding and Subtracting Integers

Solve.

1) $-(9)+15=$ ____

2) $15-(-11-9)=$ ____

3) $(-10)+(-6)=$ ____

4) $(-10)+(-6)+7=$ ____

5) $-(23)+19=$ ____

6) $(-7+5)-9=$ ____

7) $28+(-32)=$ ____

8) $(-11)+(-9)+5=$ ____

9) $25-(8-7)=$ ____

10) $-(29)+17=$ ____

11) $(-38)+(-3)+29=$ ____

12) $15-(-7+9)=$ ____

13) $24-(8-2)=$ ____

14) $(-7+4)-9=$ ____

15) $(-17)+(-3)+9=$ ____

16) $(-26)+(-7)+8=$ ____

17) $(-9)+(-11)=$ ____

18) $8-(-23-13)=$ ____

19) $(-16)+(-2)=$ ____

20) $25-(7-4)=$ ____

21) $23+(-12)=$ ____

22) $(-18)+(-6)=$ ____

23) $17-(-21-7)=$ ____

24) $-(28)-(-16)+5=$ ____

25) $(-9+4)-8=$ ____

26) $(-28)+(-6)+17=$ ____

27) $-(21)-(-15)+9=$ ____

28) $(-31)+(-6)=$ ____

29) $(-18)+(-10)+13=$ ____

30) $(-30)+(-11)+12=$ ____

31) $-(28)-(-10)+6=$ ____

32) $6-(-16-11)=$ ____

Multiplying and Dividing Integers

Solve.

1) $(-6) \times (-7) =$ _____

2) $8 \times (-5) =$ _____

3) $48 \div (-8) =$ _____

4) $(-72) \div 9 =$ _____

5) $(4) \times (-6) =$ _____

6) $(-9) \times (-11) =$ _____

7) $(10) \div (-5) =$ _____

8) $144 \div (-12) =$ _____

9) $(10) \times (-2) =$ _____

10) $(-8) \times (-2) \times 5 =$ _____

11) $(8) \div (-2) =$ _____

12) $45 \div (-15) =$ _____

13) $(5) \times (-7) =$ _____

14) $(-6) \times (-5) \times 4 =$ _____

15) $(12) \div (-6) =$ _____

16) $(14) \div (-7) =$ _____

17) $196 \div (-14) =$ _____

18) $(27 - 13) \times (-2) =$ _____

19) $125 \div (-5) =$ _____

20) $66 \div (-6) =$ _____

21) $(-6) \times (-5) \times 3 =$ _____

22) $(15 - 6) \times (-3) =$ _____

23) $(32 - 24) \div (-4) =$ _____

24) $72 \div (-6) =$ _____

25) $(-14 + 8) \times (-7) =$ _____

26) $(-3) \times (-9) \times 3 =$ _____

27) $84 \div (-12) =$ _____

28) $(-12) \times (-10) =$ _____

29) $22 \times (-3) =$ _____

30) $(-2) \times (-6) \times 5 =$ _____

31) $(24) \div (-3) =$ _____

32) $(-15) \div (3) =$ _____