



Praxis® Elementary Education: Multiple Subjects (5001) Ultimate Guide

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Preparing to take the Praxis® Elementary Education: Multiple Subjects (5001) exam?

Awesome!

We will answer every question you have and tell you exactly what you need to study to pass the Multiple Subjects exam.

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Quick Facts

Overview:

This exam tests individuals in reading, language arts, mathematics, social studies, and science. The purpose of the test is to determine the content knowledge of an entry-level elementary teacher. The Praxis Elementary Education 5001 exam is designed to support a state license in elementary education.

Format:

The Multiple Subjects exam is a computer-based test that includes four subtests made up of selected-response and numeric entry questions.

Subtest	# of Questions	# of Minutes
Reading and Language Arts	80	90
Mathematics	50	65
Social Studies	60	60
Science	55	60

Cost:

\$180

Scoring:

The score range for each subtest is 100-200. Each state has its own passing rate for each subtest, so be sure to look up your state's passing rate. Most states require a score of between 146 and 159 to pass.

You can find your state's passing score for each subtest here: <https://www.ets.org/praxis/institutions/scores/passing/>.

Quick Facts

Study time:

Start by taking a practice test and see what content knowledge you are weak in. Once you have narrowed down what content knowledge you need to brush up on, begin to set aside time each day to study that content. Continue to assess your knowledge by practicing sample questions and figuring out what areas you still need to study more. Be sure to start preparing for your exam early enough to allow for adequate time to study all the material and dive into the content.

Tips that test-takers wish they'd known:

- Familiarize yourself with the online scientific calculator.
- Make sure you understand how to skip a question and return back to it.
- Pay close attention to “except,” “not,” and “least” in questions.
- Eliminate incorrect answers.
- Don't be discouraged by words you do not know. Slow down, read carefully, and find an answer that fits.
- Don't overthink questions. They are not meant to be tricky. They are written to be straightforward.
- Practice with sample test questions.

Information obtained from the ETS website: <https://www.ets.org/s/praxis/pdf/5001.pdf>.

Subtest 1:

Reading and Language Arts

Overview

You will have 90 minutes to answer about 80 questions on the Reading and Language Arts subtest. This subtest is broken down into two categories:

1. Reading (38 questions / 47% of subtest)
2. Writing, Speaking and Listening (42 questions / 53% of subtest)

Let's explore a few concepts that are likely to appear on this subtest.

Phonemic Awareness

Phonemic awareness is one aspect of phonological awareness. They both involve the understanding that letters and sounds have relationships in words, but phonemic awareness focuses on the sounds of phonemes. Phonemes are the smallest unit of sound.

Examples of phonemic awareness skills:

- **Phoneme isolation** is looking at each individual sound separately and identifying the position of that sound in the word. Let's take the word "rod." Each individual phoneme has a sound and a position. The /r/ is in the initial position, /o/ is in the medial position, and /d/ is in the final position.
- **Phoneme recognition/phoneme identification** is recognizing the same sound or phoneme in different words. For example, take the words "sit," "cup," and "sad." The words "sit" and "sad" both have the /s/ phoneme in the initial position.
- **Phonemic categorization** is identifying which word does not belong in a group because of a different phoneme or sound. If you were to give a student the words "play," "plus," and "stop," they would identify the word "stop" as not belonging because it does not have the same pl-sound.
- **Phoneme segmentation** is breaking a word down to its individual phonemes. For example, the word "sat" would be broken down to its three phonemes: /s/, /a/, and /t/.
- **Phoneme blending** is blending the sounds of a word together to make the word. For example, when you blend together these sounds: /b/ /a/ /t/, you make the word "bat."

- **Phoneme manipulation** is when you start with a word and delete a phoneme (deletion), add a phoneme (addition), or change a phoneme (substitution) to create a new word. A great way to model this with students is to use a word ladder. You can start out with the word “mat” and have students delete the initial phoneme /m/ to make the word “at.” You then can have students add the phoneme /p/ to make the word “pat.” Lastly, you can practice manipulating phonemes with substitution by changing the /p/ phoneme to an /s/ phoneme to make the word “sat.”

A Three-Part Model for Measuring Text Complexity

Text complexity is the level of difficulty of a text. The three contributing factors of determining the difficulty of a text are qualitative measures, quantitative measures, and reader and task considerations.

So, what is the difference between qualitative and quantitative measures? Qualitative measures focus on the structure, style, grammar, conventions, and knowledge demands, while quantitative measures focus on concrete features you can count. For example, word count, syllables, sentence length, and frequency of word use would be quantitative measures. The last contributing factor in determining text complexity is reader and task considerations. These are aspects of reading a text that relate to the reader or the reader’s purpose in reading the text. These considerations are determined and measured by teachers based on their professional judgement, knowledge of their students, and knowledge of the subject. All of these factors are equally important when determining text complexity.

Common Types of Writing

Texts are generally categorized as persuasive, informative, or narrative.

- Persuasive texts present and support an argument or opinion.
 - This includes editorials, speeches, and advertisements.
- Informative text present information based on facts, avoiding opinion. This category is often also referenced as explanatory or expository texts.
 - This includes news articles and history textbooks.
- Narrative texts tell a story and can be either fiction or nonfiction.
 - This includes novels, short stories, biographies, and narrative poetry.

This is not a comprehensive list, as there are some forms of writing that do not fit well into these three categories. For example, most poetry and reflective writing would fall into a category of “descriptive” writing, and often rely on vivid descriptions and sensory language to communicate imagery and ideas.

The Types of Sentences

- Simple sentences contain a subject and a verb and finish a complete thought.
Johnny picks up an apple.
- Compound sentences contain two independent clauses that contain a subject and a verb. Each clause could stand alone as a complete sentence, and they are joined by a conjunction or a semicolon.
Johnny picks up an apple, and he hands it to his teacher.
independent clause independent clause
- Complex sentences contain one independent and one dependent clause connected by a subordinating conjunction.
Johnny picks up an apple for his teacher when he sees her.
independent clause dependent clause
- Compound-complex sentences have two independent clauses that each express a complete thought, joined by a dependent clause that cannot stand on its own.
Johnny picks up an apple, and he hands it to his teacher when he sees her.
independent clause independent clause dependent clause

Active Listening

Active listening is when a person is intentionally using techniques to make the speaker comfortable and fully understand what they are saying. Some techniques include:

- Paraphrasing what the speaker is saying to make sure you understand and they feel understood.
- Giving validation to the speaker but not verbally expressing more than short answers or comments such as “thank you,” “yes,” “I understand,” or “absolutely.”
- Using nonverbal cues such as nodding your head, close proximity, and eye contact.

Allusion

Allusion is when an author refers to a well-known person or event and the reader is supposed to make the connection from their own knowledge. For example, an author might say “He was as compassionate as Scrooge.” The author is creating sarcasm by referencing Charles Dickens’ cold-hearted character Ebenezer Scrooge. The allusion assumes that the reader already knows what Scrooge’s character traits are.

And that’s just some very basic information about the Reading and Language Arts subtest.

Now, let’s look at a few practice questions.

Subtest 1 Practice Questions

Question 1

Which of the following contains a root that means “to look”?

- A. inspect
- B. describe
- C. advocate
- D. conduct

Correct Answer: A. “Inspect” contains the root “spect,” which means “to look.”

Question 2

Johnny is a new student in Ms. Clark’s class. She notices that he is struggling to complete his assignments. After assessing his oral language skills, she places Johnny in the beginning level of language proficiency. Which activity could she ask Johnny to complete and expect him to do with success?

- A. follow three-step directions
- B. draw a picture to answer questions
- C. use technical language while speaking
- D. write sentences with varying grammatical complexity

Correct Answer: B. A student who is beginning to develop language skills will be more successful at communicating ideas through images, not words.

Question 3

Which is an accurate statement about effective reading instruction?

- A. Students who do not ask for individualized reading instruction should not be provided individualized reading instruction.
- B. It is best to assess students’ reading comprehension through formal assessments.
- C. Reading comprehension is increased when reading fluency is increased.
- D. Reading should be taught to students by addressing each concept separately.

Correct Answer: C. This is a correct correlation.

Question 4

Marsha wrote a sentence. After speaking to her teacher, she revised it.

Original Sentence: Over the hill, after the sunset, Johnny went to Grandma's house.

Revised Sentence: After the sunset, Johnny went over the hill to Grandma's house.

What aspect of the revised sentence was improved?

- A. word choice
- B. sentence fluency
- C. writing conventions
- D. the revised sentence is not an improvement

Correct Answer: B. Sentence fluency is the rhythm and flow of a sentence. The fluency of the sentence was changed so that it was easier to understand.

Question 5

Which part of speech is the underlined word an example of?

Bull sharks swim in both fresh and saltwater.

- A. noun
- B. verb
- C. adjective
- D. preposition

Correct Answer: B. Verbs are actions. In this sentence, "swim" is the verb.

Question 6

Once the class has chosen an initial research topic, they are asked to refine the topic to make their research more narrowly focused. If a student has chosen the topic of whales, which of the following does not narrow the focus?

- A. ocean mammals
- B. pollution's impact on the blue whale
- C. orcas in captivity
- D. narwhals and their tusks

Correct Answer: A. Whales are not the only ocean mammals, so this would be expanding the focus of the research, not narrowing it.

Question 7

Which of the following sentences best implies active listening has occurred?

- A. "I liked the movie because of all the famous actors and action sequences."
- B. "How could you not like the movie?"
- C. "John thinks the movie overlooked the plot in favor of extended action sequences."
- D. "I will write on my blog that the movie was entertaining."

Correct Answer: C. This answer best implies active listening has occurred. Active listening is a process of being engaged and responding to another person in a way to build and improve communication. Active listeners spend more time listening than speaking. Paraphrasing someone else's thoughts implies active listening because it demonstrates an understanding of another person's communication.

Question 8

Which of the following skills is not part of phonological awareness?

- A. letter awareness
- B. sound awareness
- C. syllable awareness
- D. rhyme awareness

Correct Answer: A. An understanding of the names and shapes of letters does not fall under the umbrella of phonological awareness. Phonological awareness is specifically focused on sounds.

Question 9

Students in Ms. Davidson's class have just finished reading some of the Greek mythology relating to Hercules. Her next lesson includes watching clips of the Disney movie version. Which activity below would best help her students fully understand the similarities and differences in the storytelling techniques of the two versions?

- A. filling out a Venn diagram to chart what is the same and different in the versions
- B. assigning a group project in which groups focus on individual sections of the film and mythology
- C. asking guided questions during the viewing of the film
- D. generating a list of what was different between the film and text as a whole group

Correct Answer: B. Assigning an activity where students can focus on a small section will allow for deeper examination and understanding of the similarities and differences.

Correct Answer: C. While allowing students to meet other people at the school is a goal of the activity, it is unlikely the primary goal. There are many activities which can better allow students to meet other teachers, principals, and students in the school. It is also unlikely that an instructional activity's primary goal is to enhance the students' social understanding of the school. Ms. Garcia is not actively engaging in professional development. There is no mention of a variety of genres in the question prompt.

Question 10

Read the following passage to answer the question:

(1) Earth's largest desert is actually a very frigid place covered with ice: Antarctica. In order for an area to be considered a desert, it must receive very little rainfall. More specifically, it must receive an (3) average of less than 10 inches of precipitation—which can be rain, sleet, hail, or snow—on the ground every year. Antarctica, the coldest place on earth, has an average temperature that usually falls (5) below the freezing point. And because cold air holds less moisture than warm air, the air in Antarctica does not hold much moisture at all. This is evident in the low precipitation statistics recorded for (7) Antarctica. For example, the central part of Antarctica receives an average of less than two inches of snow every year. However, the coastline of Antarctica receives a little bit more—between seven and (9) eight inches per year. Because Antarctica gets so little precipitation every year, it is considered a desert.

What misconception does the author most likely think his readers have?

- A. Deserts must be hot.
- B. Antarctica is cold.
- C. Antarctica doesn't get much snow.
- D. Deserts are found across the globe.

Correct Answer: A. Since the author opens with “ ... desert is actually a very frigid place,” it can be inferred that he is addressing readers who think deserts are defined by their temperature.

Subtest 2:

Mathematics

Overview

You will have 65 minutes to answer about 50 questions on the Mathematics subtest. An on-screen calculator is provided. This subtest is broken down into three categories:

1. Numbers and Operations (20 questions / 40% of subtest)
2. Algebraic Thinking (15 questions / 30% of subtest)
3. Geometry and Measurement, Data, Statistics, and Probability (15 questions / 30% of subtest)

Let's explore a few concepts that are likely to appear on this subtest.

Properties

Three of the properties used in math operations are the distributive, commutative, and associative properties.

The commutative property allows the order of the factors to change without changing the answer. Addition and multiplication are commutative; however, subtraction and division are not.

Example 1: $2 \times 4 = 8$ and $4 \times 2 = 8$

Example 2: $5 + 4 = 9$ and $4 + 5 = 9$

The associative property allows for the grouping of factors to change while producing the same answer. Once again, the associative property applies to multiplication and addition, but not subtraction or division.

Example 1: $(3 \times 4) \times 2 = 24$ and $3 \times (4 \times 2) = 24$

Example 2: $(7 + 3) + 4 = 14$ and $7 + (3 + 4) = 14$

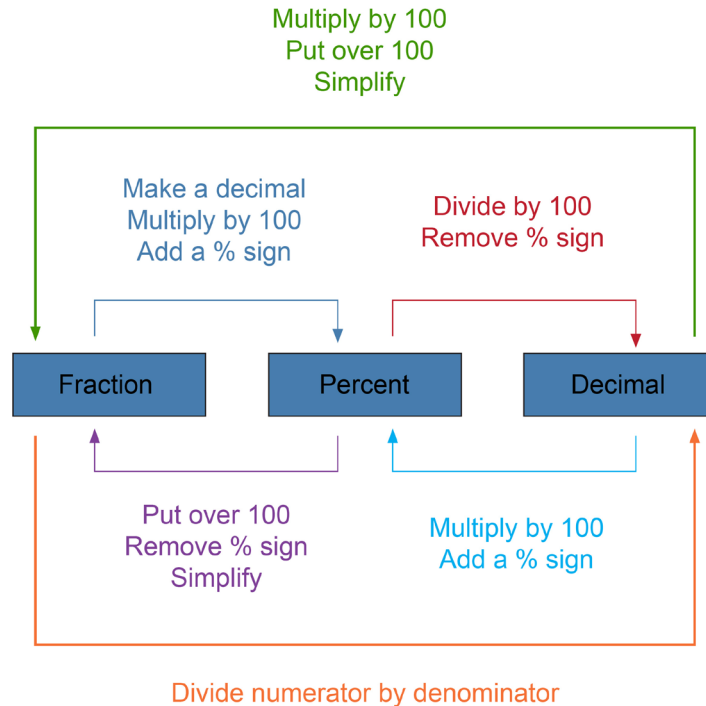
The distributive property allows for the option to multiply a factor by a sum (or difference) by multiplying the factor with each term of that sum (or difference) separately, and then finding the sum (or difference) afterward.

Example 1: $3(40 + 8) = (3 \times 40) + (3 \times 8) = 144$

Example 2: $4(2 + 3) = (4 \times 2) + (4 \times 3) = 20$

Fractions, Decimals, and Percentages: Conversions

Fractions, decimals, and percentages can all be converted from one form to another. Use the diagram below to help you decide the steps to take for each conversion.



Fraction to Percentage

Example 1: Change $\frac{3}{5}$ to a percentage.

Step 1: Write $\frac{3}{5}$ as a decimal by using division: $3 \div 5 = 0.6$

Step 2: Multiply the decimal by 100: $0.6 \times 100 = 60$. Remember that when multiplying a decimal by 100, the decimal point moves 2 places to the right.

Step 3: Add the % symbol.

So $\frac{3}{5} = 60\%$

Percentage to Fraction

Example 2: Change 42% to a fraction.

Step 1: Write the percentage as a fraction using the percentage as the numerator and 100 as the denominator: $42\% = \frac{42}{100}$.

Step 2: Simplify the fraction: $\frac{42}{100} = \frac{21}{50}$.

Percentage to Decimal

Example 3: Write 36% as a decimal.

Step 1: Remove the % sign and divide by 100: $36\% = \frac{36}{100}$

Step 2: Write as a decimal. Recall that dividing by 100 moves the decimal point two places to the left: $\frac{36}{100} = 0.36$

Decimal to Percentage

Example 4: Write 0.97 as a percentage.

Step 1: Multiply the decimal by 100. Recall this will move the decimal point two places to the right: $0.97 \times 100 = 97$

Step 2: Add the % sign: $0.97 = 97\%$

Fraction to Decimal

Example 5: Write $\frac{1}{20}$ as a decimal.

Step 1: Divide the numerator by the denominator: $1 \div 20 = 0.5$

Decimal to Fraction

Example 6: Write 0.84 as a fraction.

Step 1: Multiply 0.84 by 100: $0.84 \times 100 = 84$

Step 2: Use this number as the numerator and 100 as the denominator: $\frac{84}{100}$

Step 3: Simplify the fraction: $\frac{84}{100} = \frac{21}{25}$

Equivalence of Expressions: Use of Parentheses = Distribute

Equivalent expressions can be found by using the distributive property. A value outside of the parentheses should be applied to all pieces of the expression inside the parenthesis and order of operations still applies. Look at the three examples below.

Example 1

$$\begin{aligned} & 2(3x + 1) \\ & 2(3x) + 2(1) \\ & 6x + 2 \end{aligned}$$

Example 2

$$\begin{aligned} & -4(2x - 5) + 3x \\ & -4(2x) - 4(-5) + 3x \\ & (-8x) + 20 + 3x \\ & -5x + 20 \end{aligned}$$

Example 3

$$\begin{aligned} & 2 - 3(4x + 1) \\ & 2 - 3(4x) + -3(1) \\ & (2) - 12x - 3 \\ & -12x - 1 \end{aligned}$$

In example 1, there is a “2” outside of the parenthesis. This 2 is distributed to both the 3x and the positive 1. The values are then multiplied so that $2(3x) = 6x$ and $2(1) = 2$.

In example 2, the -4 is distributed to the expression $(2x - 5)$. This results in $-8x + 20$. This is then added to the 3x and like terms are combined. The result is $-5x + 20$.

In example 3, note that there is a -3 in front of the set of parenthesis. The sign in front of the 3 is also distributed. When -3 is multiplied through the parenthesis, the result is $-12x - 3$. This is now combined with the 2 in the front of the expression. The resulting expression is $-12x - 1$.

Solving for x in Linear Equations

To solve linear equations of one variable, follow the following steps to solve for x:

Step 1: Simplify, by distributing and combining like terms, if necessary.

Step 2: Use inverse operations to isolate the variable.

Step 3: Check the solution in the original equation.

Example: Solve $2(x - 5) + 3 = 21$ for x.

Equation	$2(x - 5) + 3 = 21$
Apply the distributive property.	$2x - 10 + 3 = 21$
Combine like terms.	$2x - 7 = 21$
Isolate the variable by using inverse operations. Add 7 to both sides.	$2x - 7 = 21$ $+7 = +7$ $2x = 28$
Isolate the variable by using inverse operations. Divide both sides by 2.	$\frac{2x}{2} = \frac{28}{2}$ $x = 14$
Check the solution in the original equation.	$2(x - 5) + 3 = 21$ $2(14 - 5) + 3 = 21$ $2(9) + 3 = 21$ $18 + 3 = 21$ $21 = 21$
Solution	$x = 14$

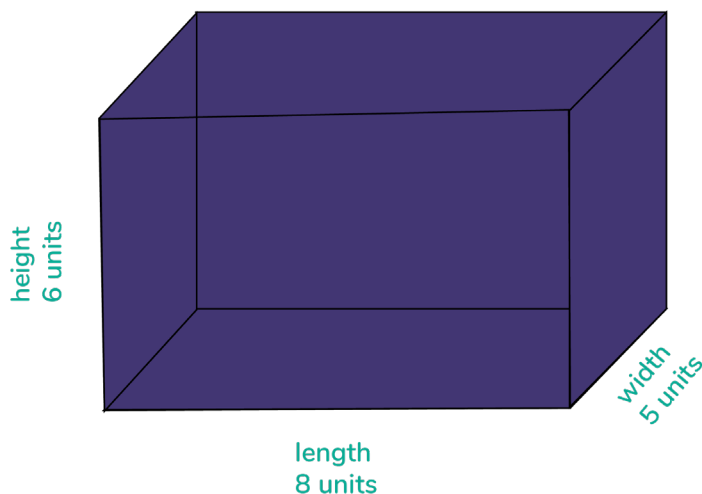
Volume and Surface Area of Right Rectangular Prisms

To find the volume and surface area of right rectangular prisms use the correct formulas.

$$\text{Volume: } V = lwh$$

$$\text{Surface area: } SA = 2(l \cdot w) + 2(w \cdot h) + 2(l \cdot h)$$

Example: Find the volume and surface area of the rectangular prism below



$$V = l \times w \times h \\ = B \times h$$

First, identify the length, width, and height. For this prism:

$$l = 8, w = 5, h = 6$$

Next, find the volume by substituting known values into the formula:

$$V = lwh = 8 \cdot 5 \cdot 6 = 240u^3$$

Find the surface area by substituting known values into the formula:

$$SA = 2(l \cdot w) + 2(w \cdot h) + 2(l \cdot h) = 2(8 \cdot 5) + 2(5 \cdot 6) + 2(8 \cdot 6)$$

$$SA = 2(40) + 2(30) + 2(48) = 80 + 60 + 96 = 236 u^2$$

The units in surface area are squared, while volume units are cubed.

Measures of Central Tendency

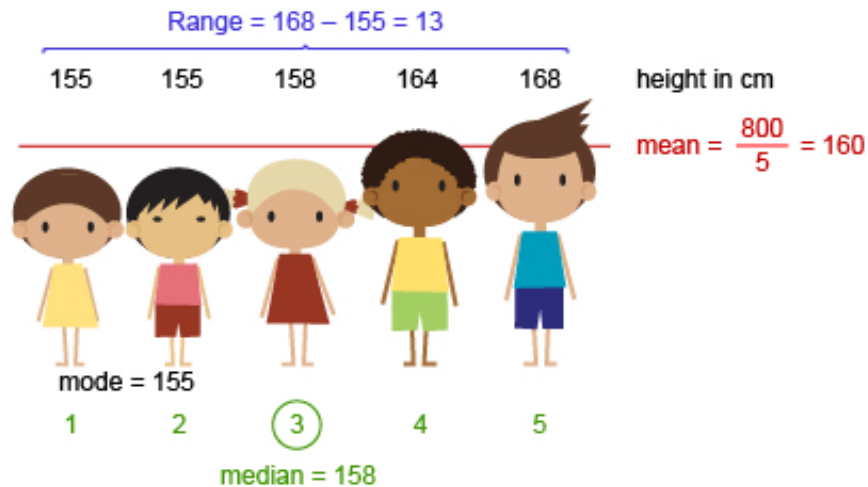
The measures of central tendency are mean, median, mode, and range.

The *mean* is the average of the data points and is found by adding the values of all of the data points then dividing by the number of data points.

The *median* is the middle value of the data when the data points are listed in numerical order. If there is an even number of data points, the median is the mean of the two points in the middle.

The *mode* is the value that occurs the most often in the data set.

The *range* of the data is the difference between the highest and lowest data points.



Example: In Maryland, the high temperatures for the first 12 days in May were recorded in degrees Fahrenheit as shown:

50, 73, 81, 63, 74, 70, 63, 67, 68, 71, 73, 63

Find the mean, median, mode and range of the data.

Mean: the average of the values.

$$\frac{\text{sum of all values}}{\text{number of values in the set}} = \frac{50 + 73 + 81 + 63 + 74 + 70 + 63 + 67 + 68 + 71 + 73 + 63}{12} = 68^{\circ}\text{F}$$

Median: the number at the center of the data, when it is listed in numerical order.

Order the values from least to greatest:

50, 63, 63, 63, 67, 68, 70, 71, 73, 73, 74, 81

Since there are 12 data values, to find the median, take the two values in the middle

and find their mean: $\frac{68 + 70}{2} = 69$.

Median: 69°F

Mode: the number that occurs the most often in the set. In this case the mode is 63, which occurs 3 times in the data set.

Mode: 63°F

Range: the difference between the highest and lowest values in the set.

Range: $81 - 50 = 31$

And that's just some very basic information about the Mathematics subtest.

Now, let's look at a few practice questions.

Subtest 2 Practice Questions

Question 1

What value does "3" represent in the number 17,436,825?

- A. 30,000
- B. 300,000
- C. 3,000
- D. 300

Correct Answer: A. In a base 10 system, each place location for a number has a value that is a power of 10. Specifically, the ones place is properly understood to be 10^0 (because any nonzero number raised to the zero power equals 1). The tens place is 10^1 , the hundreds place is 10^2 , the thousands place is 10^3 , etc. When a digit is in a specific position, it represents a value equal to the product of that digit and the power of 10 that is assigned to its position.

Therefore, in the number 17,436,825, the 3 represents 3×10^4 , or 30,000.

Question 2

Put the following fractions in order from least to greatest:

$$\frac{1}{2}, \frac{3}{4}, \frac{5}{7}, \frac{3}{16}$$

- A. $\frac{1}{2}, \frac{3}{4}, \frac{3}{16}, \frac{5}{7}$
- B. $\frac{1}{2}, \frac{3}{16}, \frac{3}{4}, \frac{5}{7}$
- C. $\frac{3}{16}, \frac{1}{2}, \frac{5}{7}, \frac{3}{4}$
- D. $\frac{3}{16}, \frac{5}{7}, \frac{1}{2}, \frac{3}{4}$

Correct Answer: C. The easiest way to order these is to convert them to decimals and round to the hundredths place:

$$\frac{1}{2} = 0.5$$

$$\frac{3}{4} = 0.75$$

$$\frac{5}{7} = 0.71$$

$$\frac{3}{16} = 0.19$$

Then order the decimals and pair with their fraction equivalents.

Question 3

What is the prime factorization of 36?

- A. 2×3
- B. $(2^2) \times (3^2)$
- C. $(2^3) \times (3^2)$
- D. $(2^2) \times (3^3)$

Correct Answer: B. The prime factors of a number are the prime numbers that divide the integer exactly. The prime numbers then can be multiplied together to equal that number. The prime factors of 36 are $(2^2)(3^2)$. For 36, the factor tree would be: $36 = 4 \times 9 = (2^2) \times (3^2)$.

Question 4

Simplify the expression: $30 - 2 \times 50 + 70$

- A. 0
- B. 1470
- C. -210
- D. -70

Correct Answer: A. To simplify the equation, follow the order of operations: Parentheses, Exponents, Multiplication, Division, Addition, Subtraction (PEMDAS) and work left to right. The steps to simplify the expression would be:

$$\begin{aligned} &= 30 - 2 \times 50 + 70 \\ &= 30 - 100 + 70 \\ &= -70 + 70 \\ &= 0 \end{aligned}$$

Question 5

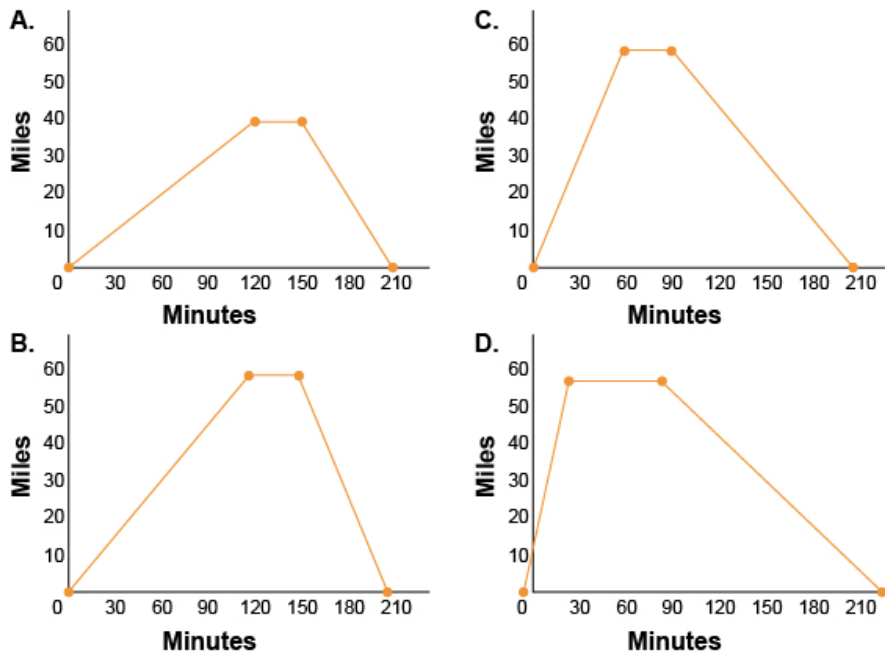
The Booster Club at Martin MS is selling spirit buttons for homecoming. The buttons cost \$0.75 to make and will be sold for \$2 each. Which equation correctly shows how many buttons, b , must be sold to make a profit of \$500?

- A. $\$500 = \$2b + \$0.75b$
- B. $\$500 + \$2b = \$0.75b$
- C. $\$500 = \$2b - \$0.75b$
- D. $\$500 - \$0.75b = \$2b$

Correct Answer: C. The profit is equal to the selling price minus whatever costs are applicable. So, if the profit is to be \$500, then enough buttons must be sold to reach that profit. If we are selling the buttons for \$2 each, but it costs \$0.75 to make each one, then there is a profit of $\$2 - .75$ or $\$1.25$ on each button. How many buttons will they have to sell to reach \$500 profit? $\$500 = \$1.25b$. $\$500 = \$2b - 0.75b = 1.25b$, so the Booster Club will have to sell 400 buttons.

Question 6

The Chen family loves to go to new places. They drove on the highway at an average speed of 60 miles per hour to try out a new restaurant. They had lunch there for about a half hour, and decided to take the scenic route home, driving on smaller roads and averaging 30 miles per hour for the return trip. If the restaurant is about 60 miles from their home, which graph best models the Chen family's journey?



Correct Answer: C. If the Chens travel at 60 miles per hour while on the highway en route to the restaurant 60 miles away, then they will reach the restaurant in 1 hour, which is expressed as 60 minutes on this graph.

During the half hour (30 minutes) that they spend eating lunch at the restaurant, their distance from home will remain constant. Accordingly, the correct graph shows a horizontal segment at 60 miles from home for 30 minutes, and so extending until the 90-minute mark.

Finally, on their way home, the Chens travel at a rate of 30 miles per hour. At that rate, the 60 mile return trip will take 2 hours, or 120 minutes, from the 90-minute mark. Therefore, their arrival home occurs at $90 + 120 = 210$ minutes.

Upon their arrival home, the Chens are 0 miles from home, and so the graph shows a point at (210, 0), representing the 3.5 hours that the Chens spent on their excursion. None of the other graphs correctly illustrate this journey.

Question 7

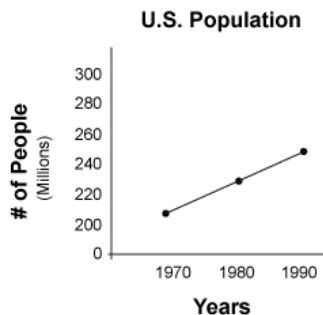
Two angles are complementary. If the measure of one of the angles is 68° , what is the measure of the other angle?

- A. 22° because the sum of the measures of complementary angles is 90° .
- B. 112° because the sum of the measures of complementary angles is 180° .
- C. 68° because complementary angles are congruent to each other.
- D. 292° because the sum of the measures of complementary angles is 360° .

Correct Answer: A. Complementary angles are two angles whose sum is 90 degrees. So, if one angle is 68 degrees, its complement would be $90 - 68 = 22$ degrees.

Question 8

The graph shows the approximate population of the United States beginning in 1970.



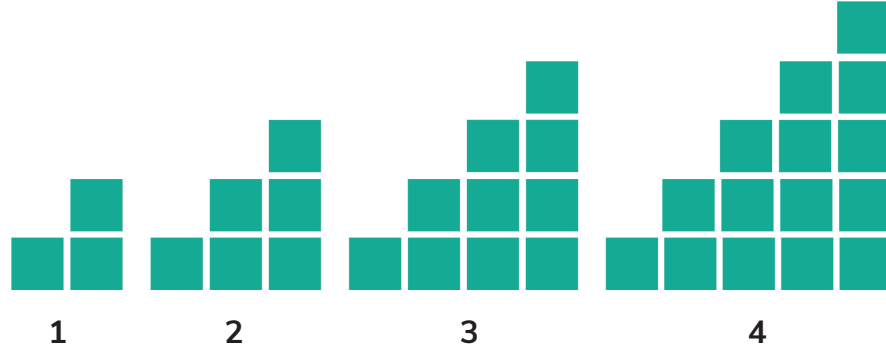
Assuming the population trend continued in the same manner, what would be a reasonable estimation for what the population of the United States was in 2010?

- A. 290 million people
- B. 270 million people
- C. 260 million people
- D. 250 million people

Correct Answer: A. If population trends continue, the population will increase by 20 million people every 10 years. 290 million people is correct.

Question 9

The graph shows the approximate population of the United States beginning in 1970.



- A. 21
- B. 28
- C. 36
- D. 45

Correct Answer: C. The first model is made with three blocks, 1 in column 1, and 2 in column 2; the second term is made of 1 block in column 1, 2 blocks in column 2, and 3 blocks in column 3. So, term #1 = 1 + 2 blocks; term #2 = 1 + 2 + 3 blocks; term #3 = 1 + 2 + 3 + 4 blocks. Each term, n , is the sum of the numbers from 1 to $(n + 1)$; the sum of the consecutive integers from 1 to $(n + 1)$.

So, the 7th term would be: $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8$, or 36 blocks. This is a small enough number that you could actually sketch the model and count the blocks.

Question 10

Which of the following has the least value?

- 0.518
- 0.5108
- 0.0518
- 0.5018

Correct Answer: C. This has the least value of the set. The tenths place has a 0 while the other numerals have a 5 in the tenths place.

Subtest 3:

Social Studies

Overview

You will have 60 minutes to answer about 60 questions on the Social Studies subtest. This subtest is broken down into three categories:

1. United States History, Government and Citizenship (27 questions / 45% of subtest)
2. Geography, Anthropology and Sociology (18 questions / 30% of subtest)
3. World History and Economics (15 questions / 25% of subtest)

Let's explore a few concepts that are likely to appear on this subtest.

Key Names in the Revolution and Early America

- King George III was the King of Great Britain during the American Revolution. He did not want America to gain independence.
- Thomas Paine was an author who wrote *Common Sense*, which influenced the leaders of the American Revolution to seek freedom from Great Britain.
- George Washington led the Continental Army to victory over Great Britain in the Revolutionary War and was the first president of the United States of America.
- Thomas Jefferson was a delegate to the Continental Congress that declared independence from Great Britain and was the author of the Declaration of Independence. He was also the third president of the United States of America.
- Benjamin Franklin was a statesman who helped write the Declaration of Independence and who signed the Treaty of Paris, which ended the Revolutionary War.
- John Adams was the second president of the United States. During the Revolutionary War he was a diplomat who went to Holland and France to negotiate the Treaty of Paris to formally end the war.
- Alexander Hamilton was an officer in the Revolutionary War and America's first Secretary of the Treasury.

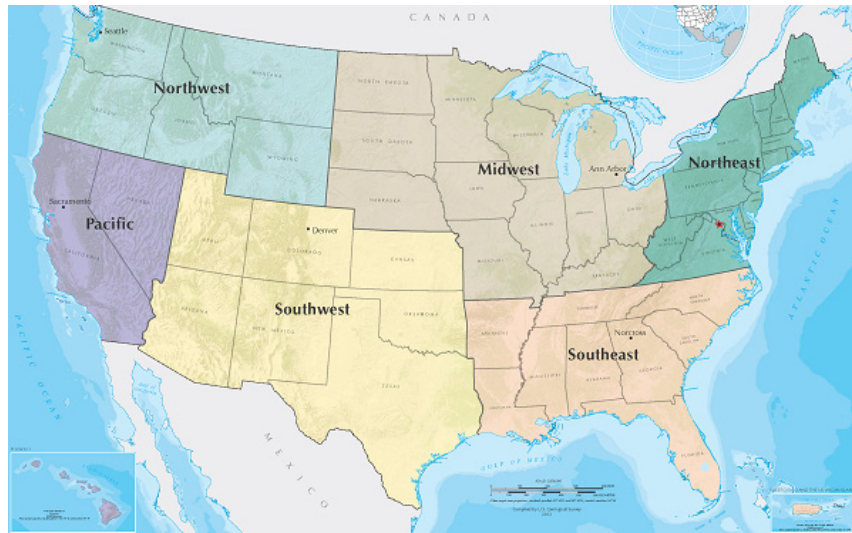
The Great Depression

The Great Depression officially began with the crash of the stock market in 1929, but was exacerbated by a number of other factors, including bank failures. People were worried their money wasn't safe and began withdrawing it all from banks. Soon, enough banks couldn't continue with their business and loans weren't given (loans that would have been spent on expenditures and put money back into the economy). People stopped spending money, which led to business closures and loss of jobs. Unemployment numbers rose. There was also the drought that came to the Mississippi Valley, which led to farmers not having the money to pay their landlords and losing their farms. Low prices for agricultural products meant that other farmers went bankrupt. Another factor was the Smoot-Hawley tariff, which upset other countries, causing them to retaliate with trade barriers of their own. The New Deal was implemented under President Franklin D. Roosevelt because of the Great Depression. It created new federal agencies and programs that regulated banks and helped get people back to work.

Common Forms of Government

- A representative democracy or democratic republic is a system in which citizens vote and elect representatives to make decisions on their behalf.
 - Pros: Most adult citizens have a chance to participate and it limits power.
 - Cons: Representatives might be persuaded one way or another.
- A monarchy, totalitarian or autocratic system of government is ruled by one ruler or monarch.
 - Pros: The transfer of power is generally smooth.
 - Cons: The people do not have a voice in government.
- An oligarchy is a government run by a small group of people.
 - Pros: The people in power are often experts and oligarchies are typically efficient.
 - Cons: By definition it restricts political power to only a few certain people.
- Direct democracy means that every citizen has a direct vote in government matters and policy.
 - Pros: Decisions reflect the will of the people.
 - Cons: Putting every issue to a popular vote is very time-consuming.
- Communism is a system in which property is collectively owned by the people and distributed according to need.
 - Pros: Decisions can often be made quickly because there are no elections or representatives.
 - Cons: Prices are set by the government, not by supply and demand.
- Socialism is a system in which the government is in charge of essential goods and services, which are paid for by taxes.
 - Pros: Socialist governments often provide free health care and education.
 - Cons: Taxes are often higher than in capitalist countries.

Major Regions of the United States



There are six major regions of the 48 contiguous states that make up the bulk of the US. Each region has specific characteristics and encompasses multiple states. Shown above is a depiction of the six regions. Some sources split the regions up differently or only have five regions.

- The **Northwest region** is full of many mountains and hills, as well as the coastal regions of those states that border the Pacific Ocean.
- The **Pacific region** also borders the Pacific Ocean, is hilly, and contains coastal mountain ranges.
- The **Southwest region** includes a broad range of landforms, from deserts to mountains to plateaus to plains.
- The **Midwest region** is mostly flat with many forests. This region includes the Great Lakes and has cold winters.
- The **Northeast region** includes mountain ranges, valleys, and hills. It also includes our country's capital.
- The **Southeast region** ranges from hills and valleys to swamps and wetlands.

The Earth's Climates

The Sun plays a huge role in the three primary climate zones, as does their proximity to water. The three climate zones are divided into ten more specific climates based on their proximity to water.

Moving from lowest latitude (nearest the equator) to highest latitude (nearest the poles), they are as follows:

- **Tropical rainforests** are hot, wet climates with many species of wildlife and vegetation. These climates do not have a dry season.
- **Savannas** are grassy plains with minimal trees. They are warm climates.
- **Deserts** are dry climates with minimal rainfall.
- **Mediterranean climates** have hot, dry summers and cool, wet winters.

- **Humid subtropical climates** have hot, humid summers and mild winters.
- **Marine climates** have cool summers and winters.
- **Humid continental climates** have four distinct seasons.
- **Steppes climates** are a lot like desert climates except for the fact they have a rainy season.
- **Taiga climates** have long, harsh winters with short growing seasons.
- **Tundra climates** are dry and cold almost all of the year with temperatures well below freezing. There is a permanent layer of ice called permafrost under the ground.

Major Contributions of Ancient Egypt

The Ancient Egyptians were advanced in many ways. The following are the most notable contributions from Ancient Egypt:

- Hieroglyphics (written language) and paper
- The Egyptian calendar (which divided the year into 12 months and 365 days)
- Advancements in mathematics
- Irrigation systems
- The Library of Alexandria

Types of Economic Resources

Economic resources can be broadly divided into three categories:

- **Human-** the labor force required to produce a good or service.
- **Capital-** an asset that allows you to produce a good; it can be physical (machinery) or intangible (knowledge and expertise).
- **Natural-** an asset from the natural environment that allows you to produce a good (i.e. oil, natural gas, stone).

And that's just some very basic information about the Social Studies subtest.

Now, let's look at a few practice questions.

Subtest 3 Practice Questions

Question 1

Which of the following was the greatest impact of Alexander the Great's military conquests?

- A. the spread of Hellenistic culture across the known world
- B. the intermarrying of Greek soldiers with natives throughout his empire
- C. the unification of military technologies
- D. the establishing of contact with Eastern civilizations

Correct Answer: A. As Alexander conquered territories, he allowed the local governments to remain intact but introduced Greek culture to the conquered areas. He did not force the culture on the natives, but he allowed them to adopt what aspects of the culture they wanted. This resulted in the spread of Hellenistic (or Greek) culture across the areas he conquered. As a result, travelers could go from town to town and rely on a common culture and language from one town to the next. The ease of travel and communication that accompanied the spread of Hellenistic culture encouraged an increase of trade and an exchange of ideas.

Question 2

The first transcontinental railroad was completed in 1869, connecting the Atlantic and Pacific Oceans and enabling people and goods to move quickly across the continent. This is best described as an example of innovation's impact on:

- A. geography.
- B. politics.
- C. the economy.
- D. distance.

Correct Answer: D. The transcontinental railroad enabled goods and people to move across the country more quickly and for lower costs, shrinking the impact of distance.

Question 3

Japan and Germany, although being badly damaged in World War II, have since grown to be among the strongest economies in the world. All of the following have contributed to their growth except:

- A. receiving military and financial support from other countries.
- B. decreasing unemployment rates matched with increased wages.
- C. strong corporations in the automotive and technology industries.
- D. oversupply of exports from decreased consumerism.

Correct answer: D. Consumerism actually increased due to the promise of postwar economic stability.

Question 4

The Tenth Amendment states that "[t]he powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people." This is an example of:

- A. limited government.
- B. federalism.
- C. agricultural aristocracy.
- D. absolute monarchy.

Correct Answer: A. The Constitution sets out specific powers for the federal government, and any powers not specified are given to the states and individuals. This limits the power of the federal government.

Question 5

Which of the following best explains the importance of the Battle of Saratoga?

- A. It was the final battle of the Revolutionary War.
- B. The victory in Saratoga convinced the French to support the Americans.
- C. It was the first battle of the Revolutionary War.
- D. It was the battle that established George Washington as a prominent leader.

Correct Answer: B. The Battle of Saratoga is often credited as the turning point of the Revolutionary War. The victory of the Continental Army over the British persuaded the French to recognize the independence of America and to give it military assistance. It is believed that this victory and ensuing French assistance made possible America's future success in the war.

Question 6

An anthropologist studies parenting practices in societies that offer paid maternity leave. This is an example of:

- A. cultural anthropology.
- B. physical anthropology.
- C. archaeological anthropology.
- D. linguistic anthropology.

Correct Answer: A. Cultural anthropology is the study of human cultures in the recent past as well as in the present.

Question 7

Microeconomics is best understood as:

- A. the study of government institutions.
- B. the structure and function of the global economy.
- C. the study of individuals and their decisions.
- D. the investigation of low-value economic transactions.

Correct Answer: C. Microeconomics considers the actions of individuals and the reasoning behind their individual economic choices.

Question 8

In North Korea, the government determines which goods should be produced and at what quantities. This is an example of a:

- A. command economy.
- B. traditional economy.
- C. market economy.
- D. mixed economy.

Correct Answer: A. This is an example of a command economy, in which the government determines what is produced and how much is produced.

Question 9

Which of the following best describes Ancient Rome's relationship with Christianity?

- A. Under Constantine's rule, Christianity became the official religion of the Roman Empire and established the Catholic Church as a powerful governing body.
- B. Ancient Rome saw the shift away from monotheism to widespread polytheism in the practice of Christianity.
- C. Despite never being officially recognized by the government, Christianity eventually became the religion practiced by the majority of Romans.
- D. The Catholic Church introduced Latin, which eventually spread to common use throughout the Roman Empire.

Correct Answer: A. Under the rule of Constantine, the Roman Empire adopted Christianity as its official religion. This solidified the influence and importance of Christianity in European thinking and established the Catholic Church as an important governing body.

Question 10

Mr. Mathers is teaching his class about the Louisiana Purchase. What social science should Mr. Mathers connect to this history lesson in order to best explain the importance of the Louisiana Purchase to the United States?

- A. economics
- B. sociology
- C. geography
- D. anthropology

Correct Answer: C. A geography lesson focused on the Gulf of Mexico, specifically the port of New Orleans and its importance to shipping, would provide context for why the United States wanted to purchase the land.

Subtest 4:

Science

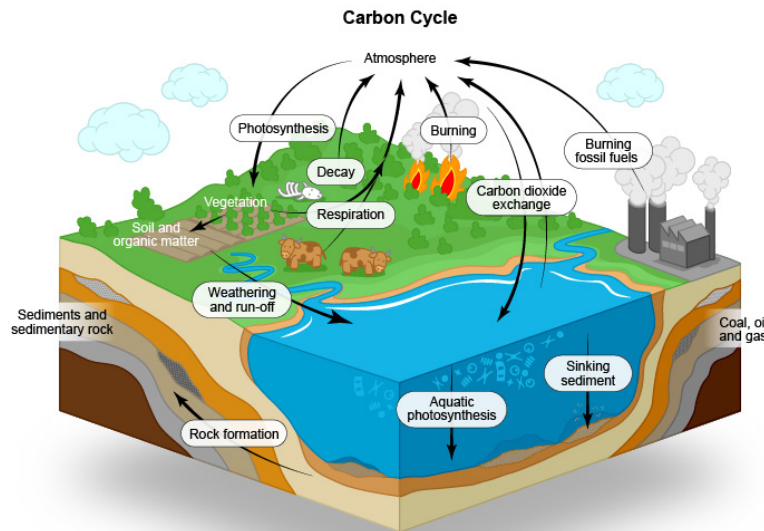
Overview

You will have 60 minutes to answer about 55 questions on the Science subtest. An on-screen calculator is provided. This subtest is broken down into three categories:

1. Earth Science (17-18 questions / 33% of subtest)
2. Life Science (18-19 questions / 33% of subtest)
3. Physical Science (18-19 questions / 33% of subtest)

Let's explore a few concepts that are likely to appear on this subtest.

The Carbon Cycle



All life on earth requires carbon. It continuously cycles through the environment. Carbon enters the food web through autotrophs such as plants. Plants take carbon dioxide from the atmosphere and use it to make glucose. Carbon in the plants is transferred to other organisms when they eat the plants. Carbon is released into the atmosphere when these organisms respire. When organisms die, decomposers release the carbon from these organisms into the soil and atmosphere.

Carbon can be stored underground as fossil fuels. When organisms die and are buried, they are compressed. Over millions of years, they turn into fossils. Humans use fossils as fuel. Carbon is released back into the atmosphere in the form of carbon dioxide when fossil fuels are burned. Carbon is also released into the atmosphere when volcanoes erupt.

The Lunar Cycle

We see moonlight because the Sun is reflected off the Moon's surface. We see different phases of the Moon because the Moon orbits the earth and the Earth orbits the Sun. These phases of the moon cycle every 29.5 days.



New moon: The sun reflects off the side of the Moon we cannot see.



Waxing crescent: Waxing means growing, so a waxing crescent is a moon that is moving toward a full moon when less than half of the Moon is illuminated.



First quarter: Half of the Moon is illuminated.



Waxing gibbous: A waxing gibbous moon is moving toward a full moon and more than half of the Moon is illuminated.



Full moon: The entire Moon is illuminated



Waning gibbous: Waning means decreasing, so a waning gibbous moon is decreasing in illumination but is more than half illuminated.

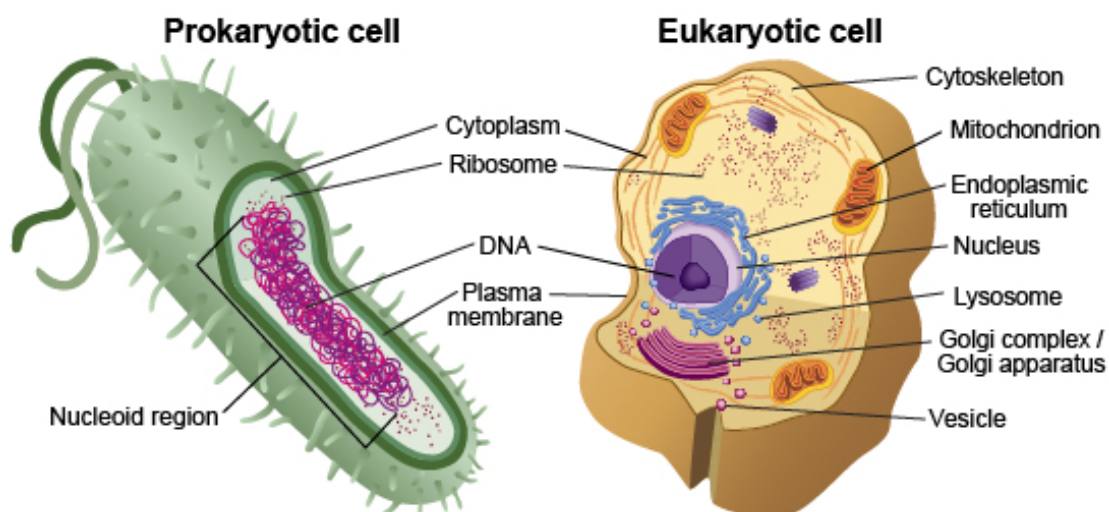


Last quarter: Half of the Moon is illuminated



Waning crescent: This moon is less than half illuminated and is decreasing in illumination

Eukaryotic vs. Prokaryotic



Organisms that are single-celled and do not have membrane-bound organelles or a nucleus are called **prokaryotes**. Their DNA is found in the cytoplasm. Organisms in the kingdoms Bacteria and Archaea are prokaryotes.

- **Archaea:** These organisms sometimes live in the most extreme environments on Earth. They have been found in deep-sea vents, hot springs, and extremely alkaline or acidic waters.
- **Bacteria:** These microorganisms are everywhere and sometimes cause disease. Salmonella is an example of a bacteria that is found in feces and can make humans sick if it contaminates food or water. Bacteria also live in our bodies and aid our digestion. Lactobacillus is a bacteria that is found in our intestines and helps break down our food.

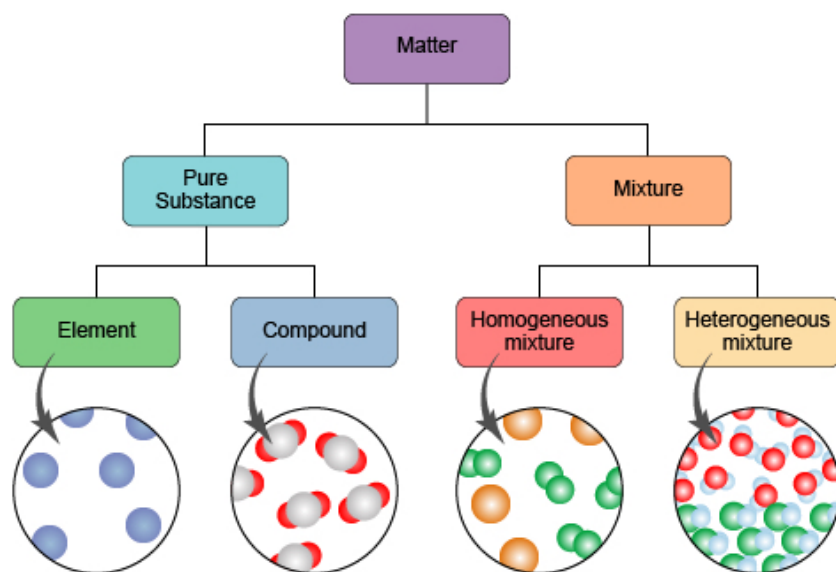
Eukaryotes differ from prokaryotes in that they have a nucleus and membrane-bound organelles, they are larger, and they can be multicellular or unicellular organisms. Their DNA is found in the nucleus. Organisms in the kingdoms Animalia, Plantae, Fungi, and Protista are all eukaryotes.

Natural Selection

Natural selection is a mechanism of evolution proposed by Charles Darwin. He observed that organisms inherit traits from their parents. Some traits will help the offspring to survive and reproduce, which will cause those traits to be more common in succeeding generations.

Let us use a population of moths as an example. Due to natural variation, half of the moths are white, and the other half are brown. They move into an area where the underbrush is very dark. Predators can see the white moths easier than the brown moths, so white moths are eaten at a higher rate than brown moths. Brown moths have a better chance of surviving because they are not as easily seen. The surviving moths reproduce, and the next generation has more brown moths than the previous generation. In this situation, the brown color is heritable and beneficial to the moths because it camouflages them. After a few more generations, the entire population could be all brown moths. This is an example of natural selection.

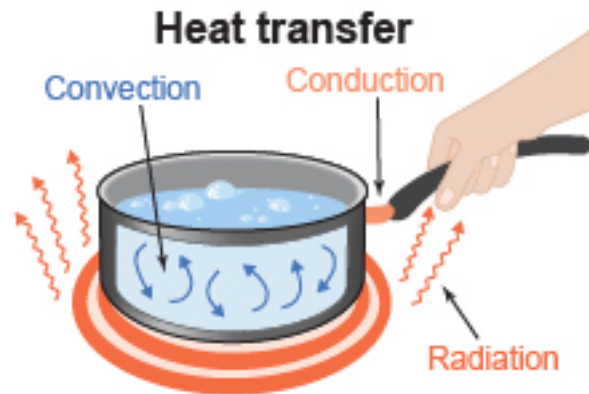
Mixtures vs. Solutions



A **mixture** is two or more substances combined physically but not chemically. A homogeneous mixture is uniform all the way through. If you were to take multiple samples of a homogeneous mixture, the samples would be the same. Air and saline solution are examples of homogeneous mixtures. A heterogeneous mixture is not uniform. Examples of heterogeneous mixtures are concrete and chicken noodle soup.

A **solution** is a type of homogeneous mixture in which a solute is dissolved in a solvent. Examples of a solution are sugar water and carbonated water. The solute is the substance to be dissolved, while the solvent is the substance doing the dissolving. In our examples, the sugar and CO₂ are the solutes and water is the solvent.

Heat Transfer



When two objects with different temperatures come together, heat is transferred. Left alone in a room, the warmer object cools and the colder object warms because heat is transferred from the hotter object to the cooler object until they reach thermal equilibrium. The three ways to transfer heat are conduction, convection, and radiation. Conduction happens when heat moves from one object to another. An example of conduction is when you touch a metal pot handle. Your hand is colder than the metal handle, so heat flows from the metal handle to your hand.

Convection occurs when currents of heat form in liquids and gases. An example of convection is boiling water. As the water heats up, it rises and carries the heat energy with it. As the water gets further away from the heat source, it cools and then falls. This repeats and creates a circular current.

Heat transfer by radiation does not occur between objects. Instead, heat is transferred in the form of electromagnetic waves. An example of radiation is heat from a stove burner. You can feel the heat without touching the burner if you hold your hand over a hot burner.

Newton's Laws of Motion

Sir Isaac Newton, a physicist and mathematician, constructed three laws to describe the relationship between forces acting on an object and the motion of that object.

Newton's first law of motion states that an object at rest or moving at a constant speed will stay at rest or keep moving at a constant speed until a force acts on it. An example of Newton's first law of motion is a ball sitting on a flat surface. It will stay at rest until an outside force acts on it. Similarly, a ball rolling will not stop unless an outside force interrupts it.

Newton's second law of motion states that the acceleration of an object is dependent on the net force acting on an object and the mass of the object, expressed as $F = ma$. This means that the greater the mass of an object, the more force needed to move it. It takes more force to push a 100-pound box than a 10-pound box.

Newton's third law of motion states that there is an equal and opposite reaction for every action. This means that forces work in pairs. When you sit in a chair, your body exerts a force on the chair, and the chair exerts an opposite force against you. If the chair did not exert a force upward, it would collapse.

And that's just some very basic information about the Science subtest.

Now, let's look at a few practice questions.

Subtest 4 Practice Questions

Question 1

Of the following, which describes a sound?

- A. a large inlet of the ocean
- B. a fan-shaped deposit of sediment at the mouth or opening of a canyon or river
- C. a flat region or plain on the ocean floor
- D. a submarine ridge composed of coral or rocks

Correct Answer: A. A sound is a deep, wide inlet of the ocean.

Question 2

A student is investigating the growth of Elodea under different light sources. Which of the following is the best research question for this student?

- A. How does the distance from the light source affect Elodea plants?
- B. How does the amount of time spent in the sun affect the growth of Elodea plants?
- C. How does the type of light source affect the rate of photosynthesis of Elodea plants?
- D. How does the color of an Elodea plant affect its growth under different light sources?

Correct Answer: C. This is the best and most testable research question.

Question 3

While Jessica is viewing membrane-stained cells under a compound microscope, she notices that the cells appear to have specialized organelles. These cells are most likely which of the following?

- A. bacteria cells
- B. archaeobacteria cells
- C. eukaryotic cells
- D. prokaryotic cells

Correct Answer: C. All eukaryotic cells contain specialized, membrane-bound organelles.

Question 4

A frozen ice pop was left in the sun and melted. Which statement is true regarding the physical properties of the popsicle after it melted?

- A. It had experienced a phase change.
- B. The number of molecules had changed.
- C. Its chemical composition had changed.
- D. Its molecules were less energetic after it melted.

Correct Answer: A. The ice pop changed state from a liquid to a solid. A phase change is a physical property.

Question 5

Of the choices listed, which is the best analogy for voltage in a circuit?

- A. a tunnel through which wind can blow
- B. the height difference between the top and bottom of a hill
- C. security screening at the airport
- D. parts moving through an assembly line on a conveyor belt

Correct Answer: A. Voltage is related to the potential energy of the charges in a circuit. For example, charges at one terminal of a disconnected battery have the "potential" to make current flow as soon as the battery is connected.

Question 6

Why is it important for scientists around the world to adhere to the same system of measurement?

- A. It allows for easier and more consistent communication of results.
- B. The results of experiments are more likely to support hypotheses.
- C. The imperial system of measurement is inaccurate.
- D. The metric system does not relate to real life, so it is easier to use for conceptual purposes.

Correct Answer: A. A consistent system of measurement allows scientists to compare results more easily and remain consistent in their findings.

Question 7

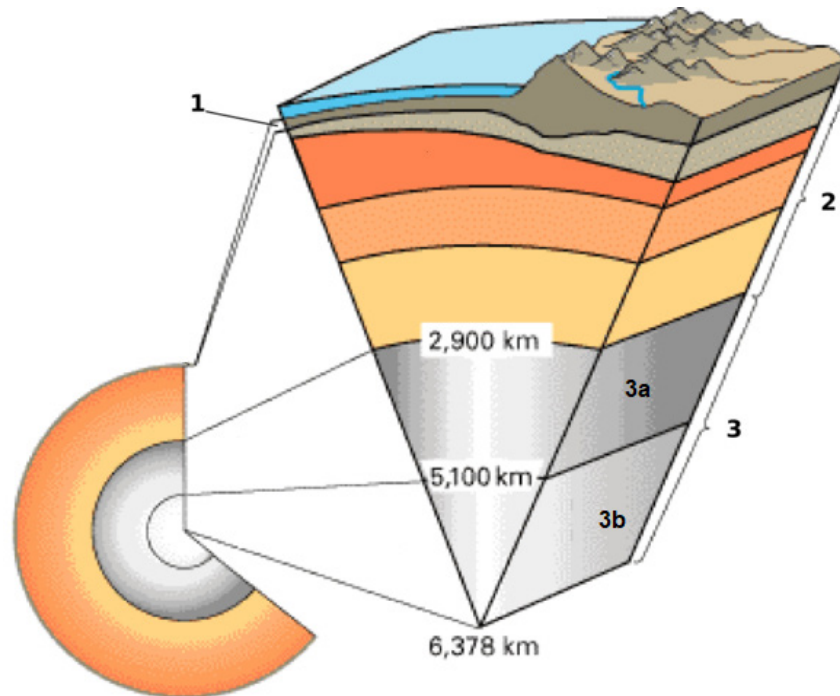
A year on Earth is approximately 365 days, while a year on Venus takes about 224 Earth days, and a year on Mars takes about 687 Earth days. What causes the number of days in a year on each of these planets to differ from one another?

- A. different compositions
- B. different climates
- C. different distances from the Sun
- D. different shapes

Correct Answer: C. A year is measured by how long it takes a planet to revolve around the Sun. These planets have years that are longer because they are farther from the Sun and thus have wider orbits.

Question 8

Which layer of the Earth is represented by the label "3a" in the diagram?



- A. inner core
- B. outer core
- C. mantle
- D. crust

Correct answer: B. The outer core is the layer above the inner core but below the mantle. In this diagram, it is labeled 3a.

Question 9

When studying the eating habits of leopard frogs in a certain habitat, researchers noticed that frogs with longer tongues were better able to hunt for food than leopard frogs with shorter tongues. Which of the following best describes the longer tongues observed in some of the leopard frogs?

- A. an adaptation
- B. an instinct
- C. a learned characteristic
- D. a dominant trait

Correct Answer: A. An adaptation is a trait that increases the survival fitness of an organism that possesses it. The leopard frogs with longer tongues are better suited for survival than leopard frogs with shorter tongues.

Question 10

Which of the following is true of evolution?

- A. Mitosis is responsible for the genetic variation in most animal populations.
- B. Individual organisms change over time.
- C. Offspring are genetically identical to their parents.
- D. Evolution can result in new species.

Correct Answer: D. Evolution can indeed result in new species over many years.

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