

## Math — Academic Skills

### SCORE RANGE 6–14

Students in this score band are beginning to obtain the basic foundational skills to be college ready.

### SCORE RANGE 15–19

**A typical student in this score band can do the following:**

- Create a simple expression or equation in one variable that represents a context [HOA]
- Evaluate a one-variable expression by substituting a value for the variable [HOA]
- Create a rate based on a context and use the rate to solve a simple problem [PSD]
- Use common English conversions (e.g., 1 hour = 60 minutes, 1 foot = 12 inches) to find an equivalent rate [PSD]
- Solve problems that involve percentages [PSD]
- Read information presented in simple tables or simple graphs [PSD]
- Solve problems using area and volume formulas

### SCORE RANGE 20–24

**A typical student in this score band can do the following:**

- Create an expression or equation in one variable that models a context [HOA]
- Create a linear expression or equation in two variables that models a context [HOA]
- Solve a linear equation in one variable [HOA]
- Find a number that satisfies a linear inequality in context [HOA]
- Use the distributive property to multiply a polynomial by either a constant or a monomial, and then combine like terms [PAM]
- Identify a ratio or a fraction based on a context [PSD]
- Use proportions to compare quantities and find missing values [PSD]
- Read and interpret contextual information presented in a graph or table [PSD]
- Identify the shape of a graph from a verbal description of some of its points [PSD]
- Use information about a directly proportional relationship to describe the graph of the relationship [PSD]
- Solve problems that involve converting units within the same measurement system [PSD]
- Solve simple problems involving percent [PSD]
- Solve simple problems using area and volume formulas

KEY: HOA = Heart of Algebra; PAM = Passport to Advanced Math; PSD = Problem Solving and Data Analysis

## Math — Academic Skills

### SCORE RANGE 25–29

#### A typical student in this score band can do the following:

- Solve a linear equation in one variable [HOA]
- Interpret a term from a linear equation in one variable in the form  $ax + b = c$  [HOA]
- Interpret a term from a linear equation in two variables in standard form or slope-intercept form [HOA]
- Create a linear equation in two variables that models a complex context [HOA]
- Create a system of two linear equations in two variables that models a context [HOA]
- Solve a system of two linear equations in two variables [HOA]
- Create an inequality in one or two variables based on a verbal description of a relationship [HOA]
- Solve linear equations in which a linear expression is used as a variable [HOA]
- Make connections between different representations (graphs, equations, tables, etc.) of linear relationships between two variables [HOA]
- Identify a key feature of one representation (graph, equation, table, etc.) of a linear relationship based on information about a different representation [HOA]
- Factor a monomial from a polynomial expression [PAM]
- Factor a trinomial into two binomials [PAM]
- Add and subtract polynomials in one variable [PAM]
- Multiply two binomial expressions [PAM]
- Solve a quadratic equation in the form  $x^2 + bx + c = 0$  by factoring or by using the quadratic formula [PAM]
- Solve a quadratic equation in the form  $ax^2 = b$  [PAM]
- Solve two- and three-step radical equations in one variable [PAM]
- Rearrange a multivariate equation to isolate a variable or term [PAM]
- Interpret a constant, variable, term, solution, or input-output pair in a quadratic or exponential function in terms of the context [PAM]
- Use function notation to represent and calculate the output from a given input for nonlinear functions [PAM]
- Identify, interpret, and use ratios, proportions, and rates, expressing them in equivalent forms, to solve real-world problems [PSD]
- Convert units one or more times to solve a contextual problem [PSD]
- Estimate/find a proportion, rate, percent, or fraction from a graph or a table [PSD]
- Solve problems involving derived units or unit conversion between different measurement systems [PSD]
- Solve multistep problems using percentages [PSD]
- Evaluate a conclusion about information presented in a graph [PSD]
- Identify a graph of a nonlinear relationship between two variables based on a verbal description [PSD]
- Recognize common characteristics of linear or exponential models based on a verbal description of a situation [PSD]
- Calculate mean, median, or range for a set of data presented in various ways [PSD]
- Use sample proportion to estimate the proportion of the population from which the sample was selected [PSD]
- Evaluate a conclusion about the plausible values of a population proportion based on sample data and margin of error [PSD]
- Identify bias that may arise from sampling methods [PSD]
- Calculate a simple conditional probability from a two-way table [PSD]
- Interpret the association shown by a scatterplot and, when applicable, use a line of best fit to make predictions [PSD]
- Solve problems about a geometric figure using the vertical angle theorem, the triangle angle sum theorem, or theorems about a transversal crossing parallel lines
- Add and subtract complex numbers

### SCORE RANGE 30–34

#### A typical student in this score band can do the following:

- Create and use linear relationships to solve a problem [HOA]
- Create an inequality in one or two variables that represents a relationship [HOA]
- Interpret terms in linear relationships shown in graphs or in linear equations that are not in standard form or slope-intercept form [HOA]
- Make connections between different representations of linear functions, linear equations in two variables, systems of two linear equations in two variables, and linear inequalities [HOA]
- Determine the conditions under which a linear equation or system of two linear equations in two variables written in standard form has no solution, one solution, or infinitely many solutions [HOA]
- Solve a linear equation in one variable or a system of linear equations in two variables that requires computation with fractions or decimals [HOA]
- Use properties of radicals and exponents to rewrite simple expressions [PAM]
- Use properties of rational expressions to rewrite simple expressions [PAM]
- Add, subtract, and multiply polynomials, using insight into the structure of the polynomial [PAM]
- Solve multistep quadratic equations [PAM]
- Solve radical equations using the structure of the equation to reduce the number of algebraic steps [PAM]
- Solve rational equations using the structure of the equation to reduce the number of algebraic steps [PAM]
- Solve a system of equations consisting of one linear equation and one quadratic equation algebraically [PAM]
- Rearrange a multivariable equation using multiple algebraic steps to isolate a term [PAM]
- For a quadratic or exponential function, make connections between the properties of a function, an algebraic representation of the function, a graph of the function, or a table of values that satisfy the function [PAM]
- Make connections between the graphs of polynomial functions and their equations by examining the zeros of the graph and the factors of the polynomial [PAM]
- For a set of data, calculate, compare, and interpret mean, median, or range in context [PSD]
- Solve mixture problems, using proportional reasoning [PSD]
- Analyze data presented in a scatterplot and draw conclusions from the trend shown [PSD]
- Identify the equation of a line that best fits the data in a scatterplot [PSD]
- Interpret and compare unit rates, ratios, or rates of change that are based in a context [PSD]
- Compute conditional probability in different settings, including two-way tables [PSD]
- Identify an appropriate inference or conclusion based on information from a graph or table [PSD]
- Distinguish between linear and exponential models from information provided verbally or in tables [PSD]
- Solve multistep problems involving interpretation of a constant rate of change associated with a percent increase or a percent decrease [PSD]
- Solve multistep problems involving rates, proportions, unit conversion, percentages, and density [PSD]
- Identify the most appropriate sample or sampling method to best answer the question of interest [PSD]
- Identify the population to which the results of a survey can be generalized [PSD]
- Understand sampling variability when the population proportion is estimated using sample data [PSD]
- Solve real-world problems using area and volume formulas, including formulas for circular cylinders and spheres
- Solve problems using properties of similar triangles
- Solve problems using multiple theorems related to lines, angles, or triangles, including the vertical angle theorem, angle bisector theorem, or theorems about a transversal crossing parallel lines
- Solve real-world problems using the Pythagorean theorem
- Solve problems using properties of special right triangles
- Make connections between the equation of a circle in the  $xy$ -plane and the center and radius of the circle
- Calculate values of sine, cosine, and tangent for right triangles

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## Math — Academic Skills

### SCORE RANGE 35–40

#### A typical student in this score band can do the following:

- Create and solve a linear equation in one variable representing a context, utilizing insight to identify the correct coefficients and constants in the equation [HOA]
- Create and use a linear equation in two variables, where the equation represents a context, utilizing insight to identify the correct coefficients and constants in the equation [HOA]
- Create and use an inequality in one or two variables, where the equation represents a context, utilizing insight to identify the correct coefficients and constants in the inequality [HOA]
- Interpret a term in a linear relationship that is presented as an equation or a graph with insight and precision [HOA]
- Make connections between different representations of linear equations in one variable, linear functions, linear equations in two variables, systems of two linear equations in two variables, and linear inequalities; these representations often include symbolic representations, which may contain variable constants [HOA]
- Determine the conditions under which a system of two linear equations in two variables written in nonstandard form has no solution, one solution, or infinitely many solutions [HOA]
- Use properties of radicals and exponents to rewrite expressions [PAM]
- Rewrite rational expressions, utilizing insight to recognize appropriate algebraic operations [PAM]
- Factor complicated polynomial expressions using the structure of the polynomial and strategies such as repeated factoring, difference of squares, and factoring by parts [PAM]
- Solve quadratic, radical, and rational equations with multiple steps, where using insight into the structure of the equation provides an advantage [PAM]
- Determine the conditions under which a quadratic equation has zero, one, or two solutions [PAM]
- Make connections between the graph and solution to a quadratic and linear system of equations [PAM]
- Create, or create and use a quadratic or exponential function to represent a relationship between two quantities in a real-world context [PAM]
- Given a graph of a quadratic or exponential function representing a context, interpret a value, variable, point, or input-output pair in terms of the context [PAM]
- For a quadratic or exponential function, make connections between the properties of a function, an algebraic representation of the function, or a graph of the function [PAM]
- Make connections between the graphs of polynomial functions and their equations by examining the zeros and end behavior of the graph and the factors of the polynomial [PAM]
- Convert units and create and use ratios, proportions, percents, rates, and unit rates to solve problems [PSD]
- Find how the mean, median, and range of data are affected by a change in the data set [PSD]
- Find the median of data from a frequency table [PSD]
- Analyze complex data displays [PSD]
- Analyze graphs of nonlinear relationships between two quantities, including relationships that are not represented by a linear, quadratic, or exponential equation [PSD]
- Use scatterplots to make predictions [PSD]
- Identify the appropriate conclusion to draw from a description of a study's design and the study results [PSD]
- Compare measures of center and spread of two data distributions represented visually [PSD]
- Solve area or volume problems by applying standard formulas to objects that can be modeled by rectangles, circles, triangles, right rectangular prisms, and right circular prisms
- Apply properties of similar triangles as well as theorems related to lines, angles, and triangles to solve problems
- Solve problems using properties of special right triangles, the Pythagorean theorem, and trigonometric ratios
- Solve problems using the relationship between sine and cosine of complementary angles
- Solve problems using properties and theorems relating to circles and parts of circles, such as radii, diameters, tangents, angles, arcs, arc length, and sector area
- Convert between radians and degrees
- Find the diameter, radius, center, or points on a circle in the  $xy$ -plane given the equation of the circle
- Multiply complex numbers

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