

## ALGEBRA I

### **Standard 1: Number Sense and Algebraic Operations - The student will use expressions and equations to model number relationships.**

1. Translate word phrases and sentences into expressions and equations and vice versa.

**ACT Strand and Score Range: Algebraic Expressions 13-15, 20-23** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as  $b + g$ ) (MCG p.30, 61, 93) Manipulate basic algebraic expressions (e.g., substitute integers for unknown quantities, add and subtract simple algebraic expressions, [multiply two binomials], and perform straightforward word-to-symbol translations) (MCG p. 30)

2. Expressions

a. Simplify and evaluate linear, absolute value, rational and radical expressions.

**ACT Strand and Score Range: Algebraic Expressions 16-19** Substitute whole numbers for unknown quantities to evaluate expressions (MCG p. 83, 23, 61)

**ACT Strand and Score Range: Number Concepts 24-27** Determine when an expression is undefined (MCG p. 60, 84, 91)

b. Simplify polynomials by adding, subtracting or multiplying.

**ACT Strand and Score Range: Algebraic Expressions 20-23, 24-27** Manipulate basic algebraic expressions (e.g., substitute integers for unknown quantities, add and subtract simple algebraic expressions, [multiply two binomials], and perform straightforward word-to-symbol translations) (MCG p. 52, 61) Add, subtract, and multiply polynomials (MCG p. 61)

### **Standard 2: Relations and Functions - The student will use relations and functions to model number relationships.**

1. Relations and Functions

a. Distinguish between linear and nonlinear data.

b. Distinguish between relations and functions.

c. Identify dependent and independent variables, domain and range.

d. Evaluate a function using tables, equations or graphs.

**ACT Strand and Score Range: Functions 20-23** Work with function notation in evaluating simple quadratic functions at integer values (MCG p. 102)

2. Recognize the parent graph of the functions  $y = k$ ,  $y = x$ ,  $y = |x|$ , and predict the effects of transformations on the parent graph (e.g.,  $y = |x| + 2$ , change slope, change intercepts, change slope and intercept).

3. Calculate the slope of a line using a graph, an equation, two points or a set of data points.

**ACT Strand and Score Range: Graphical Representations 20-23, 24-27** Exhibit knowledge of slope (MCG p, 52) Determine the slope of a line from points or equations (MCG p. 65, 84, 97)

4. Develop the equation of a line and graph linear relationships given the following:

a. slope and y-intercept

b. slope and one point on the line

c. two points on the line

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- d. x-intercept and y-intercept
- e. a set of data points

5. Slope Interpretation

- a. Use the slope to differentiate between lines that are parallel, perpendicular, horizontal, or vertical.

**ACT Strand and Score Range: Graphical Representations 20-23, 28-32** Exhibit knowledge of vertical and horizontal lines and of their point of intersection (No examples) Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point (No examples)

- b. Interpret the slope and intercepts within the context of everyday life (e.g., telephone charges based on base rate [y-intercept] plus rate per minute [slope]).

**ACT Strand and Score Range: Graphical Representations 20-23** Exhibit knowledge of slope (No examples)

6. Linear Equations and Inequalities

- a. Solve linear equations by graphing or using properties of equality.

**ACT Strand and Score Range: Equations and Inequalities 24-27** Solve real-world problems using first-degree equations (MCG p. 62, 95)

- b. Solve linear inequalities by graphing or using properties of inequalities.

**ACT Strand and Score Range: Equations and Inequalities 28-32** Find solutions to systems of linear equations (No examples)

- c. Match appropriate equations or inequalities (with 1 or 2 variables) to a graph, table, or situation and vice versa.

**ACT Strand and Score Range: Graphical Representations 28-32** Match number line graphs with solution sets of linear inequalities (MCG p. 65, 98)

- 7. Solve a system of linear equations by graphing, substitution or elimination.

**ACT Strand and Score Range: Graphical Representations 16-19** Locate points on the number line and in the first quadrant (MCG p. 97)

**ACT Strand and Score Range: Equations and Inequalities 28-32** Find solutions to systems of linear equations (No examples)

8. Problem Solving

- a. Use the formulas from measurable attributes of geometric models (perimeter, circumference, area and volume), science, and statistics to solve problems within an algebraic context.

**ACT Strand and Score Range: Equations and Inequalities 24-27** Solve real-world problems using first-degree equations (MCG p. 62, 95)

- b. Solve two-step and three-step problems using concepts such as rules of exponents, probability, rate, distance, ratio and proportion, measures of central tendency and percent.

**ACT Strand and Score Range: Basic Operations & Applications 20-23, 28-32** Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, computing an average with negative integers, and

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*computing with a given average (MCG p. 56, 87) Solve word problems containing several rates, proportions, or percentages (MCG p. 57, 85, 87)*

**ACT Strand and Score Range: Graphical Representations 28-32** *Use the distance formula (no examples)*

**ACT Strand and Score Range: Probability, Statistics, & Data Analysis 20-23, 28-32**

*Determine the probability of a simple event (MCG 24, 28, 58) Compute a probability when the event and/or sample space are not given or obvious (MCG p. 54)*

9. Nonlinear Functions

a. Match exponential and quadratic functions to a table, graph or situation and vice versa.

**ACT Strand and Score Range: Graphical Representations 28-32** *Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) (No examples)*

b. Solve quadratic equations by graphing, factoring, or using the quadratic formula.

**ACT Strand and Score Range: Equations & Inequalities 24-27, 28-32** *Identify solutions to simple quadratic equations (MCG p. 26, 31) Solve absolute value and quadratic equations (MCG p. 95)*

**Standard 3: Data Analysis and Statistics - The student will use data analysis and statistics to formulate and justify predictions from a set of data.**

1. Data Analysis

a. Translate from one representation of data to another and understand that the data can be represented using a variety of tables, graphs, or symbols and that different modes of representation often convey different messages.

**ACT Strand and Score Range: Probability, Statistics, & Data Analysis 20-23** *Translate from one representation of data to another (e.g. a bar graph to a circle graph) (No examples)*

b. Make valid inferences, predictions, and/or arguments based on data from graphs, tables, and charts.

**ACT Strand and Score Range: Probability, Statistics, & Data Analysis 16-19, 24-27, 28-32** *Perform computations on data from tables and graphs; Read tables & graphs (MCG p. 23, 28, 51, 89) Manipulate data from tables and graphs (MCG p. 28, 59) Interpret and use information from figures, tables, and graphs, including graphs in the coordinate plane (MCG p. 59)*

2. Collect data involving two variables and display on a scatter plot; interpret results using a linear model/equation and identify whether the model/equation is a line best fit for the data (e.g., given a scatter plot and several linear equations, which one is the best fit?).