



The *PRAXIS*<sup>®</sup> Study Companion

**Core Academic  
Skills for  
Educators:  
Mathematics  
(5733)**



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## Core Academic Skills for Educators: Mathematics (5733)

### Test at a Glance

<b>Test Name</b>	Core Academic Skills for Educators: Mathematics		
<b>Test Code</b>	5733		
<b>Time</b>	90 minutes		
<b>Number of Questions</b>	56		
<b>Format</b>	Selected-response questions—select one answer choice Selected-response questions—select one or more answer choices Numeric-entry questions		
<b>Calculator</b>	An on-screen four-function calculator is provided.		
<b>Test Delivery</b>	Computer Delivered		
	Content Categories	Approximate Number of Questions*	Approximate Percentage of Examination
	I. Number and Quantity	20	36%
	II. Data Interpretation and Representation, Statistics, and Probability	18	32%
	III. Algebra and Geometry	18	32%
	<i>*Includes both scored and unscored (pretest) questions. Depending on the number of pretest questions included in each scoring category, the total number of questions in that category may vary from one form of the test to another.</i>		

## About The Test

The Core Academic Skills for Educators test in Mathematics measures academic skills in mathematics needed to prepare successfully for a career in education. All skills assessed have been identified as needed for college and career readiness, in alignment with the Common Core State Standards for Mathematics. The test will cover three major content areas: Number and Quantity; Data Interpretation and Representation, Statistics, and Probability; and Algebra and Geometry. Focus is on key concepts of mathematics and the ability to solve problems and to reason in a quantitative context. Many of the problems require the integration of multiple skills to achieve a solution.

In Number and Quantity, the understanding of integers, decimals, fractions, ratio, proportion, percent, constant rates, place value, number ordering, properties of whole numbers, recognition of various ways to solve a problem, units and measurements is emphasized. Knowledge of basic U.S. customary and metric systems of measurement is assumed.

Data Interpretation and Representation, Statistics, and Probability assesses the ability to read and interpret visual display of quantitative information, understand the correspondence between data and data representation, make inferences from a given data display, determine mean, median, and mode, and assign a probability to an outcome.

Algebra assesses the ability to manipulate algebraic expressions, follow an arithmetic or algebraic procedure, solve word problems, and solve equations. Geometry assesses the understanding of properties of geometric shapes, angles, congruence, similarity, and solving problems using formulas for perimeter, circumference, area, and volume.

The test is 90 minutes long and contains 56 questions. This test may contain some questions that will not count toward your score.

The test will contain several types of questions:

- Selected-response question—select one answer choice: These questions are selected-response questions that ask you to select only one answer choice from a list of five choices.
- Selected-response question—select one or more answer choices: These questions are selected-response questions that ask you to select one or more answer choices from a list of choices. A question may or may not specify the number of choices to select. These questions are marked with square boxes beside the answer choices, not circles or ovals.
- Numeric-entry questions: Questions of this type ask you to enter your answer as an integer or a decimal in a single answer box, or to enter it as a fraction in two separate boxes—one for the numerator and one for the denominator. In the computer-based test, use the computer mouse and keyboard to enter your answer.

## On-Screen Four-Function Calculator

During the test, test takers have access to an on-screen four-function calculator.



Please consult the [Praxis Calculator Use](#) web page for further information and review the [directions for using the on-screen calculator](#).

## Content Topics

This list details the topics that may be included on the test. All test questions cover one or more of these topics.

**Note:** The use of “e.g.” to start a list of examples implies that only a few examples are offered and the list is not exhaustive, whereas the use of “i.e.” to start a list of examples implies that the given list of examples is complete.

## Discussion Questions

In this section, discussion questions provide examples of content that may be included in the questions you receive on testing day. They are open-ended questions or statements intended to help test your knowledge of fundamental concepts and your ability to apply those concepts to classroom or real-world situations. We do **not** provide answers for the discussion questions, but thinking about the answers will help improve your understanding of fundamental concepts and may help you answer a broad range of questions on the test. Most of the questions require you to combine several pieces of knowledge to formulate an integrated understanding and response. They are written to help you gain increased understanding and facility with the test’s subject matter. You may want to discuss these questions with a teacher or mentor.

### I. Number and Quantity

- A. Solve problems involving integers, decimals, and fractions
- B. Solve problems involving ratios and proportions
- C. Solve problems involving percent
- D. Solve problems involving constant rates (e.g., miles per hour, gallons per mile, cubic feet per minute)
- E. Demonstrate an understanding of place value, naming of decimal numbers, and ordering of numbers
- F. Demonstrate an understanding of the properties of whole numbers (e.g., factors, multiples, even and odd numbers, prime numbers, divisibility)
- G. Identify counterexamples to statements using basic arithmetic
- H. Solve real-life problems by identifying relevant numbers, information, or operations (including rounding)
- I. Solve problems involving units, including unit conversion and measurements

#### Discussion Questions: Number and Quantity

- Do you understand place value of numbers? For example, can you read the number 1,020,304.56? What digit is in the tens place? What digit is in the tenths place?
- What happens to the digits in 1,020,304.56 when the number is divided by 100? What happens to the digits when the number is multiplied by 10?

- Can you apply the basic number properties (such as commutative, associative, and distributive) ?
- Do you know how to correctly solve problems involving ratios of 2 or 3 quantities?
- Can you apply the concept of a ratio and use ratio language and notation to describe a relationship between two quantities? For example, if the ratio of the men and women in a group of 100 people is 2 to 3, do you know how to use ratios and proportional reasoning to find the number of men and women in this group of 100 ?
- Do you understand ratios of 3 quantities, for example 2:3:4 ?
- Given information about a real-world context involving a part-whole relationship, can you determine the quantity that represents the part? For example, a high school swimming team consists of both boys and girls. The 12 boys on the swim team represent  $\frac{4}{7}$  of the team. How many total team members are there?
- Do you understand proportionality?
- Can you describe the difference between a ratio and a proportion?
- Can you describe several real-world applications of proportional reasoning?
- If 2 apples correspond to 3 oranges, do you know how many oranges correspond to 50 apples?
- Do you understand the relationships among fractions, decimals, and percents?
- Are you able to recognize and use multiple representations of fractions, decimals, percents, and integers?
- Can you convert among fractions, decimals, and percents?
- Can you represent fractions, decimals, and percents using various models?
- Can you compute a fraction of a fraction? For example, what is  $\frac{1}{4}$  of  $\frac{3}{8}$  ?
- Can you calculate percent change? Can you compute percent of percent?
- Can you compute the fraction of a whole that has a given characteristic and then express the fraction as a percent?
- Can you change a mixed number to and from an improper fraction?
- Can you perform operations with fractions?
- For example, what is  $3\frac{2}{3} + 2\frac{1}{3}$  as a mixed number? What is  $3\frac{2}{3} \div 2\frac{1}{3}$  as an improper fraction?
- Can you perform operations with decimals? For example, what is  $3.75 + 2.50$  as a decimal? What is  $\frac{3.75}{2.50}$  as a decimal?
- Can you identify, interpret, calculate, and use a constant rate of change in a real-life context?

- Can you solve the following problem? The population of a town rose at a constant rate from a population of 160,000 people in 2010 to a population of 200,000 people in 2015. What is the constant rate, in people per year? If the population growth continues at the same constant rate, what will be the population in 2020? What is the percent increase in population from 2010 to 2015?
- Can you identify all factors of 12? Can you identify all factors of 14? Which of these factors are prime numbers?
- Can you identify the greatest common divisor of 12 and 14? What positive number is the least multiple of 12 and 14?
- Are you able to apply the concepts of prime or composite numbers, even or odd numbers, factors, multiples, and divisibility? Can you describe, for each of these concepts, a real-world context in which you would use the concept?
- Are you able to recognize relationships involving prime and composite numbers?
- Are you able to solve problems involving factors and divisibility?
- Can you write numbers as a product of prime numbers? What is the prime factorization of 350?
- How can prime factorizations for two whole numbers be used to find the greatest common divisor (GCD) and least common multiple (LCM) of the numbers?
- Can you sort (positive and negative) decimals and fractions in increasing order and place them on the number line? For example, sort the numbers 0.889, 0.9, 1.02, and 1.1 and place them on the number line. How many of the given numbers are to the right of 1 on the number line? Which of the given numbers is closest to 1 on the number line? Which of the given numbers is farthest away from 1 on the number line?
- Are you able to compare the values of numbers represented in fraction or decimal form and list them in order from least to greatest?
- What is the approximation of pi to the nearest hundredth?
- Can you work with such numbers as  $\sqrt{2}$ ,  $\sqrt{5}$ , and  $\sqrt{20}$ ?
- Are you able to find the nearest whole number approximation of  $\frac{\sqrt{50}+3}{2}$ ? What is the approximation to the nearest tenth? Which of these approximations are underestimates? Which are overestimates?
- Can you add, subtract, multiply, and divide numbers that have integer exponents?
- Can you work with units and change from one unit to another?
- Given a statement, can you identify a counterexample to the given statement?



- Are you able to use models to add, subtract, multiply, and divide fractions?
- Are you able to use models to compare fractions?
- Are you able to use models to add, subtract, multiply, and divide decimals?
- Are you able to use models to compare decimals?
- Are you able to critically analyze and synthesize word problems?
- Can you recognize the operations (for example, add, subtract, multiply, and divide) in the context of a real-life problem?
- Can you identify pertinent information for solving a problem when given in a real-life context?
- Given a description of the union and intersection of sets, can you create a Venn diagram for the sets?
- Can you describe some real-life problems that could be readily solved using sets and/or Venn diagrams?
- Do you know the U.S. customary system and the metric system, and are you able to convert units within and between each system?
- Are you able to identify the basic units of measurement for real-life applications?
- Are you able to solve measurement problems in context by using estimation?
- Are you able to use conversion factors to solve measurement problems?

- Are you able to solve problems involving scale factors?
- Are you able to convert centimeters to meters, inches to feet, and hours to seconds?

## II. Data Interpretation and Representation, Statistics, and Probability

- Work with data and data representations to solve problems
- Solve problems involving measures of central tendency (e.g., mean, median) and spread (e.g., range, standard deviation)
- Use data from a random sample to draw inferences about characteristics of a population
- Identify positive and negative linear relationships in scatterplots
- Use a linear model for a data set to make predictions
- Differentiate between correlation and causation
- Compute simple probabilities, and use probabilities to solve problems

### Discussion Questions: Data Interpretation and Representation, Statistics, and Probability

- Can you compute and interpret common measures of central tendency such as the mean and median of a data set?
- Are you able to find and interpret common measures of dispersion such as range?

- Are you able to discuss the effect on median, mean, mode, and range of a data set if the set is changed by adding a constant to all data or by multiplying all data by a positive constant?
- Given a random sample, are you able to extend the statistic from the sample to the whole population?
- Given one representation (algebraic or numeric) of a contextualized situation, can you provide other representations (graphical, etc.) of the situation?
- Can you choose an appropriate graph based on a given set of data?
- Are you able to represent and statistically analyze data graphically and numerically?
- Can you compute the probability of simple events?
- Are you able to explain and apply basic concepts of probability?
- Can you compute the probability of two independent events?
- Can you identify all possible outcomes from tossing a pair of number cubes?
- Are you able to solve problems by counting individual outcomes or by using counting techniques?
- Can you solve simple real-life probability problems?
- Can you use probability to evaluate outcomes of decisions?
- Are you able to understand and interpret simple diagrams of data sets presented in various forms including tables, charts, histograms, line graphs, bar graphs, circle graphs, scatterplots, stem-and-leaf plots, timelines, number lines, and boxplots?
- Are you able to solve problems using information from various data displays (e.g., pictographs, frequency tables, bar graphs, line plots, circle graphs, etc.)?
- Can you describe behavior in scatterplots?
- Can you justify a conclusion based on the information given about a data set?
- Are you able to interpret what the equation for a line of best fit means for a given context?
- Can you use a linear model to make predictions about a data set?
- Are you able to identify linear correlations?
- What is the difference between positive and negative linear correlation?
- Can you distinguish between correlation and causation?
- Given some contextual information, can you justify conclusions about correlation or causation?
- Are you able to identify outliers in a set of data?

### III. Algebra and Geometry

#### A. Algebra

1. Demonstrate an understanding of the properties (commutative, associative, and distributive) of the basic operations (addition, subtraction, multiplication, and division) without needing to know the names of the properties
2. Demonstrate the ability to follow an arithmetic or algebraic procedure (e.g., using a step-by-step procedure, using a simple flowchart, applying a simple recurrence sequence) by carrying it out or analyzing it
3. Use properties of operations to identify or generate equivalent algebraic expressions (e.g., multiplication of whole numbers gives the same result as repeated addition, multiplication by 0.1 gives the same result as division by 10)
4. Write an equation or expression that models a real-life or mathematical problem
5. Solve word problems, including problems involving linear relationships and problems that can be represented by Venn diagrams
6. Solve linear equations in one variable algebraically
7. Solve simple quadratic equations (e.g.,  $x^2 = 49$ )

#### Discussion Questions: Algebra

- Do you know the difference between an algebraic expression and an algebraic equation?
- Are you able to translate from a verbal description to an algebraic expression? For example, what algebraic expression corresponds to “2 less than 3 times  $x$ ”?
- Given that  $y$  is 2 less than 3 times  $x$ , can you find  $x$  in terms of  $y$ ?
- Can you demonstrate the similarities between arithmetic operations with real numbers and the corresponding operations with algebraic (symbolic) representation?
- Can you translate verbal expressions and relationships into algebraic expressions or relationships?
- Can you accurately follow an algebraic procedure to produce a desired result?
- Are you able to correctly solve problems involving some or all basic operations regardless of the order of presentation of the operations?
- Can you describe some common mistakes students make in applying the order of operations?
- Do you know the order of operations your calculator uses? Can you simplify algebraic expressions (for example,  $2(x+1) - 3(x-2)$  or  $\frac{2x^2}{6x}$ )?
- Can you plot the line in the  $xy$ -plane with equation  $2x + 3y = 24$ ?

- Given the equation of a line, can you determine the slope of the line? Can you write the equation of another line with the same slope?
- Can you explain the concept of slope using tables, graphs, and linear equations?
- Given the equation of a line, can you determine the x-intercept and the y-intercept of the line?
- Can you solve word problems?
- Are you able to organize information into a Venn diagram, given a description of a real-world context?
- Given a linear equation (for example,  $\frac{1}{3}x + 1\frac{2}{3} = \frac{5}{6}$ ), can you write all the steps that you used to solve the equation?
- Can you solve a simple quadratic equation?
- Can you plot the solution set to an equation or inequality in one variable on the number line?
- Given two points, can you write the equation of a line in point-slope form?
- Given a point and the slope of a line, can you write the equation of the line in slope-intercept form?
- Given the equation of a line in point-slope form, can you write the equation of the line in slope-intercept form?

## B. Geometry

1. Utilize basic properties of common two-dimensional shapes to solve problems
2. Utilize facts about angles to solve problems
3. Utilize facts about congruency and similarity of geometric figures to solve problems
4. Use the formulas for the area and circumference of a circle to solve problems
5. Use the formulas for the perimeter and area of a triangle and a rectangle and the formula for the volume of a rectangular prism (box) to solve problems

### Discussion Questions: Geometry

- Are you able to effectively use a standard ruler?
- Can you classify triangles such as scalene, isosceles, and equilateral by their sides?
- Are you able to classify quadrilaterals based on their characteristics?
- Are you able to use a Venn diagram to classify special quadrilaterals?
- Can you classify triangles by their angles, such as acute, obtuse, and right?
- Are you able to identify and classify right, acute, obtuse, and straight angles?
- Do you know the general characteristics that distinguish quadrilaterals as parallelograms, rectangles, squares, rhombuses, and trapezoids?

- Can you use properties of angles?
- Can you identify congruent angles when two parallel lines are crossed by a transversal?
- Are you able to determine the measure of angles formed by intersecting lines (e.g., vertical angles, complementary angles, supplementary angles, and angles formed by two parallel lines intersected by a transversal)?
- Can you identify when two triangles are congruent in order to find the measurement of missing corresponding angles or sides?
- Do you know the characteristics of similar figures?
- Do you know the relationship between sides and areas of similar figures?
- Do you know the triangle inequality property relationship among the sides of a triangle?
- Are you able to find the missing length of a side or the missing angle of an equilateral and an isosceles triangle?
- Are you able to apply properties of circles such as those that involve radius, diameter, sector, and central angle?
- Can you identify the measurements needed to calculate the area of a triangle and use these measurements to calculate the area?
- Do you know how to apply basic formulas to compute the perimeter, area, and volume of geometric shapes, including finding the area of a square when the perimeter is given?
- Can you describe some real-life applications that involve finding perimeter, area, and volume?
- What is the area of a circular region with diameter 8? What is the perimeter of a circle with radius 3? If a circular region with radius 5 is divided into 8 equal sectors, what is the area of each sector?
- Do you know the difference between radius and diameter?
- Are you able to find the radius of a circle, given its circumference?
- If a tangent line to a circle with center  $O$  touches the circle at point  $P$ , do you know that the tangent line is perpendicular to line segment  $OP$ ?
- Do you know the difference between an inscribed angle and a central angle of a circle?
- Can you compute the volume of rectangular solids?
- Are you able to identify and classify characteristics of two-dimensional and three-dimensional geometric shapes?

## Core Academic Skills for Educators: Mathematics (5733)

### Sample Test Questions

#### Information about Questions That Is Specific to the Core Academic Skills for Educators: Mathematics Test

- **General**

- All numbers used are real numbers.
- Rectangular coordinate systems are used unless otherwise stated.
- Figures that accompany questions are intended to provide information that is useful in answering questions.
  - Figures are drawn to scale unless otherwise stated.
  - Lines shown as straight are straight, and angle measures are positive.
  - Positions of points, angles, regions, etc., exist in the order shown.

- **Types of questions that may be on the test**

- Selected-response questions—select one answer choice
  - These are questions that ask you to select only one answer choice from a list of five choices. In the computer-delivered test, these questions are marked with ovals beside the answer choices. See question 1 in the Sample Test Questions.
- Selected-response questions—select one or more answer choices
  - These are questions that ask you to select one or more answer choices from a list of choices. A question may or may not specify the number of choices to select. In the computer-delivered test, these questions are marked with square boxes beside the answer choices, not circles or ovals. See question 15 in the Sample Test Questions.
  - A question of this type will have at least one correct answer choice. For example, if a question of this type has exactly three answer choices, one, two, or three of the choices may be correct.
- Fraction questions
  - These questions ask you to enter your answer as a fraction in two separate boxes—one box for the numerator and one box for the denominator. Enter integers in each of the two boxes. A negative sign can be entered in either box. Equivalent forms of the correct answer, such as  $\frac{1}{2}$  and  $\frac{6}{12}$ , are all correct, though there may be cases in which you need to simplify your fraction so that it fits in the boxes. See question 13 in the Sample Test Questions.

- Numeric-entry questions
  - These questions ask you to enter your answer as an integer or a decimal in a single answer box. Equivalent forms of the correct answer, such as 2.5 and 2.50, are all correct. See question 14 in the Sample Test Questions. Note that in these questions, the exact answer should be entered unless the question asks you to round your answer. Therefore, if one of these questions does not ask you to round your answer, you should be able to enter the exact answer in the numeric-entry box. If you are unable to do so, this may indicate that your answer is incorrect.

**NOTATIONS**

⊥ Perpendicular symbol

⊓ Right angle symbol

∥ Parallel lines symbol

**FORMULAS**

Circle of radius  $r$

Area:  $A = \pi r^2$

Circumference:  $C = 2\pi r$

Rectangle with length  $\ell$  and width  $w$  :

Area:  $A = \ell w$

Triangle with base  $b$  and corresponding height  $h$  :

Area:  $A = \frac{bh}{2}$

Rectangular box with length  $\ell$ , width  $w$ , and height  $h$ :

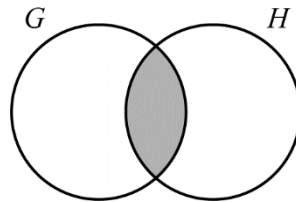
Volume:  $V = \ell wh$



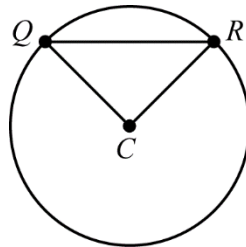
## Sample Questions

The sample questions that follow represent a number of the types of questions and topics that appear on the test. They are not, however, representative of the entire scope of the test in either content or difficulty. Answers with explanations follow the questions.

**Directions:** The test consists of a variety of selected-response questions, where you select one or more answer choices, and questions where you enter a numeric answer in a box.



1. In the Venn diagram shown, circle  $G$  represents the integers 2 to 10, inclusive, and circle  $H$  represents the integers 6 to 12, inclusive. How many integers are represented by the shaded region?
- (A) Two
  - (B) Three
  - (C) Four
  - (D) Five
  - (E) Six



2. In the figure shown,  $C$  is the center of the circle. Which of the following must be true?
- (A)  $QC$  and  $RC$  have the same length.
  - (B)  $QR$  and  $RC$  have the same length.
  - (C)  $QC$  is perpendicular to  $QR$ .
  - (D)  $QR$  is perpendicular to  $RC$ .
  - (E)  $\triangle QRC$  is equilateral.

3. A soft drink company surveyed a random sample of 1,240 people between the ages of 18 and 24 and found that 5 out of 8 of those surveyed liked the company's new soft drink. Based on the results of the survey, if 200,000 people ages 18 to 24 were to try the new drink, which of the following statements would most likely be true?
- (A) Between 90,000 and 100,000 people would like the new drink.
  - (B) Between 100,000 and 110,000 people would like the new drink.
  - (C) Between 110,000 and 120,000 people would like the new drink.
  - (D) Between 120,000 and 130,000 people would like the new drink.
  - (E) Between 130,000 and 140,000 people would like the new drink.

Men	12
Women	18
Boys	10
Girls	8

4. The table shown shows the distribution of men, women, boys, and girls in a group of 48 individuals. If one individual is to be selected at random from the group, what is the probability that the individual selected is a woman?
- (A)  $\frac{1}{2}$
  - (B)  $\frac{3}{8}$
  - (C)  $\frac{1}{4}$
  - (D)  $\frac{2}{15}$
  - (E)  $\frac{1}{18}$

5. When 641.29 is divided by 10, which digit of the resulting number is in the tens place?
- (A) 1
  - (B) 2
  - (C) 4
  - (D) 6
  - (E) 9
6. If  $x \neq 0$  and  $y \neq 0$ , which of the following is equivalent to  $\frac{3}{2x} - \frac{1}{y}$ ?
- (A)  $\frac{1}{xy}$
  - (B)  $\frac{3}{2xy}$
  - (C)  $\frac{3y - 2x}{2xy}$
  - (D)  $\frac{2}{2x - y}$
  - (E)  $\frac{3y - 2x}{2x - y}$
7. The number of absences in Ms. Klein's class for each of the first 3 months of the year was 16, 12, and 17, respectively. If the average (arithmetic mean) number of absences for the first 4 months of the year was 14, how many absences were there in the fourth month?
- (A) 9
  - (B) 10
  - (C) 11
  - (D) 12
  - (E) 13

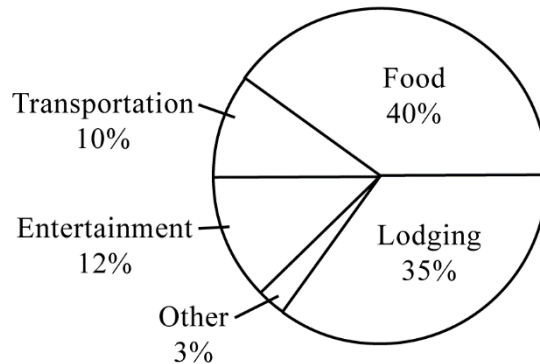
8. At a computer store on Monday last week, the price of a computer was  $x$  dollars. On Tuesday, the price of the computer was reduced by 25% of Monday's price. On Wednesday, the price of the computer was further reduced by 40% of Tuesday's price. Which of the following expressions represents the price, in dollars, of the computer on Wednesday?
- (A)  $(0.35)x$
  - (B)  $(0.4)(0.25)x$
  - (C)  $(0.4)(0.75)x$
  - (D)  $(0.6)(0.25)x$
  - (E)  $(0.6)(0.75)x$
9. If  $4x = 14 + 9y$  and  $y = 2$ , what is the value of  $x$ ?
- (A) 4
  - (B) 5
  - (C) 6
  - (D) 7
  - (E) 8
10. A student claimed, "Whenever you multiply two numbers, the product will always be greater than each of the two numbers you started with." Which of the following pairs of numbers is a counterexample to the student's claim?
- (A) 4 and 5
  - (B) 3 and 4.5
  - (C) 2 and 3.5
  - (D) 1.5 and 2
  - (E) 0.5 and 2

$$-\frac{1}{4}, \dots, \frac{3}{8}$$

11. When placed into the blank spaces shown in increasing order, which of the following pairs of numbers creates a list of numbers that is ordered from least to greatest?

- (A)  $-\frac{1}{2}, 0$
- (B)  $-\frac{1}{8}, \frac{1}{3}$
- (C)  $-\frac{3}{8}, \frac{1}{4}$
- (D)  $0, \frac{1}{2}$
- (E)  $\frac{1}{3}, \frac{2}{5}$

CHANG FAMILY'S VACATION BUDGET



Total vacation budget = \$3,500

12. The circle graph shown shows the distribution of the Chang family's vacation budget over five categories. According to the graph, for how many of the five categories is the dollar amount of the budget category greater than \$1,000?

- (A) One
- (B) Two
- (C) Three
- (D) Four
- (E) Five

**For the following question, enter your answer in the answer boxes.**

13. Helen budgets  $\frac{2}{5}$  of her monthly salary for food, and last month she spent  $\frac{1}{10}$  of her monthly salary on produce. What fraction of her food budget did Helen spend on produce last month?

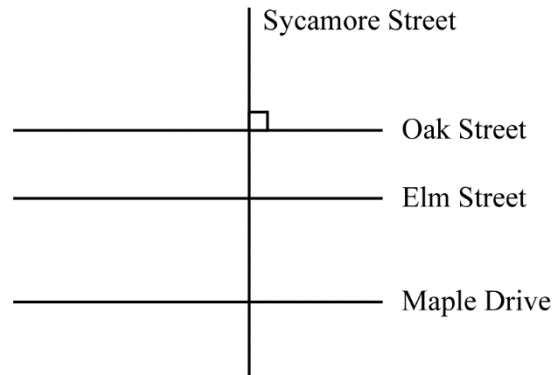
  

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**For the following question, enter your answer in the answer box.**

14. A box of machine parts contains 6 times as many usable parts as defective parts. If there are exactly 882 parts in the box, how many of them are usable?

For the following question, select all the answer choices that apply.



15. In the diagram shown, Oak Street is parallel to Elm Street, Elm Street is parallel to Maple Drive, and Sycamore Street is perpendicular to Oak Street. Which of the following statements must be true?

Indicate all such statements.

- (A) Oak Street is parallel to Maple Drive.
- (B) Elm Street and Sycamore Street form right angles.
- (C) Maple Drive and Sycamore Street form right angles.

## Answers

- Option (D) is correct. In the Venn diagram, the shaded region represents the integers that are in both  $G$  and  $H$ ; i.e., these integers are among the integers 2 through 10 and also among the integers 6 through 12, or 6, 7, 8, 9, and 10, which amount to five integers. The answer, therefore, is choice (D).
- Option (A) is correct. Since  $C$  is the center of the circle,  $QC$  and  $RC$  are both radii of the circle and therefore have the same length. The answer, therefore, is choice (A).
- Option (D) is correct. Of the 200,000 people, the number of people that would like the new drink is approximately  $\frac{5}{8} \times 200,000$ , or 125,000. Since 125,000 is between 120,000 and 130,000, the answer is choice (D).
- Option (B) is correct. In the table provided, there are 48 individuals in the group, 18 of whom are women. The probability that the individual selected is a woman is 18 out of 48, or  $\frac{18}{48} = \frac{3}{8}$ . The answer, therefore, is choice (B).
- Option (D) is correct. When dividing a number expressed as a decimal by 10, the decimal point is moved one place to the left, so 641.29 divided by 10 is 64.129. The tens place is the second place to the left of the decimal point. In the number 64.129, the digit 6 is in the tens place.

6	4	.	1	2	9
Tens	Ones		Tenths	Hundredths	Thousandths

The answer, therefore, is choice (D).



6. Option (C) is correct. Recall that in order to subtract fractions with different denominators, a common denominator must first be determined. For example, consider the following evaluation of  $\frac{3}{5} - \frac{1}{2}$ , where each of the fractions  $\frac{3}{5}$  and  $\frac{1}{2}$  are first expressed as fractions with a common denominator of 10.

$$\begin{aligned}\frac{3}{5} - \frac{1}{2} &= \frac{3}{5} \times \frac{2}{2} - \frac{1}{2} \times \frac{5}{5} \\ &= \frac{6}{10} - \frac{5}{10} \\ &= \frac{6-5}{10} \\ &= \frac{1}{10}\end{aligned}$$

The same is true for rational expressions. To subtract rational expressions, each rational expression must first be expressed with a common denominator. In this case, a common denominator is  $2xy$ . Multiply each rational expression by an expression equal to 1 so that each rational expression will have the same common denominator of  $2xy$  as follows.

$$\begin{aligned}\frac{3}{2x} - \frac{1}{y} &= \frac{3}{2x} \times \frac{y}{y} - \frac{1}{y} \times \frac{2x}{2x} \\ &= \frac{3y}{2xy} - \frac{2x}{2xy} \\ &= \frac{3y-2x}{2xy}\end{aligned}$$

The answer, therefore, is choice (C).

7. Option (C) is correct.

**Solution Strategy 1:**

For the average of a set of data, the sum of the data entries is equal to the product of the average and the number of entries. Since  $\text{Average} = \frac{\text{Sum of data entries}}{\text{Total number of entries}}$ ,

$\text{Sum of data entries} = \text{Average} \times \text{Total number of entries}$ . Since the average of the absences for the first 4 months is 14, the number of absences for the first 4 months is  $14 \times 4 = 56$ . The number of absences in the fourth month is the number of absences in the first 4 months minus the number of absences in the first 3 months, or  $56 - (16 + 12 + 17) = 11$ . The answer, therefore, is choice (C).

**Solution Strategy 2:**

If  $x$  denotes the number of absences in the fourth month, the equation

$\text{Average} = \frac{\text{Sum of data entries}}{\text{Total number of entries}}$  becomes  $14 = \frac{16 + 12 + 17 + x}{4}$ , which is equivalent to

$14 \times 4 = 45 + x$  with solution  $x = 4 \times 14 - 45$  or  $x = 11$ . The answer, therefore, is choice (C).

8. Option (E) is correct. The price on Monday was  $x$  dollars. A reduction of 25% means that the price on Tuesday is 75% of the price on Monday, or  $(0.75)x$  dollars. The price on Tuesday is then reduced by 40%, so the price on Wednesday is 60% of  $(0.75)x$  dollars, or  $(0.6)(0.75)x$  dollars. The answer, therefore, is choice (E).
9. Option (E) is correct. Since  $y = 2$ , substituting the value 2 for  $y$  in the equation  $4x = 14 + 9y$  gives the following equations.

$$4x = 14 + 9 \times 2$$

$$4x = 14 + 18$$

$$4x = 32$$

Dividing both sides of the equation  $4x = 32$  by 4 gives the result  $x = 8$ . The answer, therefore, is choice (E).

10. Option (E) is correct. A counterexample is an example that does not support the claim in the statement. The product of 0.5 and 2 is 1, which is not greater than 2. For all the other pairs of numbers, the product is greater than each of the two numbers in the pair; so, all other pairs of numbers support the claim in the statement and are not counterexamples.
11. Option (B) is correct. The numbers to be placed in the blank spaces must be both greater than  $-\frac{1}{4}$  and less than  $\frac{3}{8}$ . The first pair of numbers listed is  $-\frac{1}{2}$  and 0. Although 0 is both greater than  $-\frac{1}{4}$  and less than  $\frac{3}{8}$ ,  $-\frac{1}{2}$  is less than  $-\frac{1}{4}$ , so this pair is not the correct answer. The second pair of numbers listed is  $-\frac{1}{8}$  and  $\frac{1}{3}$ , both of which are greater than  $-\frac{1}{4}$  and less than  $\frac{3}{8}$ , so this pair is the correct answer. At least one of the numbers in each of the other pairs is either less than  $-\frac{1}{4}$  or greater than  $\frac{3}{8}$ . For example, in the third pair of numbers,  $-\frac{3}{8}$  is less than  $-\frac{1}{4} = -\frac{2}{8}$ ; in the fourth pair of numbers,  $\frac{1}{2} = \frac{4}{8}$  is greater than  $\frac{3}{8}$ ; and in the fifth pair of numbers,  $\frac{2}{5} = \frac{16}{40}$  is greater than  $\frac{3}{8} = \frac{15}{40}$ . The answer, therefore, is choice (B).

12. Option (B) is correct.

**Solution Strategy 1:**

To answer this question, compute the dollar amount for each of the five categories and compare each dollar amount to \$1,000.

$$\text{Dollar amount for food} = \$3,500 \times 40\% = \$1,400$$

$$\text{Dollar amount for lodging} = \$3,500 \times 35\% = \$1,225$$

$$\text{Dollar amount for other} = \$3,500 \times 3\% = \$105$$

$$\text{Dollar amount for entertainment} = \$3,500 \times 12\% = \$420$$

$$\text{Dollar amount for transportation} = \$3,500 \times 10\% = \$350$$

Of the five dollar amounts, only two are greater than \$1,000.

**Solution Strategy 2:**

An alternative solution method is to express \$1,000 as a percent of the total budget and determine how many of the percent values given in the circle graph are greater. That is,

\$1,000 is  $\left(\frac{1,000}{3,500}\right) \times 100\% \approx 28.6\%$  of \$3,500. Of the five percent values in the circle graph,

only two percent values are greater than 28.6%. The answer, therefore, is choice (B).

13. The correct answer is  $\frac{1}{4}$ . The fraction of the food budget that Helen spent on produce is given by  $\frac{\text{budget for produce}}{\text{budget for food}}$ , or equivalently,

$\frac{\text{budget for produce as a fraction of monthly salary}}{\text{budget for food as a fraction of monthly salary}}$ . This fraction is  $\frac{\frac{1}{10}}{\frac{2}{5}}$ , which is

equivalent to  $\frac{1}{10} \div \frac{2}{5} = \frac{1}{10} \times \frac{5}{2} = \frac{1}{4}$ . The answer, therefore, is  $\frac{1}{4}$ .

14. The correct answer is 756.

**Solution Strategy 1:**

Since the box contains 6 times as many usable parts as defective parts, the ratio of usable to defective parts is 6:1. The number of usable parts is  $\frac{6}{7}$  of the total number of parts in the box. Since there are 882 parts in the box, the number of usable parts is  $\frac{6}{7} \times 882$ , or 756. The answer, therefore, is 756.

**Solution Strategy 2:**

Let  $d$  stand for the number of defective parts. The number of usable parts would be  $6d$ , and the total number of parts would be  $d + 6d = 7d$ . Since the total number of parts in the box is 882, we can write the equation  $7d = 882$ , which has the solution  $d = 126$ . The number of usable parts is  $6d = 6(126) = 756$ . The answer, therefore, is 756.

15. Options (A), (B), and (C) are correct.

Choice (A): Since Oak Street is parallel to Elm Street and Elm Street is parallel to Maple Drive, it follows that Oak Street is parallel to Maple Drive.

Choice (B): Since Sycamore Street is perpendicular to Oak Street and Oak Street is parallel to Elm Street, it follows that Sycamore Street is perpendicular to Elm Street, so Elm Street and Sycamore Street form right angles.

Choice (C): Since Sycamore Street is perpendicular to Oak Street and Oak Street is parallel to Maple Drive (as shown in choice (A)), it follows that Sycamore Street is perpendicular to Maple Drive, so Maple Drive and Sycamore Street form right angles.

## Understanding Question Types

The *Praxis*® assessments include a variety of question types: constructed response (for which you write a response of your own); selected response, for which you select one or more answers from a list of choices or make another kind of selection (e.g., by selecting a sentence in a text or by selecting part of a graphic); and numeric entry, for which you enter a numeric value in an answer field. You may be familiar with these question formats from taking other standardized tests. If not, familiarize yourself with them so you don't spend time during the test figuring out how to answer them.

### Understanding Selected-Response and Numeric-Entry Questions

For most questions, you respond by selecting an oval to select a single answer from a list of answer choices.

However, interactive question types may also ask you to respond by:

- Selecting more than one choice from a list of choices.
- Typing in a numeric-entry box. When the answer is a number, you may be asked to enter a numerical answer. Some questions may have more than one entry box to enter a response. Numeric-entry questions typically appear on mathematics-related tests.
- Selecting parts of a graphic. In some questions, you will select your answers by selecting a location (or locations) on a graphic such as a map or chart, as opposed to choosing your answer from a list.
- Selecting sentences. In questions with reading passages, you may be asked to choose your answers by selecting a sentence (or sentences) within the reading passage.
- Dragging and dropping answer choices into targets on the screen. You may be asked to select answers from a list of choices and to drag your answers to the appropriate location in a table, paragraph of text or graphic.
- Selecting answer choices from a drop-down menu. You may be asked to choose answers by selecting choices from a drop-down menu (e.g., to complete a sentence).

Remember that with every question you will get clear instructions.

## Understanding Constructed-Response Questions

Some tests include constructed-response questions, which require you to demonstrate your knowledge in a subject area by writing your own response to topics. Essays and short-answer questions are types of constructed-response questions.

For example, an essay question might present you with a topic and ask you to discuss the extent to which you agree or disagree with the opinion stated. You must support your position with specific reasons and examples from your own experience, observations, or reading.

Review a few sample essay topics:

- *Brown v. Board of Education of Topeka*

“We come then to the question presented: Does segregation of children in public schools solely on the basis of race, even though the physical facilities and other ‘tangible’ factors may be equal, deprive the children of the minority group of equal educational opportunities? We believe that it does.”

  - A. What legal doctrine or principle, established in *Plessy v. Ferguson* (1896), did the Supreme Court reverse when it issued the 1954 ruling quoted above?
  - B. What was the rationale given by the justices for their 1954 ruling?
  
- *In his self-analysis, Mr. Payton says that the better-performing students say small-group work is boring and that they learn more working alone or only with students like themselves. Assume that Mr. Payton wants to continue using cooperative learning groups because he believes they have value for all students.*
  - Describe **TWO** strategies he could use to address the concerns of the students who have complained.
  - Explain how each strategy suggested could provide an opportunity to improve the functioning of cooperative learning groups. Base your response on principles of effective instructional strategies.
  
- *“Minimum-wage jobs are a ticket to nowhere. They are boring and repetitive and teach employees little or nothing of value. Minimum-wage employers take advantage of people because they need a job.”*
  - Discuss the extent to which you agree or disagree with this opinion. Support your views with specific reasons and examples from your own experience, observations, or reading.

Keep these things in mind when you respond to a constructed-response question:

1. **Answer the question accurately.** Analyze what each part of the question is asking you to do. If the question asks you to describe or discuss, you should provide more than just a list.
2. **Answer the question completely.** If a question asks you to do three distinct things in your response, you should cover all three things for the best score. Otherwise, no matter how well you write, you will not be awarded full credit.
3. **Answer the question that is asked.** Do not change the question or challenge the basis of the question. You will receive no credit or a low score if you answer another question or if you state, for example, that there is no possible answer.
4. **Give a thorough and detailed response.** You must demonstrate that you have a thorough understanding of the subject matter. However, your response should be straightforward and not filled with unnecessary information.
5. **Take notes on scratch paper** so that you don't miss any details. Then you'll be sure to have all the information you need to answer the question.
6. **Reread your response.** Check that you have written what you thought you wrote. Be sure not to leave sentences unfinished or omit clarifying information.



## General Assistance For The Test

### *Praxis*® Interactive Practice Test

This full-length *Praxis*® practice test lets you practice answering one set of authentic test questions in an environment that simulates the computer-delivered test.

- Timed just like the real test
- Correct answers with detailed explanations
- Practice test results for each content category

ETS provides a free interactive practice test with each test registration. You can learn more [here](#).

### Doing Your Best

#### Strategy and Success Tips

Effective *Praxis* test preparation doesn't just happen. You'll want to set clear goals and deadlines for yourself along the way. Learn from the experts. Get practical tips to help you navigate your Praxis test and make the best use of your time. Learn more at [Strategy and Tips for Taking a Praxis Test](#).

#### Develop Your Study Plan

Planning your study time is important to help ensure that you review all content areas covered on the test. View a sample plan and learn how to create your own. Learn more at [Develop a Study Plan](#).

### Helpful Links

[Ready to Register](#) – How to register and the information you need to know to do so.

[Disability Accommodations](#) – Testing accommodations are available for test takers who meet ETS requirements.

[PLNE Accommodations \(ESL\)](#) – If English is not your primary language, you may be eligible for extended testing time.

[What To Expect on Test Day](#) – Knowing what to expect on test day can make you feel more at ease.

[Getting Your Scores](#) – Find out where and when you will receive your test scores.

[State Requirements](#) – Learn which tests your state requires you to take.

[Other Praxis Tests](#) – Learn about other *Praxis* tests and how to prepare for them.

To search for the *Praxis* test prep resources  
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