STAAR CONNECTION™

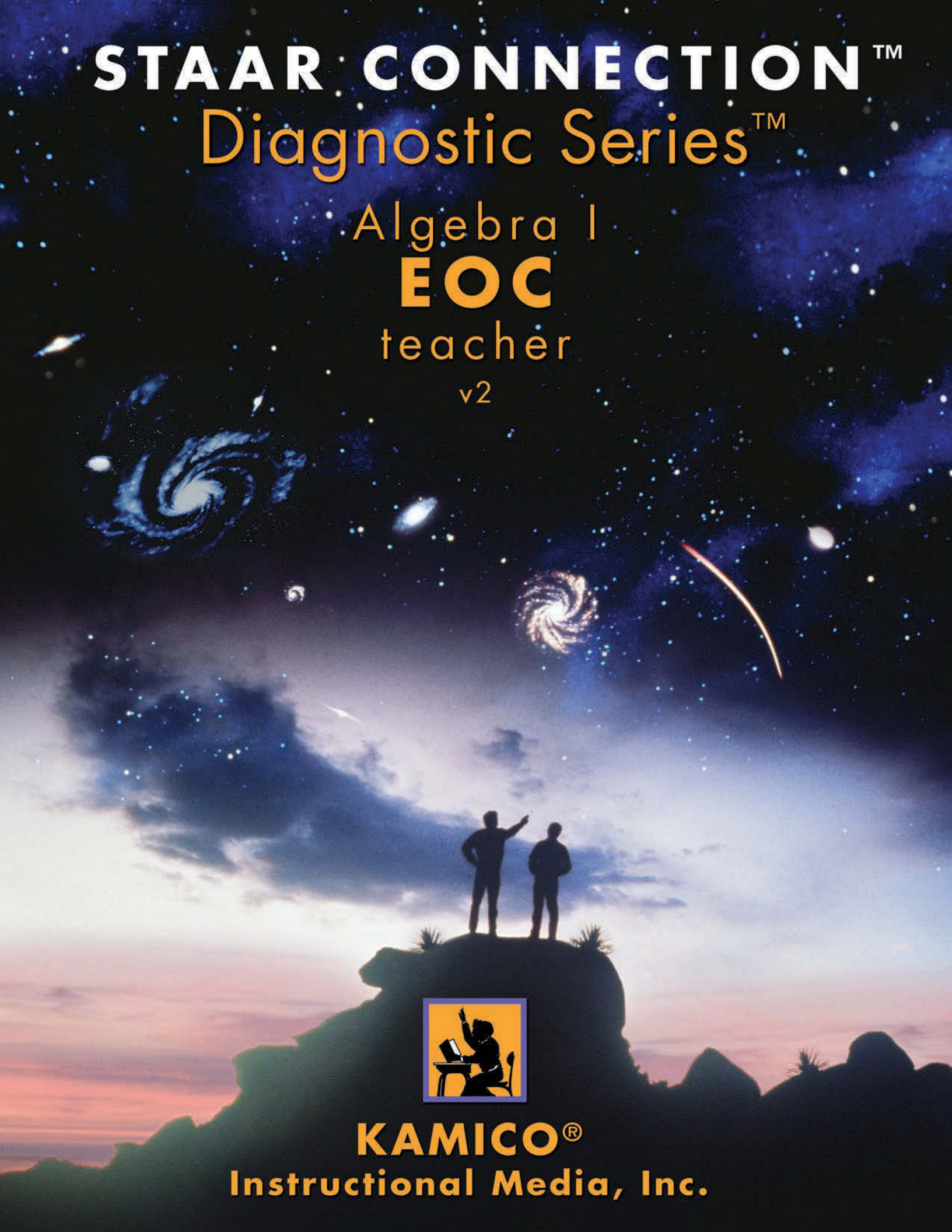
Diagnostic Series™

Algebra I

EOC

teacher

v2



KAMICO®
Instructional Media, Inc.

STAAR CONNECTION™

Algebra I
EOC
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Diagnostic Series™

XXVIII/i/MMXXII
Version 2

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KAMICO® Instructional Media, Inc.
STAAR CONNECTION™
Introduction

KAMICO® Instructional Media's program is validated by scientifically based research. **STAAR CONNECTION™ Diagnostic Series™** and **Developmental Series™** can be used in tandem to ensure mastery of Texas reporting categories and TEKS. The *Diagnostic Series™* consists of a bank of assessments. Each assessment covers a mixture of reporting categories and TEKS. This research-based format provides continual reinforcement for and ensures retention of mastered concepts. To take full advantage of this series, administer an assessment to students. After they have completed the assessment, use it as an instructional tool. Go over each item with the class, discussing all correct and incorrect answers. Then, use the assessment as a diagnostic tool to determine a standard for which students need remediation. Find that standard in the *Developmental Series™*.

Each book in the *STAAR CONNECTION Developmental Series™* consists of isolated activities and assessments to allow for the development of specific TEKS. For every TEKS, there is at least one individual or group activity. The activities provide a fun, challenging, yet nonthreatening, way to develop mastery of the TEKS. In addition to these activities, each *Developmental Series™* book has assessments on isolated standards to be used to identify mastery or the need for further skill development or reinforcement. Continue to alternate between the *STAAR CONNECTION™ Diagnostic Series™* and the *Developmental Series™*.

KAMICO's **DATA CONNECTION®** software prints student answer sheets on plain paper using a standard laser printer, scans answer sheets using a TWAIN-compliant scanner, scores assessments, and disaggregates student academic data, showing which goals and objectives are mastered and which goals and objectives are in need of reinforcement. The software is preprogrammed to work with all KAMICO® assessments. It is easily customized to work with other instructional materials and assessments as well as teacher-, school-, district-, or state-created assessments. DATA CONNECTION® analyzes academic data from individual students, classes, grade levels, and demographic groups. Reports are presented in tabular and graphic form. Item analysis is provided to help determine the most effective method of instruction.

KAMICO® Instructional Media, Inc., supports efforts to ensure adequate yearly progress and eliminate surprises in high-stakes test results.

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Table of Contents

State of Texas Assessments of Academic Readiness
Algebra I Assessment
Eligible Texas Essential Knowledge and Skills

Mathematical Process Standards

These student expectations will not be listed under a separate reporting category. Instead, they will be incorporated into test questions across reporting categories since the application of mathematical process standards is part of each knowledge statement.

(A.1) **Mathematical process standards**. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to

(A) apply mathematics to problems arising in everyday life, society, and the workplace;

(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;

(C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;

(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;

(E) create and use representations to organize, record, and communicate mathematical ideas;

(F) analyze mathematical relationships to connect and communicate mathematical ideas; and

(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

Reporting Category 1:
Number and Algebraic Methods

The student will demonstrate an understanding of how to use algebraic methods to manipulate numbers, expressions, and equations.

(A.10) **Number and algebraic methods.** The student applies the mathematical process standards and algebraic methods to rewrite in equivalent forms and perform operations on polynomial expressions. The student is expected to

(A) add and subtract polynomials of degree one and degree two; ***Supporting Standard***

(B) multiply polynomials of degree one and degree two; ***Supporting Standard***

(C) determine the quotient of a polynomial of degree one and polynomial of degree two when divided by a polynomial of degree one and polynomial of degree two when the degree of the divisor does not exceed the degree of the dividend; ***Supporting Standard***

(D) rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property; ***Supporting Standard***

(E) factor, if possible, trinomials with real factors in the form $ax^2 + bx + c$, including perfect square trinomials of degree two; and ***Readiness Standard***

(F) decide if a binomial can be written as the difference of two squares and, if possible, use the structure of a difference of two squares to rewrite the binomial. ***Supporting Standard***

(A.11) **Number and algebraic methods.** The student applies the mathematical process standards and algebraic methods to rewrite algebraic expressions into equivalent forms. The student is expected to

(A) simplify numerical radical expressions involving square roots; and ***Supporting Standard***

(B) simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents. ***Readiness Standard***

(A.12) **Number and algebraic methods.** The student applies the mathematical process standards and algebraic methods to write, solve, analyze, and evaluate equations, relations, and functions. The student is expected to

(A) decide whether relations represented verbally, tabularly, graphically, and symbolically define a function; ***Supporting Standard***

(B) evaluate functions, expressed in function notation, given one or more elements in their domains; ***Supporting Standard***

(C) identify terms of arithmetic and geometric sequences when the sequences are given in function form using recursive processes; ***Supporting Standard***

(D) write a formula for the nth term of arithmetic and geometric sequences, given the value of several of their terms; and ***Supporting Standard***

(E) solve mathematic and scientific formulas, and other literal equations, for a specified variable. ***Supporting Standard***

Reporting Category 2:
Describing and Graphing Linear Functions, Equations, and Inequalities

The student will demonstrate an understanding of how to describe and graph linear functions, equations, and inequalities.

(A.3) **Linear functions, equations, and inequalities.** The student applies the mathematical process standards when using graphs of linear functions, key features, and related transformations to represent in multiple ways and solve, with and without technology, equations, inequalities, and systems of equations. The student is expected to

(A) determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$; ***Supporting Standard***

(B) calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems; ***Readiness Standard***

(C) graph linear f unctions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems; ***Readiness Standard***

(D) graph the solution set of linear inequalities in two variables on the coordinate plane; ***Readiness Standard***

(E) determine the effects on the graph of the parent function $f(x) = x$ when $f(x)$ is replaced by $af(x)$, $f(x) + d$, $f(x - c)$, $f(bx)$ for specific values of a, b, c, and d; ***Supporting Standard***

(F) graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist; ***Supporting Standard***

(G) estimate graphically the solutions to systems of two linear equations with two variables in real-world problems; and ***Supporting Standard***

(H) graph the solution set of systems of two linear inequalities in two variables on the coordinate plane. ***Supporting Standard***

(A.4) **Linear functions, equations, and inequalities.** The student applies the mathematical process standards to formulate statistical relationships and evaluate their reasonableness based on real-world data. The student is expected to

(A) calculate, using technology, the correlation coefficient between two quantitative variables and interpret this quantity as a measure of the strength of the linear association; ***Supporting Standard***

(B) compare and contrast association and causation in real-world problems; and ***Supporting Standard***

(C) write, with and without technology, linear functions that provide a reasonable fit to data to estimate solutions and make predictions for real-world problems. ***Supporting Standard***

Reporting Category 3:
Writing and Solving Linear Functions, Equations, and Inequalities

The student will demonstrate an understanding of how to write and solve linear functions, equations, and inequalities.

(A.2) **Linear functions, equations, and inequalities.** The student applies the mathematical process standards when using properties of linear functions to write and represent in multiple ways, with and without technology, linear equations, inequalities, and systems of equations. The student is expected to

(A) determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities; ***Readiness Standard***

(B) write linear equations in two variables in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points; ***Supporting Standard***

(C) write linear equations in two variables given a table of values, a graph, and a verbal description; ***Readiness Standard***

(D) write and solve equations involving direct variation; ***Supporting Standard***

(E) write the equation of a line that contains a given point and is parallel to a given line; ***Supporting Standard***

(F) write the equation of a line that contains a given point and is perpendicular to a given line; ***Supporting Standard***

(G) write an equation of a line that is parallel or perpendicular to the x- or y-axis and determine whether the slope of the line is zero or undefined; ***Supporting Standard***

(H) write linear inequalities in two variables given a table of values, a graph, and a verbal description; and ***Supporting Standard***

(I) write systems of two linear equations given a table of values, a graph, and a verbal description. ***Readiness Standard***

(A.5) **Linear functions, equations, and inequalities.** The student applies the mathematical process standards to solve, with and without technology, linear equations and evaluate the reasonableness of their solutions. The student is expected to

(A) solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides; ***Readiness Standard***

(B) solve linear inequalities in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides; and ***Supporting Standard***

(C) solve systems of two linear equations with two variables for mathematical and real-world problems. ***Readiness Standard***

Reporting Category 4:
Quadratic Functions and Equations

The student will demonstrate an understanding of how to describe, write, and solve quadratic functions and equations.

(A.6) **Quadratic functions and equations.** The student applies the mathematical process standards when using properties of quadratic functions to write and represent in multiple ways, with and without technology, quadratic equations. The student is expected to

(A) determine the domain and range of quadratic functions and represent the domain and range using inequalities; ***Readiness Standard***

(B) write equations of quadratic functions given the vertex and another point on the graph, write the equation in vertex form ($f(x) = a(x - h)^2 + k$), and rewrite the equation from vertex form to standard form ($f(x) = ax^2 + bx + c$); and ***Supporting Standard***

(C) write quadratic functions when given real solutions and graphs of their related equations. ***Supporting Standard***

(A.7) **Quadratic functions and equations.** The student applies the mathematical process standards when using graphs of quadratic functions and their related transformations to represent in multiple ways and determine, with and without technology, the solutions to equations. The student is expected to

(A) graph quadratic functions on the coordinate plane and use the graph to identify key attributes, if possible, including x-intercept, y-intercept, zeros, maximum value, minimum values, vertex, and the equation of the axis of symmetry; ***Readiness Standard***

(B) describe the relationship between the linear factors of quadratic expressions and the zeros of their associated quadratic functions; and ***Supporting Standard***

(C) determine the effects on the graph of the parent function $f(x) = x2$ when $f(x)$ is replaced by $af(x)$, $f(x) + d$, $f(x - c)$, $f(bx)$ for specific values of a, b, c, and d. ***Readiness Standard***

(A.8) **Quadratic functions and equations.** The student applies the mathematical process standards to solve, with and without technology, quadratic equations and evaluate the reasonableness of their solutions. The student formulates statistical relationships and evaluates their reasonableness based on real-world data. The student is expected to

(A) solve quadratic equations having real solutions by factoring, taking square roots, completing the square, and applying the quadratic formula; and ***Readiness Standard***

(B) write, using technology, quadratic functions that provide a reasonable fit to data to estimate solutions and make predictions for real-world problems. ***Supporting Standard***

Reporting Category 5:
Exponential Functions and Equations

The student will demonstrate an understanding of how to describe and write exponential f unctions and equations.

(A.9) Exponential functions and equations. The student applies the mathematical process standards when using properties of exponential functions and their related transformations to write, graph, and represent in multiple ways exponential equations and evaluate, with and without technology, the reasonableness of their solutions. The student formulates statistical relationships and evaluates their reasonableness based on real-world data. The student is expected to

(A) determine the domain and range of exponential functions of the form $f(x) = abx$ and represent the domain and range using inequalities; ***Supporting Standard***

(B) interpret the meaning of the values of a and b in exponential functions of the form $f(x) = abx$ in real-world problems; ***Supporting Standard***

(C) write exponential functions in the form $f(x) = abx$ (where b is a rational number) to describe problems arising from mathematical and real-world situations, including growth and decay; ***Readiness Standard***

(D) graph exponential functions that model growth and decay and identify key features, including y-intercept and asymptote, in mathematical and real-world problems; and ***Readiness Standard***

(E) write, using technology, exponential functions that provide a reasonable fit to data and make predictions for real-world problems. ***Supporting Standard***

Name _____ Date _____

1 Elbridge is a farmer. He grows potatoes and tomatoes. After many years of farming, he has identified a relationship between the number of seeds he plants and the number of vegetables he has harvested. He figures out that if he plants m potato seeds and m tomato seeds, he will harvest $m^2 + 9m - 7$ potatoes and $m^2 + 7m - 9$ tomatoes. If Elbridge is correct, which expression will he use to find the total number of vegetables he will have after harvesting them?

A $m^2 + 2m - 16$

B $m^2 + 16m - 16$

C $2m^2 + 16m + 16$

D $2m^2 + 16m - 16$

2 After completing a lecture on radical expressions, Mrs. Stanley assigned each of her students the task of writing a radical expression equal to his or her age. Following are the expressions created by five of her students.

Dawn: $\sqrt{6(7^2 - 5^2)} - \sqrt{36} + \sqrt{11(5^2 - 14)}$

Candace: $3\sqrt{(10^2 - 8^2)} + \sqrt{25(2^2 - 2^2)} + \sqrt{(2^2 - 3)}$

Bailey: $\sqrt{5(6^2 - 4^2)} + \sqrt{144} - \sqrt{(2^5 - 2^4)}$

Adrian: $3\sqrt{(5^2 - 4^2)} + \sqrt{121} - 3\sqrt{(2^3 - 4)}$

Carina: $\sqrt{7(7^2 - 42)} + \sqrt{225} - \sqrt{5(5^3 - 120)}$

Based on the radical expressions, who was the youngest of the 5 students?

F Adrian

G Bailey

H Carina

J Dawn

3 The concept of parallel lines was introduced more than 2,000 years ago by the Greek mathematician Euclid. His idea was simple. When two lines never intersect, they are parallel.

Today, we can apply algebraic methods to determine if two lines are parallel.

	Column 1	**Column 2**	**Column 3**
Row A	$y = 3x - 11$	$y = 11x + 43$	$y + 11 = -5(x + 12)$
Row B	$y - 29 = -11(3 - x)$	$y = -5x + 49$	$-12x + 4y = -31$
Row C	$25x + 5y = 61$	$y - 11 = 3(x + 21)$	$-33x + 3y = 67$

Which answer response contains 3 sets of lines, in which each of the lines in each set have the same slope?

A [A2, B3, C1], [A3, B1, C2], [A1, B2, C1]

B [A2, B3, C2], [A1, B1, C3], [A3, B2, C1]

C [A1, B3, C2], [A2, B1, C3], [A3, B2, C1]

D [A1, B3, C2], [A2, B2, C3], [A3, B1, C1]

4 The following data table contains the weight and the average highway gas mileage of 12 different automobiles.

	Car 1	**Car 2**	**Car 3**	**Car 4**	**Car 5**	**Car 6**	**Car 7**	**Car 8**	**Car 9**	**Car 10**	**Car 11**	**Car 12**
Weight (in pounds)	3305	3170	2898	4321	3930	4545	5355	2865	3298	4076	2800	4517
Average Highway Gas Mileage (in mpg)	28	37	28	25	31	30	23	41	29	22	42	24

Using a linear regression, determine the correlation coefficient between these two variables, and describe the strength of their linear association.

F $r = 0.71$; The association between the weight of each car and its average highway gas mileage is strong.

G $r = -0.71$; The association between the weight of each car and its average highway gas mileage is moderately strong.

H $r = 0.71$; The association between the weight of each car and its average highway gas mileage is not strong.

J $r = -0.71$; The association between the weight of each car and its average highway gas mileage is not strong.

5 Kinetic Company is required to limit air pollution created by its manufacturing process. The company knows that complete elimination of air pollution created by its manufacturing process is impossible. To limit x% of air pollutants, the company must spend C dollars. C has a direct relationship with x and is defined as

$$C(x) = 88{,}000 + 32x.$$

What are the domain and range of $C(x)$?

A domain: $x < 100$; range: $y > 3{,}200$

B domain: $0 \leq x$; range: $88{,}000 < y$

C domain: $0 \leq x < 100$; range: $88{,}000 \leq y < 91{,}200$

D domain: $0 \leq x \leq 100$; range: $y \geq 88{,}000$

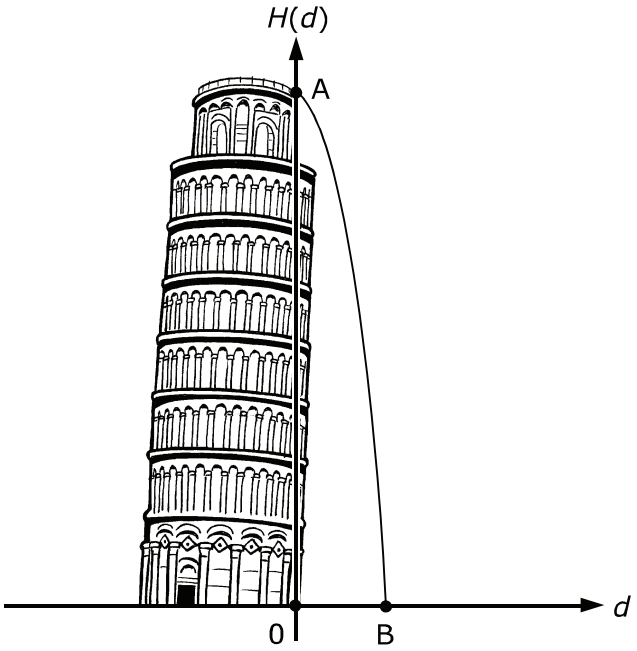
6 A company purchased a piece of equipment for $87,430. The equipment will be depreciated over 8 years. Its scrap value at any time over 8 years V is determined by the equation

$$2(87{,}430 - 8V) = 162{,}240 + 3(1{,}000 - 5V).$$

What will be the scrap value in dollars of the equipment after it is fully depreciated?

Record your answer and fill in the bubbles on your answer document.

7 In 1988, Michael McCarthy jumped from near the top of the Tower of Pisa. The height of his jumping point was 179 feet. McCarthy claimed that his was the lowest parachute jump ever recorded. The landing point was B, 32 feet from the base of the tower. The function $H(d) = -\frac{179}{1{,}024}d^2 + 179$ defines the general path of a parabola, where the path of the landing parachute is a segment of the parabola.



What are the domain and range of the path of McCarthy's parachute?

A domain: $0 \le d \le 32$; range: $-1 \le H(d) \le 179$

B domain: $-32 \le d \le 32$; range: $-179 \le H(d) \le 179$

C domain: $0 \le d \le 32$; range: $0 \le H(d) \le 179$

D domain: $-32 \le d \le 32$; range: $0 \le H(d) \le 179$

8 Consider the quadratic function $f(x) = a^2x^2 + 2ax - 3$. If one of the zeros of the function is $-\frac{1}{3}$, which of the following could be the linear factors related to this function?

F $(9x + 1)(9x - 3)$

G $(-3x - 1)(-3x + 3)$

H $(-3x + 1)(-3x - 3)$

J $(-9x - 1)(-9x + 3)$

9 Consider the graph of the exponential function that represents the following scenario.

Mitchell buys a boat for $63,000. The boat is used only for business purposes. The boat decreases in value at a rate of 12% each year. What are the domain and the range of the function?

A domain: $x \leq 63{,}000$
range: $y \geq 0$

B domain: $x \geq 0$
range: $y \leq 63{,}000$

C domain: $x \geq 0$
range: $0 \leq y \leq 63{,}000$

D domain: $x \geq 0$
range: $0 < y \leq 63{,}000$

10 The number of franchises of a fast-food chain specializing in low fat, high-fiber salads, yogurt and fruit smoothies is exploding. One company started in 2008 with 300 franchises in Texas, and it has been opening franchises throughout the state ever since. The total number of franchises in operation each year is shown in the table.

Year	Total Number of Franchises
2008	300
2009	323
2010	377
2011	486
2012	580
2013	762

Assuming that the company continues to grow exponentially at this rate, determine with the use of technology the approximate function that represents the growth of the company's number of franchises since 2008 where x is represented in years since 2008. Based on this function, which is the best prediction of the number of franchises the company will own in 2017?

F 1,271 franchises

G 1,539 franchises

H 1,629 franchises

J 1,862 franchises

Student Name:

STAAR CONNECTION™
EOC Algebra I
Diagnostic Series Math

The following charts provide the correct answer to each assessment question, along with the corresponding reporting category, identification of readiness or supporting standard, content student expectation, and process student expectation.

Circle the number of any question that has been answered incorrectly. Circle the TEKS that need additional reinforcement.

Assessment 1

Item Number	Correct Answer	Reporting Category	Readiness or Supporting	Content Student Expectation (TEKS)	Process Student Expectation (TEKS)
1	D	1	Supporting	A.10A	A.1D
2	F	1	Supporting	A.11A	A.1C
3	C	2	Supporting	A.3A	A.1B
4	G	2	Supporting	A.4A	A.1C
5	C	3	Readiness	A.2A	A.1D
6	9,620	3	Readiness	A.5A	A.1E
7	C	4	Readiness	A.6A	A.1A
8	G	4	Supporting	A.7B	A.1F
9	D	5	Supporting	A.9A	A.1E
10	G	5	Supporting	A.9E	A.1C