

The Praxis® Study Companion

Core Academic Skills for Educators: Mathematics

5733



Welcome to *The Praxis*® Study Companion

Prepare to Show What You Know

You have been working to acquire the knowledge and skills you need for your teaching career. Now you are ready to demonstrate your abilities by taking a *Praxis*® test.

Using the *Praxis*® Study Companion is a smart way to prepare for the test so you can do your best on test day. This guide can help keep you on track and make the most efficient use of your study time.

The Study Companion contains practical information and helpful tools, including:

- An overview of the *Praxis* tests
- Specific information on the *Praxis* test you are taking
- A template study plan
- Study topics
- Practice questions and explanations of correct answers
- Test-taking tips and strategies
- Frequently asked questions
- Links to more detailed information

So where should you start? Begin by reviewing this guide in its entirety and note those sections that you need to revisit. Then you can create your own personalized study plan and schedule based on your individual needs and how much time you have before test day.

Keep in mind that study habits are individual. There are many different ways to successfully prepare for your test. Some people study better on their own, while others prefer a group dynamic. You may have more energy early in the day, but another test taker may concentrate better in the evening. So use this guide to develop the approach that works best for you.

Your teaching career begins with preparation. Good luck!

Know What to Expect

Which tests should I take?

Each state or agency that uses the *Praxis* tests sets its own requirements for which test or tests you must take for the teaching area you wish to pursue.

Before you register for a test, confirm your state or agency's testing requirements at www.ets.org/praxis/states.

How are the *Praxis* tests given?

Praxis tests are given on computer. Other formats are available for test takers approved for accommodations (see page 37).

What should I expect when taking the test on computer?

When taking the test on computer, you can expect to be asked to provide proper identification at the test center. Once admitted, you will be given the opportunity to learn how the computer interface works (how to answer questions, how to skip questions, how to go back to questions you skipped, etc.) before the testing time begins. Watch the [What to Expect on Test Day](#) video to see what the experience is like.

Where and when are the *Praxis* tests offered?

You can select the test center that is most convenient for you. The *Praxis* tests are administered through an international network of test centers, which includes Prometric® Testing Centers, some universities, and other locations throughout the world.

Testing schedules may differ, so see the *Praxis* web site for more detailed test registration information at www.ets.org/praxis/register.

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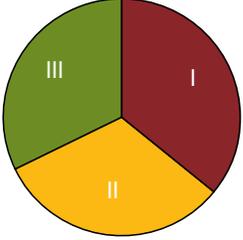
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1. Learn About Your Test

Learn about the specific test you will be taking

Core Academic Skills for Educators: Mathematics (5733)

Test at a Glance			
Test Name	Core Academic Skills for Educators: Mathematics		
Test Code	5733		
Time	90 minutes		
Number of Questions	56		
Format	Selected-response questions—select one answer choice Selected-response questions—select one or more answer choices Numeric entry questions On-screen calculator available		
Test Delivery	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%
*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.			

About This 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 are emphasized. Knowledge of basic U.S. customary and metric systems of measurement is assumed.

Data Interpretation and Representation, Statistics, and Probability assess 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 besides 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.

An on-screen calculator, shown below, is available for this test. The Transfer Display button can be used on numeric entry questions with a single answer box to transfer the calculator display to the answer box.



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

Test Specifications

Test specifications in this chapter describe the knowledge and skills measured by the test. Study topics to help you prepare to answer test questions can be found on page 28.

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

II. Data Interpretation and Representation, Statistics, and Probability

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

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., $x^2 = 49$)

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

2. Familiarize Yourself with Test Questions

Become comfortable with the types of questions you'll find on the Praxis tests

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 clicking on a sentence in a text or by clicking on 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 Computer-Delivered Questions

Questions on computer-delivered tests are interactive in the sense that you answer by selecting an option or entering text on the screen. If you see a format you are not familiar with, read the directions carefully. The directions always give clear instructions on how you are expected to respond.

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

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

- **Clicking more than one oval** to select answers from a list of answer choices.
- **Typing in an entry box.** When the answer is a number, you may be asked to enter a numerical answer. Some questions may have more than one place to enter a response.
- **Clicking check boxes.** You may be asked to click check boxes instead of an oval when more than one choice within a set of answers can be selected.
- **Clicking parts of a graphic.** In some questions, you will select your answers by clicking on a location (or locations) on a graphic such as a map or chart, as opposed to choosing your answer from a list.
- **Clicking on sentences.** In questions with reading passages, you may be asked to choose your answers by clicking on 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 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.

Perhaps the best way to understand computer-delivered questions is to view the [Computer-delivered Testing Demonstration](#) on the Praxis web site to learn how a computer-delivered test works and see examples of some types of questions you may encounter.

Understanding Selected-Response Questions

Many selected-response questions begin with the phrase “which of the following.” Take a look at this example:

Which of the following is a flavor made from beans?

- (A) Strawberry
- (B) Cherry
- (C) Vanilla
- (D) Mint

How would you answer this question?

All of the answer choices are flavors. Your job is to decide which of the flavors is the one made from beans.

Try following these steps to select the correct answer.

- 1) **Limit your answer to the choices given.** You may know that chocolate and coffee are also flavors made from beans, but they are not listed. Rather than thinking of other possible answers, focus only on the choices given (“which of the following”).
- 2) **Eliminate incorrect answers.** You may know that strawberry and cherry flavors are made from fruit and that mint flavor is made from a plant. That leaves vanilla as the only possible answer.
- 3) **Verify your answer.** You can substitute “vanilla” for the phrase “which of the following” and turn the question into this statement: “Vanilla is a flavor made from beans.” This will help you be sure that your answer is correct. If you’re still uncertain, try substituting the other choices to see if they make sense. You may want to use this technique as you answer selected-response questions on the practice tests.

Try a more challenging example

The vanilla bean question is pretty straightforward, but you’ll find that more challenging questions have a similar structure. For example:

Entries in outlines are generally arranged according to which of the following relationships of ideas?

- (A) Literal and inferential
- (B) Concrete and abstract
- (C) Linear and recursive
- (D) Main and subordinate

You’ll notice that this example also contains the phrase “which of the following.” This phrase helps you determine that your answer will be a “relationship of ideas” from the choices provided. You are supposed to find the choice that describes how entries, or ideas, in outlines are related.

Sometimes it helps to put the question in your own words. Here, you could paraphrase the question in this way: “How are outlines usually organized?” Since the ideas in outlines usually appear as main ideas and subordinate ideas, the answer is (D).

QUICK TIP: Don't be intimidated by words you may not understand. It might be easy to be thrown by words like "recursive" or "inferential." Read carefully to understand the question and look for an answer that fits. An outline is something you are probably familiar with and expect to teach to your students. So slow down, and use what you know.

Watch out for selected-response questions containing "NOT," "LEAST," and "EXCEPT"

This type of question asks you to select the choice that does not fit. You must be very careful because it is easy to forget that you are selecting the negative. This question type is used in situations in which there are several good solutions or ways to approach something, but also a clearly wrong way.

How to approach questions about graphs, tables, or reading passages

When answering questions about graphs, tables, or reading passages, provide only the information that the questions ask for. In the case of a map or graph, you might want to read the questions first, and then look at the map or graph. In the case of a long reading passage, you might want to go ahead and read the passage first, noting places you think are important, and then answer the questions. Again, the important thing is to be sure you answer the questions as they refer to the material presented. So read the questions carefully.

How to approach unfamiliar formats

New question formats are developed from time to time to find new ways of assessing knowledge. Tests may include audio and video components, such as a movie clip or animation, instead of a map or reading passage. Other tests may allow you to zoom in on details in a graphic or picture.

Tests may also include interactive questions. These questions take advantage of technology to assess knowledge and skills in ways that standard selected-response questions cannot. If you see a format you are not familiar with, **read the directions carefully**. The directions always give clear instructions on how you are expected to respond.

QUICK TIP: Don't make the questions more difficult than they are. Don't read for hidden meanings or tricks. There are no trick questions on *Praxis* tests. They are intended to be serious, straightforward tests of your knowledge.

Understanding Constructed-Response Questions

Constructed-response questions require you to demonstrate your knowledge in a subject area by creating your own response to particular 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.

Take a look at a few sample essay topics:

- "Celebrities have a tremendous influence on the young, and for that reason, they have a responsibility to act as role models."
- "We are constantly bombarded by advertisements—on television and radio, in newspapers and magazines, on highway signs, and the sides of buses. They have become too pervasive. It's time to put limits on advertising."
- "Advances in computer technology have made the classroom unnecessary, since students and teachers are able to communicate with one another from computer terminals at home or at work."

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) **Reread your response.** Check that you have written what you thought you wrote. Be sure not to leave sentences unfinished or omit clarifying information.

QUICK TIP: You may find that it helps to 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.

3. Practice with Sample Test Questions

Answer practice questions and find explanations for correct answers

Sample Test Questions

This test is available via computer delivery. To illustrate what the computer-delivered test looks like, the following sample question shows an actual screen used in a computer-delivered test. For the purposes of this guide, sample questions are provided as they would appear in a paper-delivered test.

The screenshot shows a computer-delivered test interface. At the top left is the logo for 'The PRAXIS TEST'. In the top center, it says 'Question 1 of 94'. At the top right, there are five buttons: 'Review' (with a magnifying glass icon), 'Mark' (with a square icon), 'Help' (with a question mark icon), 'Back' (with a left arrow icon), and 'Next' (with a right arrow icon). Below these buttons is a 'Show Time' button. The main content area contains a question: 'While planning units for science instruction, a teacher includes weekly quizzes, a project, and end of chapter tests. Which of the following best describes the primary purpose for including such activities while planning instruction?' Below the question are four radio button options: 'To determine students' prior knowledge', 'To monitor students' progress', 'To forecast students' success rate in state tests', and 'To compare student achievement with that of previous classes'. At the bottom of the question area, there is a grey box with the instruction: 'Answer the question above by clicking on the correct response.'

NOTATIONS

\perp Perpendicular symbol

\llcorner Right angle symbol

\parallel Parallel lines symbol

FORMULAS

Circle of radius r

Area: $A = \pi r^2$

Circumference: $C = 2\pi r$

Rectangle with length ℓ and width w :

Area: $A = \ell w$

Triangle with base b and corresponding height h :

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

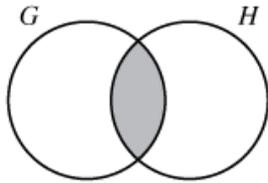
Rectangular box with length ℓ , width w , and height h :

Volume: $V = \ell wh$

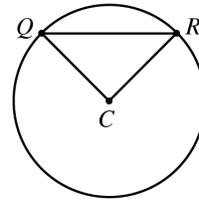
The sample questions that follow illustrate the kinds of questions on the test. They are not, however, representative of the entire scope of the test in either content or difficulty. Answers with explanations follow the questions.

Directions: Questions 1-12 below are followed by five suggested answers or completions. Select the one that is best in each case and then click on the oval to the left of your choice. For innovative question types, click on the box and type in the correct answer (questions 13-14) or click on one or more answers (question 15).

Remember, try to answer every question.



- In the Venn diagram above, 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?
 - Two
 - Three
 - Four
 - Five
 - Six



- In the figure above, C is the center of the circle. Which of the following must be true?
 - QC and RC have the same length.
 - QR and RC have the same length.
 - QC is perpendicular to QR .
 - QR is perpendicular to RC .
 - $\triangle QRC$ is equilateral.
- 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?
 - Between 90,000 and 100,000 people would like the new drink.
 - Between 100,000 and 110,000 people would like the new drink.
 - Between 110,000 and 120,000 people would like the new drink.
 - Between 120,000 and 130,000 people would like the new drink.
 - Between 130,000 and 140,000 people would like the new drink.

Men	12
Women	18
Boys	10
Girls	8

4. The table above 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 numbers of absences in Mrs. Klein's class for each of the first 3 months of the year were 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?

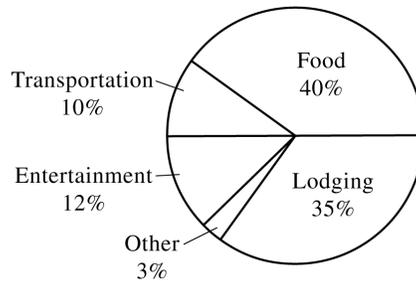
- (A) 4 and 5
- (B) 3 and 4.5
- (C) 2 and 3.5
- (D) 1.5 and 2
- (E) 0.5 and 2

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

11. When placed into the blank spaces above 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 above 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

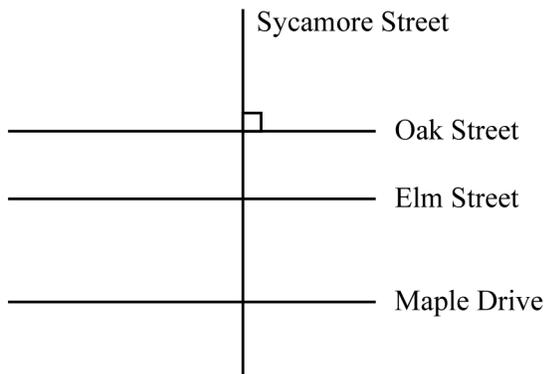
For the following question, enter your answer in the answer boxes.

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 budget for food was spent on produce last month?

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 above, 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 to Sample Questions

- The correct answer is (D). 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).
- The correct answer is (A). 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).
- The correct answer is (D). 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).
- The correct answer is (B). In the table provided, there are 48 individuals in the group, 18 of whom are women. The probability that the individual selected will be a woman is 18 out of 48, or $\frac{18}{48} = \frac{3}{8}$. The answer, therefore, is choice (B).
- The correct answer is (D). 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).

- The correct answer is (C). 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 common denominator 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 $2xy$ 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).

- The correct answer is (C).

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. The correct answer is (E). 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. The correct answer is (E). 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. The correct answer is (E). 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. The correct answer is (B). 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. The correct answer is (B).

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.

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

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

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

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

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

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

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 $\frac{\frac{1}{10}}{\frac{5}{2}}$, which is equivalent to

$\frac{1}{10} \div \frac{5}{2} = \frac{1}{10} \times \frac{2}{5} = \frac{2}{50} = \frac{1}{25}$. The answer, therefore, is $\frac{1}{25}$.

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. The correct answers are (A), (B), and (C).

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.

4. Determine Your Strategy for Success

Set clear goals and deadlines so your test preparation is focused and efficient

Effective *Praxis* test preparation doesn't just happen. You'll want to set clear goals and deadlines for yourself along the way. Otherwise, you may not feel ready and confident on test day.

1) Learn what the test covers.

You may have heard that there are several different versions of the same test. It's true. You may take one version of the test and your friend may take a different version a few months later. Each test has different questions covering the same subject area, but both versions of the test measure the same skills and content knowledge.

You'll find specific information on the test you're taking on page 5, which outlines the content categories that the test measures and what percentage of the test covers each topic. Visit www.ets.org/praxis/testprep for information on other *Praxis* tests.

2) Assess how well you know the content.

Research shows that test takers tend to overestimate their preparedness—this is why some test takers assume they did well and then find out they did not pass.

The *Praxis* tests are demanding enough to require serious review of likely content, and the longer you've been away from the content, the more preparation you will most likely need. If it has been longer than a few months since you've studied your content area, make a concerted effort to prepare.

3) Collect study materials.

Gathering and organizing your materials for review are critical steps in preparing for the *Praxis* tests. Consider the following reference sources as you plan your study:

- Did you take a course in which the content area was covered? If yes, do you still have your books or your notes?
- Does your local library have a high school-level textbook in this area? Does your college library have a good introductory college-level textbook in this area?

Practice materials are available for purchase for many *Praxis* tests at www.ets.org/praxis/testprep. Test preparation materials include sample questions and answers with explanations.

4) Plan and organize your time.

You can begin to plan and organize your time while you are still collecting materials. Allow yourself plenty of review time to avoid cramming new material at the end. Here are a few tips:

- Choose a test date far enough in the future to leave you plenty of preparation time. Test dates can be found at www.ets.org/praxis/register/dates_centers.
- Work backward from that date to figure out how much time you will need for review.
- Set a realistic schedule—and stick to it.

5) Practice explaining the key concepts.

Praxis tests with constructed-response questions assess your ability to explain material effectively. As a teacher, you'll need to be able to explain concepts and processes to students in a clear, understandable way. What are the major concepts you will be required to teach? Can you explain them in your own words accurately, completely, and clearly? Practice explaining these concepts to test your ability to effectively explain what you know.

6) Understand how questions will be scored.

Scoring information can be found on page 40.

7) Develop a study plan.

A study plan provides a road map to prepare for the *Praxis* tests. It can help you understand what skills and knowledge are covered on the test and where to focus your attention. Use the study plan template on page 26 to organize your efforts.

And most important—get started!

Would a Study Group Work for You?

Using this guide as part of a study group

People who have a lot of studying to do sometimes find it helpful to form a study group with others who are working toward the same goal. Study groups give members opportunities to ask questions and get detailed answers. In a group, some members usually have a better understanding of certain topics, while others in the group may be better at other topics. As members take turns explaining concepts to one another, everyone builds self-confidence.

If the group encounters a question that none of the members can answer well, the group can go to a teacher or other expert and get answers efficiently. Because study groups schedule regular meetings, members study in a more disciplined fashion. They also gain emotional support. The group should be large enough so that multiple people can contribute different kinds of knowledge, but small enough so that it stays focused. Often, three to six members is a good size.

Here are some ways to use this guide as part of a study group:

- **Plan the group's study program.** Parts of the study plan template, beginning on page 26, can help to structure your group's study program. By filling out the first five columns and sharing the worksheets, everyone will learn more about your group's mix of abilities and about the resources, such as textbooks, that members can share with the group. In the sixth column ("Dates I will study the content"), you can create an overall schedule for your group's study program.
- **Plan individual group sessions.** At the end of each session, the group should decide what specific topics will be covered at the next meeting and who will present each topic. Use the topic headings and subheadings in the Test at a Glance table on page 5 to select topics, and then select practice questions, beginning on page 12.
- **Prepare your presentation for the group.** When it's your turn to present, prepare something that is more than a lecture. Write two or three original questions to pose to the group. Practicing writing actual questions can help you better understand the topics covered on the test as well as the types of questions you will encounter on the test. It will also give other members of the group extra practice at answering questions.

- **Take a practice test together.** The idea of a practice test is to simulate an actual administration of the test, so scheduling a test session with the group will add to the realism and may also help boost everyone's confidence. Remember, complete the practice test using only the time that will be allotted for that test on your administration day.
- **Learn from the results of the practice test.** Review the results of the practice test, including the number of questions answered correctly in each content category. For tests that contain constructed-response questions, look at the Sample Test Questions section, which also contain sample responses to those questions and shows how they were scored. Then try to follow the same guidelines that the test scorers use.
- **Be as critical as you can.** You're not doing your study partner(s) any favors by letting them get away with an answer that does not cover all parts of the question adequately.
- **Be specific.** Write comments that are as detailed as the comments about the sample responses. Indicate where and how your study partner(s) are doing an inadequate job of answering the question. Writing notes in the margins of the answer sheet may also help.
- **Be supportive.** Include comments that point out what your study partner(s) got right.

Then plan one or more study sessions based on aspects of the questions on which group members performed poorly. For example, each group member might be responsible for rewriting one paragraph of a response in which someone else did an inadequate job.

Whether you decide to study alone or with a group, remember that the best way to prepare is to have an organized plan. The plan should set goals based on specific topics and skills that you need to learn, and it should commit you to a realistic set of deadlines for meeting those goals. Then you need to discipline yourself to stick with your plan and accomplish your goals on schedule.

5. Develop Your Study Plan

Develop a personalized study plan and schedule

Planning your study time is important because it will help ensure that you review all content areas covered on the test. Use the sample study plan below as a guide. It shows a plan for the *Core Academic Skills for Educators: Reading* test. Following that is a study plan template that you can fill out to create your own plan. Use the "Learn about Your Test" and "Test Specifications" information beginning on page 5 to help complete it.

Use this worksheet to:

- 1. Define Content Areas:** List the most important content areas for your test as defined in chapter 1.
- 2. Determine Strengths and Weaknesses:** Identify your strengths and weaknesses in each content area.
- 3. Identify Resources:** Identify the books, courses, and other resources you plan to use for each content area.
- 4. Study:** Create and commit to a schedule that provides for regular study periods.

Praxis Test Name (Test Code): Core Academic Skills for Educators: Reading (5713)

Test Date: 9/15/18

Content covered	Description of content	How well do I know the content? (scale 1–5)	What resources do I have/need for the content?	Where can I find the resources I need?	Dates I will study the content	Date completed
Key Ideas and Details						
Close reading	Draw inferences and implications from the directly stated content of a reading selection	3	Middle school English textbook	College library, middle school teacher	7/15/18	7/15/18
Determining ideas	Identify summaries or paraphrases of the main idea or primary purpose of a reading selection	3	Middle school English textbook	College library, middle school teacher	7/17/18	7/17/18
Determining ideas	Identify summaries or paraphrases of the supporting ideas and specific details in a reading selection	3	Middle and high school English textbook	College library, middle and high school teachers	7/20/18	7/21/18
Craft, Structure, and Language Skills						
Interpreting tone	Determine the author's attitude toward material discussed in a reading selection	4	Middle and high school English textbook	College library, middle and high school teachers	7/25/18	7/26/18
Analysis of structure	Identify key transition words and phrases in a reading selection and how they are used	3	Middle and high school English textbook, dictionary	College library, middle and high school teachers	7/25/18	7/27/18
Analysis of structure	Identify how a reading selection is organized in terms of cause/effect, compare/contrast, problem/solution, etc.	5	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/1/18	8/1/18
Author's purpose	Determine the role that an idea, reference, or piece of information plays in an author's discussion or argument	5	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/1/18	8/1/18

(continued on next page)

Content covered	Description of content	How well do I know the content? (scale 1–5)	What resources do I have/need for the content?	Where can I find the resources I need?	Dates I will study the content	Date completed
Language in different contexts	Determine whether information presented in a reading selection is presented as fact or opinion	4	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/1/18	8/1/18
Contextual meaning	Identify the meanings of words as they are used in the context of a reading selection	2	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/1/18	8/1/18
Figurative language	Understand figurative language and nuances in word meanings	2	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/8/18	8/8/18
Vocabulary range	Understand a range of words and phrases sufficient for reading at the college and career readiness level	2	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/15/18	8/17/18
Integration of Knowledge and Ideas						
Diverse media and formats	Analyze content presented in diverse media and formats, including visually and quantitatively, as well as in words	2	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/22/18	8/24/18
Evaluation of arguments	Identify the relationship among ideas presented in a reading selection	4	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/24/18	8/24/18
Evaluation of arguments	Determine whether evidence strengthens, weakens, or is relevant to the arguments in a reading selection	3	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/27/18	8/27/18
Evaluation of arguments	Determine the logical assumptions upon which an argument or conclusion is based	5	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/28/18	8/30/18
Evaluation of arguments	Draw conclusions from material presented in a reading selection	5	High school textbook, college course notes	College library, course notes, high school teacher, college professor	8/30/18	8/31/18
Comparison of texts	Recognize or predict ideas or situations that are extensions of or similar to what has been presented in a reading selection	4	High school textbook, college course notes	College library, course notes, high school teacher, college professor	9/3/18	9/4/18
Comparison of texts	Apply ideas presented in a reading selection to other situations	2	High school textbook, college course notes	College library, course notes, high school teacher, college professor	9/5/18	9/6/18

6. Review Study Topics

Review the content that the test covers

Using the Study Topics That Follow

The test is designed to measure the knowledge and skills that are necessary for a beginning teacher to have.

This chapter is intended to help you organize your preparation for the test and to give you a clear indication of the depth and breadth of the knowledge required for success on the test.

Virtually all accredited teacher preparation programs address the topics covered by the test; however, you are not expected to be an expert on all aspects of the topics that follow.

You are likely to find that the topics below are covered by most introductory textbooks. Consult materials and resources, including lecture and laboratory notes, from all your course work. You should be able to match up specific topics and subtopics with what you have covered in your courses.

Try not to be overwhelmed by the volume and scope of content knowledge in this guide. Although a specific term may not seem familiar as you see it here, you might find that you can understand it when applied to a real-life situation. Many of the items on the actual test will provide you with a context for these topics or terms.

Discussion Areas

Interspersed throughout the study topics are discussion areas, presented as open-ended questions or statements. These discussion areas are intended to help test your knowledge of fundamental concepts and your ability to apply those concepts to situations in the classroom or the real world. Most of the areas require you to combine several pieces of knowledge to formulate an integrated understanding and response. If you spend time on these areas, you will gain increased understanding and facility with the subject matter covered on the test. You may want to discuss these areas and your answers with a teacher or mentor.

Note that this study companion *does not provide answers for the discussion area questions*, but thinking about the answers to them will help improve your understanding of fundamental concepts and will probably help you answer a broad range of questions on the test.

Study Topics

An overview of the areas covered on the test, along with their subareas, follows.

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 areas: 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 represents $\frac{4}{7}$ 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

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

Discussion areas: 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 areas: 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 areas: 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?

7. Review Smart Tips for Success

Follow test-taking tips developed by experts

Learn from the experts. Take advantage of the following answers to questions you may have and practical tips to help you navigate the *Praxis* test and make the best use of your time.

Should I guess?

Yes. Your score is based on the number of questions you answer correctly, with no penalty or subtraction for an incorrect answer. When you don't know the answer to a question, try to eliminate any obviously wrong answers and then guess at the correct one. Try to pace yourself so that you have enough time to carefully consider every question.

Can I answer the questions in any order?

You can answer the questions in order or skip questions and come back to them later. If you skip a question, you can also mark it so that you can remember to return and answer it later. Remember that questions left unanswered are treated the same as questions answered incorrectly, so it is to your advantage to answer every question.

Are there trick questions on the test?

No. There are no hidden meanings or trick questions. All of the questions on the test ask about subject matter knowledge in a straightforward manner.

Are there answer patterns on the test?

No. You might have heard this myth: the answers on tests follow patterns. Another myth is that there will never be more than two questions in a row with the correct answer in the same position among the choices. Neither myth is true. Select the answer you think is correct based on your knowledge of the subject.

Can I write on the scratch paper I am given?

Yes. You can work out problems on the scratch paper, make notes to yourself, or write anything at all. Your scratch paper will be destroyed after you are finished with it, so use it in any way that is helpful to you. But make sure to select or enter your answers on the computer.

Smart Tips for Taking the Test

1. **Skip the questions you find extremely difficult.** Rather than trying to answer these on your first pass through the test, you may want to leave them blank and mark them so that you can return to them later. Pay attention to the time as you answer the rest of the questions on the test, and try to finish with 10 or 15 minutes remaining so that you can go back over the questions you left blank. Even if you don't know the answer the second time you read the questions, see if you can narrow down the possible answers, and then guess. Your score is based on the number of right answers, so it is to your advantage to answer every question.

2. **Keep track of the time.** The on-screen clock will tell you how much time you have left. You will probably have plenty of time to answer all of the questions, but if you find yourself becoming bogged down, you might decide to move on and come back to any unanswered questions later.
3. **Read all of the possible answers before selecting one.** For questions that require you to select more than one answer, or to make another kind of selection, consider the most likely answers given what the question is asking. Then reread the question to be sure the answer(s) you have given really answer the question. Remember, a question that contains a phrase such as “Which of the following does NOT . . .” is asking for the one answer that is NOT a correct statement or conclusion.
4. **Check your answers.** If you have extra time left over at the end of the test, look over each question and make sure that you have answered it as you intended. Many test takers make careless mistakes that they could have corrected if they had checked their answers.
5. **Don’t worry about your score when you are taking the test.** No one is expected to answer all of the questions correctly. Your score on this test is not analogous to your score on the *GRE*[®] or other tests. It doesn’t matter on the *Praxis* tests whether you score very high or barely pass. If you meet the minimum passing scores for your state and you meet the state’s other requirements for obtaining a teaching license, you will receive a license. In other words, what matters is meeting the minimum passing score. You can find passing scores for all states that use the *Praxis* tests at <https://www.ets.org/praxis/institutions/scores/passing/> or on the web site of the state for which you are seeking certification/licensure.
6. **Use your energy to take the test, not to get frustrated by it.** Getting frustrated only increases stress and decreases the likelihood that you will do your best. Highly qualified educators and test development professionals, all with backgrounds in teaching, worked diligently to make the test a fair and valid measure of your knowledge and skills. Your state painstakingly reviewed the test before adopting it as a licensure requirement. The best thing to do is concentrate on answering the questions.

8. Check on Testing Accommodations

See if you qualify for accommodations to take the Praxis test

What if English is not my primary language?

Praxis tests are given only in English. If your primary language is not English (PLNE), you may be eligible for extended testing time. For more details, visit https://www.ets.org/praxis/register/plne_accommodations/.

What if I have a disability or other health-related need?

The following accommodations are available for *Praxis* test takers who meet the Americans with Disabilities Act (ADA) Amendments Act disability requirements:

- Extended testing time
- Additional rest breaks
- Separate testing room
- Writer/recorder of answers
- Test reader
- Sign language interpreter for spoken directions only
- Perkins Braille
- Braille slate and stylus
- Printed copy of spoken directions
- Oral interpreter
- Audio test
- Braille test
- Large print test book
- Large print answer sheet
- Listening section omitted

For more information on these accommodations, visit www.ets.org/praxis/register/disabilities.

Note: Test takers who have health-related needs requiring them to bring equipment, beverages, or snacks into the testing room or to take extra or extended breaks must request these accommodations by following the procedures described in the *Bulletin Supplement for Test Takers with Disabilities or Health-Related Needs* (PDF), which can be found at https://www.ets.org/s/praxis/pdf/bulletin_supplement_test_takers_with_disabilities_health_needs.pdf.

You can find additional information on available resources for test takers with disabilities or health-related needs at www.ets.org/disabilities.

9. Do Your Best on Test Day

Get ready for test day so you will be calm and confident

You followed your study plan. You prepared for the test. Now it's time to prepare for test day.

Plan to end your review a day or two before the actual test date so you avoid cramming. Take a dry run to the test center so you're sure of the route, traffic conditions, and parking. Most of all, you want to eliminate any unexpected factors that could distract you from your ultimate goal—passing the *Praxis* test!

On the day of the test, you should:

- be well rested
- wear comfortable clothes and dress in layers
- eat before you take the test
- bring an acceptable and valid photo identification with you
- bring an approved calculator only if one is specifically permitted for the test you are taking (see Calculator Use, at http://www.ets.org/praxis/test_day/policies/calculators)
- be prepared to stand in line to check in or to wait while other test takers check in

You can't control the testing situation, but you can control yourself. Stay calm. The supervisors are well trained and make every effort to provide uniform testing conditions, but don't let it bother you if the test doesn't start exactly on time. You will have the allotted amount of time once it does start.

You can think of preparing for this test as training for an athletic event. Once you've trained, prepared, and rested, give it everything you've got.

What items am I restricted from bringing into the test center?

You cannot bring into the test center personal items such as:

- handbags, knapsacks, or briefcases
- water bottles or canned or bottled beverages
- study materials, books, or notes
- pens, pencils, scrap paper, or calculators, unless specifically permitted for the test you are taking (see Calculator Use, at http://www.ets.org/praxis/test_day/policies/calculators)
- any electronic, photographic, recording, or listening devices

Personal items are not allowed in the testing room and will not be available to you during the test or during breaks. You may also be asked to empty your pockets. At some centers, you will be assigned a space to store your belongings, such as handbags and study materials. Some centers do not have secure storage space available, so please plan accordingly.

Test centers assume no responsibility for your personal items.

If you have health-related needs requiring you to bring equipment, beverages or snacks into the testing room or to take extra or extended breaks, you need to request accommodations in advance. Procedures for requesting accommodations are described in the [Bulletin Supplement for Test Takers with Disabilities or Health-related Needs \(PDF\)](#).

Note: All cell phones, smart phones (e.g., Android® devices, iPhones®, etc.), and other electronic, photographic, recording, or listening devices are strictly prohibited from the test center. If you are seen with such a device, you will be dismissed from the test, your test scores will be canceled, and you will forfeit your test fees. If you are seen *using* such a device, the device will be confiscated and inspected. For more information on what you can bring to the test center, visit www.ets.org/praxis/test_day/bring.

Are You Ready?

Complete this checklist to determine whether you are ready to take your test.

- Do you know the testing requirements for the license or certification you are seeking in the state(s) where you plan to teach?
- Have you followed all of the test registration procedures?
- Do you know the topics that will be covered in each test you plan to take?
- Have you reviewed any textbooks, class notes, and course readings that relate to the topics covered?
- Do you know how long the test will take and the number of questions it contains?
- Have you considered how you will pace your work?
- Are you familiar with the types of questions for your test?
- Are you familiar with the recommended test-taking strategies?
- Have you practiced by working through the practice questions in this study companion or in a study guide or practice test?
- If constructed-response questions are part of your test, do you understand the scoring criteria for these questions?
- If you are repeating a *Praxis* test, have you analyzed your previous score report to determine areas where additional study and test preparation could be useful?

If you answered “yes” to the questions above, your preparation has paid off. Now take the *Praxis* test, do your best, pass it—and begin your teaching career!

10. Understand Your Scores

Understand how tests are scored and how to interpret your test scores

Of course, passing the *Praxis* test is important to you so you need to understand what your scores mean and what your state requirements are.

What are the score requirements for my state?

States, institutions, and associations that require the tests set their own passing scores. Visit www.ets.org/praxis/states for the most up-to-date information.

If I move to another state, will my new state accept my scores?

The *Praxis* tests are part of a national testing program, meaning that they are required in many states for licensure. The advantage of a national program is that if you move to another state that also requires *Praxis* tests, you can transfer your scores. Each state has specific test requirements and passing scores, which you can find at www.ets.org/praxis/states.

How do I know whether I passed the test?

Your score report will include information on passing scores for the states you identified as recipients of your test results. If you test in a state with automatic score reporting, you will also receive passing score information for that state.

A list of states and their passing scores for each test are available online at www.ets.org/praxis/states.

What your *Praxis* scores mean

You received your score report. Now what does it mean? It's important to interpret your score report correctly and to know what to do if you have questions about your scores.

Visit http://www.ets.org/s/praxis/pdf/sample_score_report.pdf to see a sample score report.

To access *Understanding Your Praxis Scores*, a document that provides additional information on how to read your score report, visit www.ets.org/praxis/scores/understand.

Put your scores in perspective

Your score report indicates:

- Your score and whether you passed
- The range of possible scores
- The raw points available in each content category
- The range of the middle 50 percent of scores on the test

If you have taken the same *Praxis* test or other *Praxis* tests in the last 10 years, your score report also lists the highest score you earned on each test taken.

Content category scores and score interpretation

Questions on the *Praxis* tests are categorized by content. To help you in future study or in preparing to retake the test, your score report shows how many raw points you earned in each content category. Compare your “raw points earned” with the maximum points you could have earned (“raw points available”). The greater the difference, the greater the opportunity to improve your score by further study.

Score scale changes

ETS updates *Praxis* tests on a regular basis to ensure they accurately measure the knowledge and skills that are required for licensure. When tests are updated, the meaning of the score scale may change, so requirements may vary between the new and previous versions. All scores for previous, discontinued tests are valid and reportable for 10 years, provided that your state or licensing agency still accepts them.

These resources may also help you interpret your scores:

- *Understanding Your Praxis Scores* (PDF), found at www.ets.org/praxis/scores/understand
- *Praxis Passing Scores*, found at <https://www.ets.org/praxis/institutions/scores/passing/>
- State requirements, found at www.ets.org/praxis/states

Appendix: Other Questions You May Have

Here is some supplemental information that can give you a better understanding of the *Praxis* tests.

What do the *Praxis* tests measure?

The *Praxis* tests measure the specific knowledge and skills that beginning teachers need. The tests do not measure an individual's disposition toward teaching or potential for success, nor do they measure your actual teaching ability. The assessments are designed to be comprehensive and inclusive but are limited to what can be covered in a finite number of questions and question types. Teaching requires many complex skills that are typically measured in other ways, including classroom observation, video recordings, and portfolios.

Ranging from Agriculture to World Languages, there are more than 80 *Praxis* tests, which contain selected-response questions or constructed-response questions, or a combination of both.

Who takes the tests and why?

Some colleges and universities use the *Praxis* Core Academic Skills for Educators tests (Reading, Writing, and Mathematics) to evaluate individuals for entry into teacher education programs. The assessments are generally taken early in your college career. Many states also require Core Academic Skills test scores as part of their teacher licensing process.

Individuals entering the teaching profession take the *Praxis* content and pedagogy tests as part of the teacher licensing and certification process required by many states. In addition, some professional associations and organizations require the *Praxis* Subject Assessments for professional licensing.

Do all states require these tests?

The *Praxis* tests are currently required for teacher licensure in approximately 40 states and United States territories. These tests are also used by several professional licensing agencies and by several hundred colleges and universities. Teacher candidates can test in one state and submit their scores in any other state that requires *Praxis* testing for licensure. You can find details at www.ets.org/praxis/states.

What is licensure/certification?

Licensure in any area—medicine, law, architecture, accounting, cosmetology—is an assurance to the public that the person holding the license possesses sufficient knowledge and skills to perform important occupational activities safely and effectively. In the case of teacher licensing, a license tells the public that the individual has met predefined competency standards for beginning teaching practice.

Because a license makes such a serious claim about its holder, licensure tests are usually quite demanding. In some fields, licensure tests have more than one part and last for more than one day. Candidates for licensure in all fields plan intensive study as part of their professional preparation. Some join study groups, others study alone. But preparing to take a licensure test is, in all cases, a professional activity. Because a licensure exam surveys a broad body of knowledge, preparing for a licensure exam takes planning, discipline, and sustained effort.

Why does my state require the *Praxis* tests?

Your state chose the *Praxis* tests because they assess the breadth and depth of content—called the “domain”—that your state wants its teachers to possess before they begin to teach. The level of content knowledge, reflected in the passing score, is based on recommendations of panels of teachers and teacher educators in

each subject area. The state licensing agency and, in some states, the state legislature ratify the passing scores that have been recommended by panels of teachers.

How were the tests developed?

ETS consulted with practicing teachers and teacher educators around the country during every step of the *Praxis* test development process. First, ETS asked them what knowledge and skills a beginning teacher needs to be effective. Their responses were then ranked in order of importance and reviewed by hundreds of teachers.

After the results were analyzed and consensus was reached, guidelines, or specifications, for the selected-response and constructed-response tests were developed by teachers and teacher educators. Following these guidelines, teachers and professional test developers created test questions that met content requirements and [*ETS Standards for Quality and Fairness*](#).*

When your state adopted the research-based *Praxis* tests, local panels of teachers and teacher educators evaluated each question for its relevance to beginning teachers in your state. During this “validity study,” the panel also provided a passing-score recommendation based on how many of the test questions a beginning teacher in your state would be able to answer correctly. Your state’s licensing agency determined the final passing-score requirement.

ETS follows well-established industry procedures and standards designed to ensure that the tests measure what they are intended to measure. When you pass the *Praxis* tests your state requires, you are proving that you have the knowledge and skills you need to begin your teaching career.

How are the tests updated to ensure the content remains current?

Praxis tests are reviewed regularly. During the first phase of review, ETS conducts an analysis of relevant state and association standards and of the current test content. State licensure titles and the results of relevant job analyses are also considered. Revised test questions are then produced following the standard test development methodology. National advisory committees may also be convened to review and revise existing test specifications and to evaluate test forms for alignment with the specifications.

How long will it take to receive my scores?

Scores for tests that do not include constructed-response questions are available on screen immediately after the test. Scores for tests that contain constructed-response questions or essays aren’t available immediately after the test because of the scoring process involved. Official score reports are available to you and your designated score recipients approximately two to three weeks after the test date for tests delivered continuously, or two to three weeks after the testing window closes for other tests. See the test dates and deadlines calendar at www.ets.org/praxis/register/dates_centers for exact score reporting dates.

Can I access my scores on the web?

All test takers can access their test scores via My *Praxis* Account free of charge for one year from the posting date. This online access replaces the mailing of a paper score report.

The process is easy—simply log into My *Praxis* Account at www.ets.org/praxis and click on your score report. If you do not already have a *Praxis* account, you must create one to view your scores.

Note: You must create a *Praxis* account to access your scores, even if you registered by mail or phone.

*[*ETS Standards for Quality and Fairness*](#) (2014, Princeton, N.J.) are consistent with the [*Standards for Educational and Psychological Testing*](#), industry standards issued jointly by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education (2014, Washington, D.C.).

Your teaching career is worth preparing for, so start today!
Let the Praxis® Study Companion guide you.

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that meet your specific needs, visit:

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