# STAAR CONNECTION™

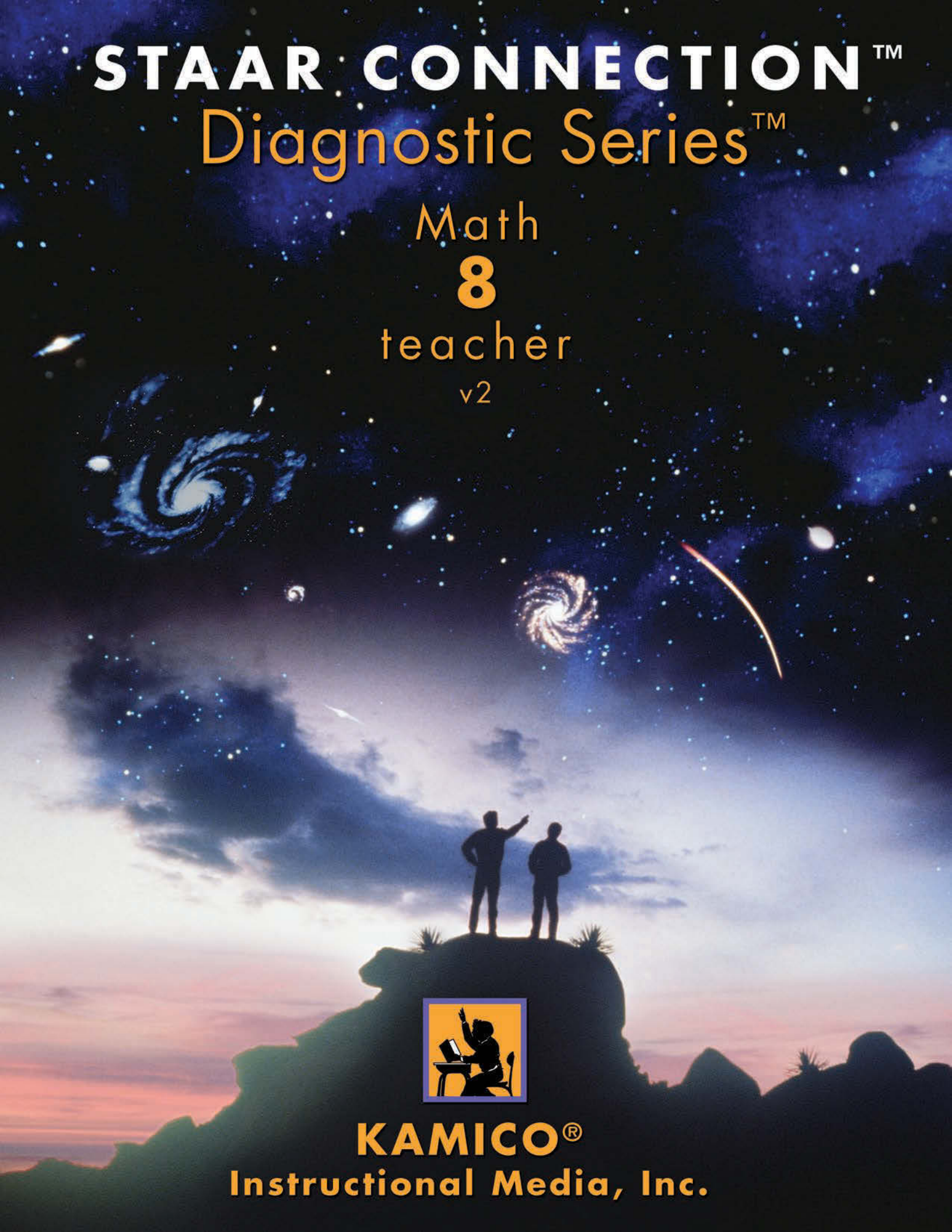
## Diagnostic Series™

## Math

# 8

## teacher

v2



KAMICO®
Instructional Media, Inc.

# STAAR CONNECTION™

# Math
# 8
# teacher

# Diagnostic Series™

XXVIII/i/MMXXII
Version 2

KAMICO®
Instructional Media, Inc.



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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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**KAMICO® Instructional Media, Inc.**
**STAAR CONNECTION™**
**Diagnostic Series™**
**Grade 8 Math**
**Table of Contents**

# Reporting Categories and Related TEKS
# Grade 8 Mathematics

## 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.**

(8.1) **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:
## Numerical Representations and Relationships

**The student will demonstrate an understanding of how to represent and manipulate numbers and expressions.**

(8.2) **Number and operations.** The student applies mathematical process standards to represent and use real numbers in a variety of forms. The student is expected to

(A) extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers; ***Supporting Standard***

(B) approximate the value of an irrational number, including $\pi$ and square roots of numbers less than 225, and locate that rational number approximation on a number line; ***Supporting Standard***

(C) convert between standard decimal notation and scientific notation; and ***Supporting Standard***

(D) order a set of real numbers arising from mathematical and real-world contexts. ***Readiness Standard***

## Reporting Category 2:
## Computations and Algebraic Relationships

**The student will demonstrate an understanding of how to perform operations and represent algebraic relationships.**

(8.4) **Proportionality.** The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. The student is expected to

(A) use similar right triangles to develop an understanding that slope, $m$, given as the rate comparing the change in $y$-values to the change in $x$-values, $(y_2 - y_1)/(x_2 - x_1)$, is the same for any two points $(x_1, y_1)$ and $(x_2, y_2)$ on the same line; ***Supporting Standard***

(B) graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship; and ***Readiness Standard***

(C) use data from a table or graph to determine the rate of change or slope and $y$-intercept in mathematical and real-world problems. ***Readiness Standard***

(8.5) **Proportionality.** The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to

(A) represent linear proportional situations with tables, graphs, and equations in the form of $y = kx$; ***Supporting Standard***

(B) represent linear non-proportional situations with tables, graphs, and equations in the form of $y = mx + b$, where $b \neq 0$; ***Supporting Standard***

(E) solve problems involving direct variation; ***Supporting Standard***

(F) distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form $y = kx$ or $y = mx + b$, where $b \neq 0$; ***Supporting Standard***

(G) identify functions using sets of ordered pairs, tables, mappings, and graphs; ***Readiness Standard***

(H) identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems; and ***Supporting Standard***

(I) write an equation in the form $y = mx + b$ to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations. ***Readiness Standard***

(8.8) **Expressions, equations, and relationships.** The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to

(A) write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants; ***Supporting Standard***

(B) write a corresponding real-world problem when given a one-variable equation or inequality with variables on both sides of the equal sign using rational number coefficients and constants; and
***Supporting Standard***

(C) model and solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems using rational number coefficients and constants.
***Readiness Standard***

(8.9) **Expressions, equations, and relationships.** The student applies mathematical process standards to use multiple representations to develop foundational concepts of simultaneous linear equations. The student is expected to

(A) identify and verify the values of $x$ and $y$ that simultaneously satisfy two linear equations in the form $y = mx + b$ from the intersections of the graphed equations. ***Supporting Standard***

## Reporting Category 3:
## Geometry and Measurement

**The student will demonstrate an understanding of how to represent and apply geometry and measurement concepts.**

(8.3) **Proportionality.** The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to

(A) generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation; ***Supporting Standard***

(B) compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane; and ***Supporting Standard***

(C) use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation. ***Readiness Standard***

(8.6) **Expressions, equations, and relationships.** The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas. The student is expected to

(A) describe the volume formula $V = Bh$ of a cylinder in terms of its base area and its height; and ***Supporting Standard***

(C) use models and diagrams to explain the Pythagorean theorem. ***Supporting Standard***

(8.7) **Expressions, equations, and relationships.** The student applies mathematical process standards to use geometry to solve problems. The student is expected to

(A) solve problems involving the volume of cylinders, cones, and spheres; ***Readiness Standard***

(B) use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders; ***Readiness Standard***

(C) use the Pythagorean theorem and its converse to solve problems; and ***Readiness Standard***

(D) determine the distance between two points on a coordinate plane using the Pythagorean theorem. ***Supporting Standard***

(8.8) **Expressions, equations, and relationships.** The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to

(D) use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. ***Supporting Standard***

(8.10) **Two-dimensional shapes.** The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to

(A) generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane; ***Supporting Standard***

(B) differentiate between transformations that preserve congruence and those that do not; ***Supporting Standard***

(C) explain the effect of translations, reflections over the *x*- or *y*-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation; and ***Readiness Standard***

(D) model the effect on linear and area measurements of dilated two-dimensional shapes. ***Supporting Standard***

## Reporting Category 4:
## Data Analysis and Personal Financial Literacy

**The student will demonstrate an understanding of how to represent and analyze data and how to describe and apply personal financial concepts.**

(8.5) **Proportionality.** The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to

(C) contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation; and ***Supporting Standard***

(D) use a trend line that approximates the linear relationship between bivariate sets of data to make predictions. ***Readiness Standard***

(8.11) **Measurement and data.** The student applies mathematical process standards to use statistical procedures to describe data. The student is expected to

(A) construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data; and ***Supporting Standard***

(B) determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean using a data set of no more than 10 data points. ***Supporting Standard***

(8.12) **Personal financial literacy.** The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one's life as a knowledgeable consumer and investor. The student is expected to

(A) solve real-world problems comparing how interest rate and loan length affect the cost of credit; ***Supporting Standard***

(C) explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time; ***Supporting Standard***

(D) calculate and compare simple interest and compound interest earnings; and ***Readiness Standard***

(G) estimate the cost of a two-year and four-year college education, including family contribution, and devise a periodic savings plan for accumulating the money needed to contribute to the total cost of attendance for at least the first year of college. ***Supporting Standard***

Name _____ Date _____

**1** Ms. Timmes places an empty fish aquarium in the front of her classroom. She fills it with slips of paper. Each slip of paper has a number printed on it. Ms. Timmes has each student come to the front of the class and draw a dozen slips of paper from the aquarium. After all students have drawn their slips of paper and returned to their desks, Ms. Timmes instructs them to write their 12 numbers on a sheet of paper. Next, Ms. Timmes tells the students to use as many of their numbers as possible to create a set of numbers that are rational numbers but not natural numbers. Lisa, one of the students in the class, has the following numbers.

$$\frac{1}{3} \quad \sqrt{0} \quad -3 \quad 5 \quad \pi \quad 0$$

$$\frac{-4}{1} \quad \sqrt{2} \quad -8 \quad 4 \quad \frac{9}{1} \quad 2^2$$

If Lisa correctly performs the assigned task, which answer choice shows her set of numbers?

**A** $\left\{\frac{1}{3},\ \sqrt{0},\ -3,\ 5,\ 0,\ \frac{-4}{1},\ -8,\ 4,\ \frac{9}{1},\ 2^2\right\}$

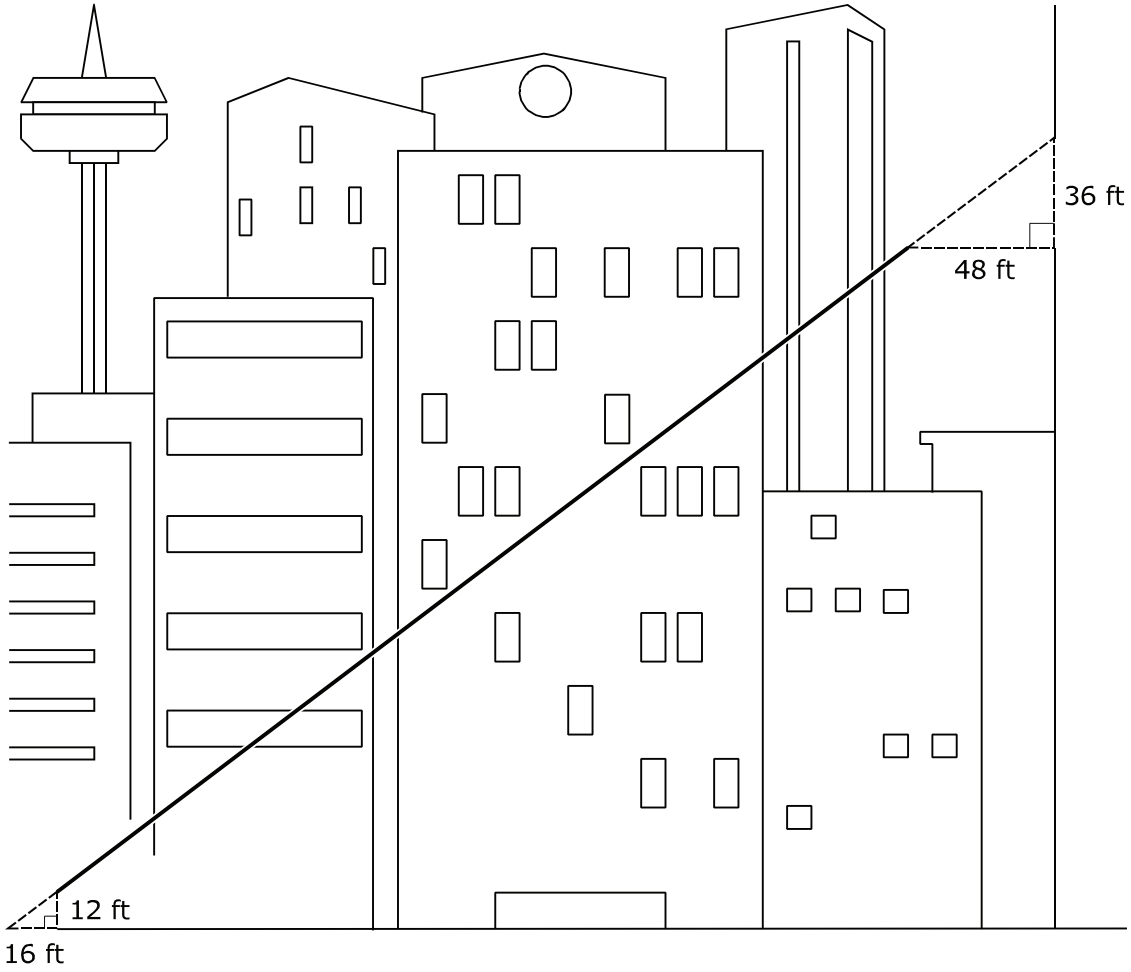
**B** $\left\{5,\ 4,\ \frac{9}{1},\ 2^2\right\}$

**C** $\left\{\frac{1}{3},\ \sqrt{0},\ -3,\ 0,\ \frac{-4}{1},\ -8\right\}$

**D** $\left\{\sqrt{0},\ -3,\ 5,\ 0,\ \frac{-4}{1},\ -8,\ 4,\ \frac{9}{1},\ 2^2\right\}$

**2** An entertainment company installs a zip line in a downtown area of a major city. Using a platform on one of the tallest skyscrapers, the zip line sends its riders flying in front of tall buildings before landing on a street corner. A diagram of the zip line is shown.

Study the two similar right triangles. The dimensions of the right triangle formed by the platform and zip line are 36 feet, 48 feet, and 60 feet, and the dimensions of the right triangle formed by the zip line and the street corner are 12 feet, 16 feet, and 20 feet.




Use the similar triangles to calculate the slope of the zip line.

**F** $\frac{12}{16} = \frac{36}{48}$ = slope of $\frac{3}{4}$

**G** $\frac{12}{20} = \frac{36}{60}$ = slope of $\frac{3}{5}$

**H** $\frac{16}{20} = \frac{48}{60}$ = slope of $\frac{4}{5}$

**J** $\frac{12}{36} = \frac{16}{48}$ = slope of $\frac{1}{3}$

**3** In a busy warehouse, pallets of goods are loaded onto trucks using a pallet jack. Each pallet of a certain product contains 20 crates. The table shows the number of pallets of this product that need to be loaded onto trucks over a period of time.

| Time Spent Loading (in minutes) | Number of Pallets Remaining to Be Moved |
|---|---|
| 30 | 120 |
| 45 | 115 |
| 60 | 110 |
| 75 | 105 |

Determine the number of crates from the warehouse of this product that originally needed to be loaded onto trucks.

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

**4** Consider the set of ordered pairs: {(2, –3), (3, –3), (4, 6), (10, 5)}. Does this set represent a function? Explain why or why not.

**F** The set of ordered pairs represents a function because each *y* value is assigned only one *x* value.

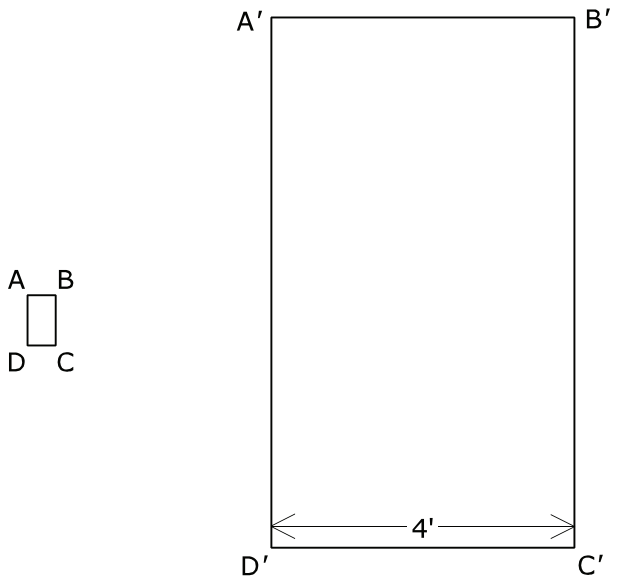
**G** The set of ordered pairs does not represent a function because each *y* value is assigned only one *x* value.

**H** The set of ordered pairs represents a function because each *x* value is assigned only one *y* value.

**J** The set of ordered pairs does not represent a function because each *x* value is assigned only one *y* value.

**5** A blueprint is a scale drawing that represents an actual object. Contractors use blueprints to show the dimensions of a room or building under construction. Blueprints help contractors perform the job to the correct specifications.

Daniel is a contractor who is using a blueprint with a scale factor of 1 to 15. The doorway to the kitchen on the blueprint is represented by rectangle ABCD. The actual doorway to the kitchen is represented by the dilation A'B'C'D'.




Given that the length of C'D', the actual width of the doorway, is 4 feet, what is the length of CD, the width of the doorway on the blueprint?

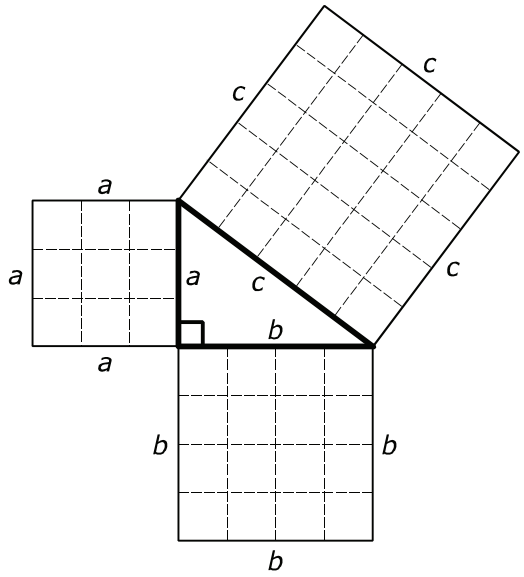
**A** 3.2 inches

**B** $\frac{4}{15}$ inches

**C** 6 inches

**D** 3.75 inches

**6** This diagram uses the Pythagorean triple (3, 4, 5) to illustrate that $a^2 + b^2 = c^2$. Given $a = 3$, $b = 4$, and $c = 5$, we see that $3^2 + 4^2 = 5^2 \rightarrow 9 + 16 = 25$.




Which of the answer choices is also a Pythagorean triple?

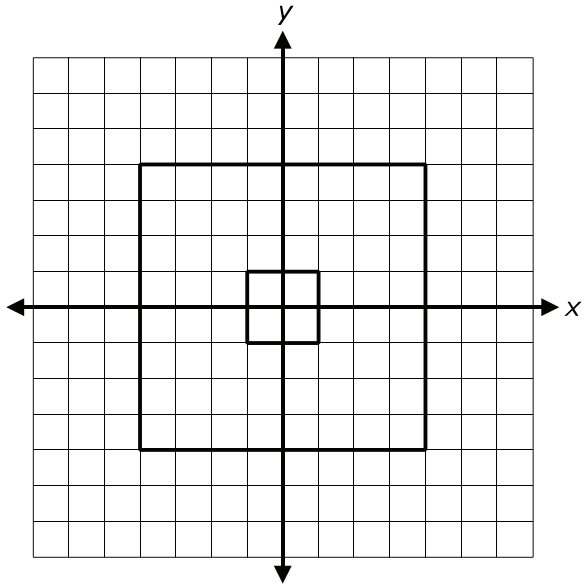
**F** (4, 5, 6)

**G** (5, 12, 13)

**H** (6, 9, 12)

**J** (7, 11, 15)

**7** There are two squares in this coordinate plane. Using the origin as the center of dilation, the larger square is dilated by a scale factor of 0.25 to form the smaller square.




How much larger is the larger square than the smaller square?

**A** 60 square units

**B** 63 square units

**C** 64 square units

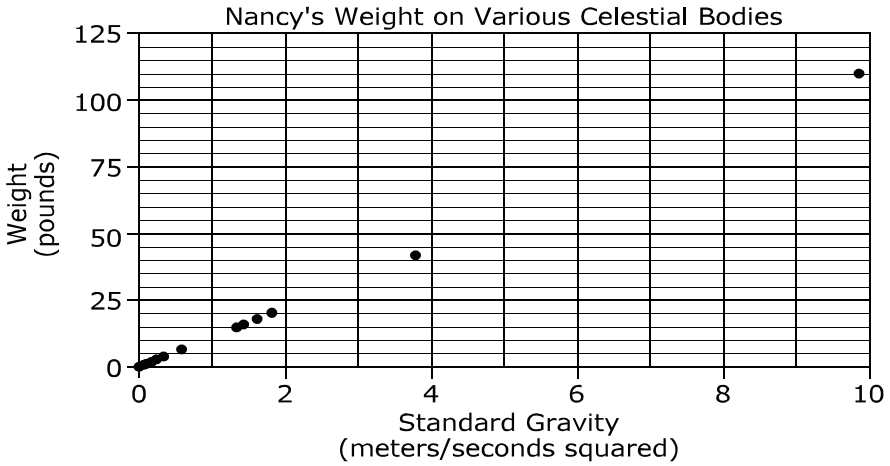
**D** Not here

**8** Nancy wants to be an astrophysicist. She loves studying physics, chemistry, and outer space. Nancy enjoys browsing NASA's website. She finds many things on the site that are very interesting to her. Here is one of the tables Nancy finds on the site.

| Object | Location | Standard Gravity ($m/sec^2$) | Weight (pounds) |
|---|---|---|---|
| Earth | Planet | 9.8 | 110 |
| Mercury | Planet | 3.7 | 41.5 |
| Mars | Planet | 3.7 | 41.5 |
| Io | Jupiter moon | 1.8 | 20.2 |
| Moon | Earth moon | 1.6 | 18.0 |
| Titan | Saturn moon | 1.4 | 15.7 |
| Europa | Jupiter moon | 1.3 | 14.6 |
| Pluto | Planet | 0.58 | 6.5 |
| Charon | Pluto moon | 0.28 | 3.1 |
| Vesta | Asteroid | 0.22 | 2.5 |
| Enceladus | Saturn moon | 0.11 | 1.2 |
| Miranda | Uranus moon | 0.08 | 0.9 |
| Deimos | Mars moon | 0.003 | 0.03 |

Nancy weighs 110 pounds on Earth, and she is fascinated that the table shows what her weight would be on some other celestial bodies.

The graph shows information from the table.




Source: NASA Website

Based on the information in the graph, which of the following conclusions is accurate?

**F** There is a linear, proportional relationship between standard gravity and weight.

**G** There is no relationship between standard gravity and weight.

**H** There is a linear, non-proportional relationship between standard gravity and weight.

**J** There is a non-linear, proportional relationship between standard gravity and weight.

**9** Virgil is at a car dealership. He is purchasing his dream car for $50,000, including all fees and taxes. The dealership works with 2 different finance companies. The first offers Virgil a loan for $50,000 with a 6.5% simple interest rate over 5 years. The second offers Virgil a loan for $50,000 with a 5.5% simple interest rate over 7 years. How much more interest will Virgil have to pay over the life of the loan if he selects the more expensive loan?

**A** $1,500

**B** $3,000

**C** $6,000

**D** $9,000

**10** Study the chart.

**Central Texas College**
**estimated cost of attending**
**2015-2016 school year**

| | Texas In-District | | | Texas Out-of-District | | | Non-Resident |
|---|---|---|---|---|---|---|---|
| Cost of Attendance | On-Campus (C) | Off-Campus w/Parents (P) | Off-Campus (O) | On-Campus (C) | Off-Campus w/Parents (P) | Off-Campus (O) | Off-Campus (O) |
| Tuition and Fees | 2280 | 2280 | 2280 | 2940 | 2940 | 2940 | 6420 |
| Books and Supplies | 1707 | 1707 | 1707 | 1707 | 1707 | 1707 | 1707 |
| Room and Board | 5031 | 2551 | 5306 | 5031 | 2551 | 5306 | 5306 |
| Transportation | 807 | 878 | 947 | 807 | 878 | 947 | 947 |
| Personal and Misc. | 1647 | 1885 | 2350 | 1647 | 1885 | 2350 | 2350 |
| **Total** | **11,472** | **9,301** | **12,590** | **12,132** | **9,961** | **13,250** | **16,730** |

**Figures only reflect students without dependents.

**Tuition and Fees** – The average cost of tuition and fees for a typical full-time student based on enrolling for 30 hours per year. The actual costs that a student incurs will vary depending on the student's degree or certificate program.

**Books and Supplies** – The average cost of books and supplies for a typical student for an entire academic year. The actual costs the student incurs for books and supplies will vary depending on the student's degree or certificate program.

**Room and Board** – A reasonable estimate of what it would cost to live in Killeen while attending school. Actual costs may vary due to individual choices related to location and circumstances.

**Transportation** – A reasonable estimate of gasoline for an academic year.

**Personal Expenses** – A reasonable estimate of the amount for personal living expenses during an academic year.

Tempe lives in Arizona. His grandmother and his cousin Zach live in Killeen. Zach was born and raised in Killeen. Both Tempe and Zach plan to attend Central Texas College in Killeen. They are both going to live with their grandmother. Since Tempe's permanent address is in Arizona, he will be classified as a non-resident. Since Zach has lived in Killeen all of his life, he will be classified as an in-district, Texas resident.

Zach and Tempe are responsible for all their college expenses. However, their grandmother opened a savings account for each grandson when they were little, and when they begin their first semester, she plans to give each $5,000. Use the chart to determine how much each boy will need in order to meet the estimated cost of attending Central Texas College for one year (fall and spring semesters).

**F** Tempe $16,730 Zach $9,301

**G** Tempe $7,590 Zach $11,730

**H** Tempe $11,730 Zach $7,590

**J** Tempe $11,730 Zach $4,301

Student Name:

STAAR CONNECTION™
Grade 8
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 | C | 1 | Supporting | 8.2A | 8.1B |
| 2 | F | 2 | Supporting | 8.4A | 8.1F |
| 3 | 2600 | 2 | Readiness | 8.4C | 8.1A |
| 4 | H | 2 | Readiness | 8.5G | 8.1B |
| 5 | A | 3 | Supporting | 8.3A | 8.1D |
| 6 | G | 3 | Supporting | 8.6C | 8.1F |
| 7 | A | 3 | Supporting | 8.10D | 8.1F |
| 8 | F | 4 | Supporting | 8.5C | 8.1G |
| 9 | B | 4 | Supporting | 8.12A | 8.1A |
| 10 | J | 4 | Supporting | 8.12G | 8.1A |