

Fundamental Subjects: Content Knowledge (0511)

Test at a Glance

Test Name	Fundamental Subjects: Content Knowledge	
Test Code	0511	
Time	2 hours	
Number of Questions	100	
Format	Multiple-choice questions; nonprogrammable four-function calculator use permitted	
	Content Categories	Approximate Number of Questions
	I. English Language Arts II. Mathematics III. Citizenship and Social Science IV. Science	25 25 25 25

About This Test

The Fundamental Subjects: Content Knowledge examination assesses candidates' skills and understanding broadly across four subjects:

- English Language Arts
- Mathematics
- Citizenship and Social Science
- Science

Questions are arranged in the test book by subject. An index on the back page of the test book identifies the page locations where each subject can be found. Candidates may answer the questions in any order they choose.

The content of the examination is not predicated on the assumption that the candidates should be experts in all of the subjects. Since the examination's purpose is to assess knowledge and skills in subject matter that may lie outside an individual candidate's teaching specialization, the questions in each subject focus on key indicators of general knowledge and understanding, requiring examinees to utilize fundamental skills that are founded upon broad concepts in each of the subjects.

This test may contain some questions that will not count toward your score.

Topics Covered

Descriptions of the subject content covered on the test are provided below.

I. English Language Arts

The English Language Arts section of the Fundamental Subjects: Content Knowledge test is designed to assess basic understanding in the field of English language arts. The questions allow examinees to demonstrate their knowledge and understanding of a variety of texts, including fiction, poetry, speeches, essays, and other nonfiction. Some questions will assess examinees' basic understanding of literary passages and the effects created by literary devices in those passages. Other questions will assess examinees' basic reading comprehension skills and knowledge of key elements in writing and speaking. While examinees may encounter basic terms such as "theme" or "character," the English Language Arts section will not assess knowledge of more specialized vocabulary terms such as "metaphor" or "personification."

- Reading Literature
 - Literal and basic nonliteral meanings of literary selections
 - Major themes and purposes
 - Relationships among particular elements in a selection and relationships between particular elements and the selection as a whole
 - Historical, cultural, and cross-cultural contexts
 - Comparisons among literary texts
- Literary Methods and Effects; Meanings and effects created by specific literary elements, including
 - Point of view
 - Character
 - Setting, tone, and mood
 - Imagery and figurative language (e.g., metaphor, simile, personification*)

**Technical terms (e.g., metaphor, simile, personification) that appear in questions in the test will be accompanied by definitions.*
- Reading and Communication Skills
 - Summaries or paraphrases of the main idea and supporting ideas in a selection
 - How language is used and the meanings of words as they are used in context
 - How a selection is organized
 - Fact versus opinion
 - Inferences and conclusions
 - Purposes for writing and speaking and the role of the audience within varying contexts

- Decisions about the writing process, including identifying appropriate revision strategies for a given text

II. Mathematics

Since the focus of the Mathematics section of the Fundamental Subjects examination is on testing the mathematical competencies needed in teaching and everyday life, each question is presented in one of the following meaningful real-world contexts:

- ◆ School/classroom or work settings, such as calculating grades, interpreting a class or office survey, budgeting for a field trip or project.
- ◆ Personal settings, such as balancing a checkbook, determining the amount or cost of floor covering for a room, the cost of purchases with taxes and/or shipping costs, and appropriate gratuities.
- ◆ Interdisciplinary settings, such as interpreting census and/or meteorological data.

The test questions do not require knowledge of advanced-level mathematics vocabulary. *Examinees may use nonprogrammable calculators while taking the test; a basic four-function calculator will be adequate.*

The National Council of Teachers of Mathematics' *Principles and Standards for School Mathematics* were referred to when developing this section, and the following are covered:

- Number Sense and Basic Algebra
 - Compute using rational numbers
 - Use estimating skills to solve a problem
 - Use percents to solve a problem
 - Set up ratios and simplify to solve a problem
 - Set up and solve proportions
 - Solve a word problem
 - Express a word problem in algebraic form
 - Represent and use numbers in equivalent forms
 - Apply place-value concepts and numeration to ordering and grouping
- Geometry & Measurement
 - Convert, select, and use measurements within the same system
 - Use scale measurements to interpret maps, drawings, or models
 - Use concepts of area, perimeter, circumference, and volume to solve a problem
 - Solve a problem involving rates

- Data Analysis & Probability
 - Interpret data based on charts, graphs, tables, and spreadsheets
 - Find trends and patterns and make inferences using graphs or data
 - Determine mean, median, mode, and range using sets of data
 - Compare, calculate, and use probability in a variety of problems

III. Citizenship and Social Science

The questions in this section of the test will assess examinees' knowledge, understanding, and ability to use the major concepts and modes of inquiry from the social sciences, with an emphasis on the ability to make connections and comparisons among major historical events and ideas, especially those that have connections to contemporary events and problems. Test questions from the following four thematic areas also address the examinees' ability to make informed decisions as citizens of a culturally diverse democratic society and interdependent world.

- Historical Continuity and Change
 - Demonstrate the ability to use chronological thinking skills and to use and analyze historical data (e.g., timelines, maps, graphs, and tables)
 - Distinguish between fact and opinion with respect to primary and other historical documents (e.g., U.S. Declaration of Independence, U.S. Constitution, essays, speeches)
 - Demonstrate understanding of multiple points of view with respect to primary and other historical documents (e.g., essays, famous speeches, interview transcripts, personal narratives)
 - Demonstrate understanding of the significance of historical artifacts, oral traditions, and historical places (e.g., religious holy sites, ancient cities)
 - Identify and demonstrate understanding of the impact of individuals, groups, religions, social organizations, and movements on history (e.g., Susan B. Anthony, Abraham Lincoln, Mohammed, Mahatma Gandhi, Eleanor Roosevelt, imperialism, worldwide immigration and cultural diffusion, the Industrial Revolution, women's and Civil Rights movements, post-Second World War technological advances)
- Identify and demonstrate understanding of the causes, results, and consequences of social, political, economic, and military events (e.g., the U.S. Revolutionary War and Civil War, independence struggles, the slave trade, U.S. westward expansion, the First and Second World Wars, industrialization, and immigration)
- People, Places, and Geographic Regions
 - Demonstrate understanding of the interaction between people and places, especially the impact of human activity on the physical environment, the environment's impact on people's lives and culture, and human adaptation to the environment
 - Demonstrate the ability to use basic geographic literacy skills (e.g., geographic tools: maps, graphs, charts)
- Civics and Government
 - Demonstrate an understanding of major systems of government and how they function, including the major features of the U.S. political system
 - Demonstrate an understanding of rights and responsibilities of U.S. citizens (e.g., voting, taxation, civic participation)
- Scarcity and Economic Choice
 - Demonstrate an understanding of the economic factors and principles that affect individuals, institutions, nations, and events, and how economic factors interact with other factors such as geographic features and cultural values

IV. Science

The science section of the test focuses on assessing the candidate's general background knowledge and understanding of the fundamental facts, basic concepts, principles, processes, methods, and skills that are common to the various scientific disciplines.

It is important for teachers to have a basic understanding of

- ▶ the features and natural processes of Earth, biological processes, and the interactions of matter and energy
- ▶ the nature of science as a complex human enterprise with a distinct philosophy, methodology, and role in society

Because conceptual and procedural schemes unify scientific disciplines, the concepts and processes below can be found within any of the other specific content domains.

- ▶ Systems, orders, and organization
- ▶ Evidence, models, and explanation
- ▶ Change, constancy, and measurement
- ▶ Evolution and equilibrium
- ▶ Form and function
- Nature and History of Science
 - Demonstrate the ability to gather reliable information about nature and to develop explanations that can account for the information gathered
 - Demonstrate the ability to identify and use the elements of scientific inquiry for problem solving
 - Demonstrate familiarity with the heritage of science, i.e., important scientific events and contributions made by major historical figures
 - Demonstrate understanding of the processes involved in scientific data collection, manipulation, interpretation, and presentation
 - Interpret and draw conclusions from data, including those presented in tables, graphs, maps, and charts
 - Demonstrate the ability to analyze errors in data that are presented

- Basic Principles and Fundamentals of Science
 - Demonstrate the ability to use basic principles of science to explain natural phenomena and events
 - Demonstrate understanding of the importance of energy relationships and transformations in both living and nonliving contexts
 - Demonstrate understanding of the structure and properties of matter and the forces that act upon it
 - Demonstrate understanding of the diversity and characteristics of living organisms and their interactions with the environment and each other
 - Demonstrate understanding of the processes that have led to changes in the dominant organisms at various times and in various places
 - Demonstrate understanding of Earth as a part of the universe and a body with specific features and processes
- Science, Technology, and Social Perspectives
 - Demonstrate understanding of the impact of science and technology on the environment and human affairs (e.g., production, use, and management of energy, consumer products, and natural resources)
 - Demonstrate knowledge of the societal issues with health awareness and medical advances (including biotechnology)
 - Demonstrate understanding of the social, political, ethical, and economic issues arising from science and technology
 - Demonstrate understanding of relationships between societal demands and scientific and technological enterprises (e.g., past and current trade-offs, social change as a result of scientific and technological advances)

Sample Test Questions

English Language Arts

1. The following is an Iroquois poem entitled “Darkness Song.”

We wait in the darkness!
 Come, all ye who listen,
 Line Help in our night journey:
 Now no sun is shining;
 5 Now no star is glowing;
 Come show us the pathway:
 The night is not friendly;
 She closes her eyelids;
 The moon has forgot us,
 10 We wait in the darkness!

In the context of the poem, the phrase “She closes her eyelids” (line 8) most likely refers to the

- (A) refusal of the speaker’s companion to keep walking
- (B) twinkling of the stars in the night sky
- (C) darkness of the night sky
- (D) setting of the sun behind the forest

Questions 2–3 are based on the following passage from Elizabeth Bowen’s novel *The Death of the Heart*.

On a footbridge between an island and the mainland a man and woman stood talking, leaning on the rail. In the intense cold, which made everyone hurry, they had chosen to make this long summerlike pause. Their oblivious stillness made them look like lovers—actually, their elbows were some inches apart; they were riveted not to each other but to what she said. Their thick coats made their figures sexless and stiff as chessmen: they were well-to-do, inside bulwarks of fur and cloth their bodies generated a steady warmth; they could only see the cold—or, if they felt it, they only felt it at their extremities . . . Ice pushed down the channel under the bridge, so that while they talked their reflections were constantly broken up.

2. An acquaintance of yours argues that Elizabeth Bowen portrays the wealthy people described in this passage as unaffected by the experiences of people around them. Which of the following, taken from the paragraph above, could your acquaintance best use to support his or her argument?
- (A) “In the intense cold, which made everyone hurry, they had chosen to make this long summerlike pause”
 - (B) “they were riveted not to each other but to what she said”
 - (C) “Their thick coats made their figures sexless and stiff as chessmen”
 - (D) “Ice pushed down the channel under the bridge”
3. The man and woman in the passage are described primarily in terms of which of the following?
- (A) Their personality traits and family histories
 - (B) Their body language and clothing
 - (C) The content of their conversations
 - (D) The expressions on their faces

4. The following passage is from “Sonny’s Blues” by James Baldwin.

These boys . . . were growing up with a rush and their heads bumped abruptly against the low ceiling of their actual possibilities. They were filled with rage. All they really knew were two darkneses, the darkness of their lives, which was now closing in on them, and the darkness of the movies, which had blinded them to that other darkness, and in which they now, vindictively, dreamed, at once more together than they were at any other time, and more alone.

The author uses images of a “low ceiling” and “darkness” in order to portray life experiences that are

- (A) limitless
 - (B) empty
 - (C) restricted
 - (D) fulfilling
5. The following excerpt is from a speech by William Safire.

Is the decline of the written word inevitable? Will the historians of the future deal merely in oral history? I hope not. I hope that oral history will limit itself to the discovery of toothpaste and the invention of mouthwash. I don’t want to witness the decomposing of the art of composition, or be present when we get in touch with our feelings and lose contact with our minds.

It can be inferred from the passage that the author believes that, in contrast to oral history, the written word is

- (A) able to convey emotions more accurately
- (B) a more intellectual exercise
- (C) doomed to describe mundane historical events
- (D) already obsolete

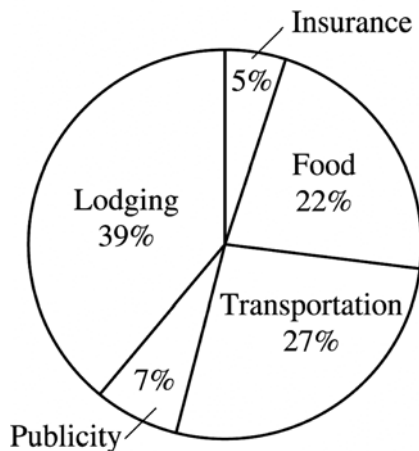
Mathematics

RECORD LOW TEMPERATURES AT TANNERSVILLE, PA	
Month	Record Low (degrees Fahrenheit)
January	-31
February	-25
March	-14
April	11
May	22
June	31
July	39
August	32
September	22
October	12
November	-6
December	-19

6. The monthly record low temperatures, in degrees Fahrenheit, for Tannersville, Pennsylvania, are given in the table above. What is the range of the record low temperatures for Tannersville? (The range is the difference between the highest and the lowest number in a set of values.)
- (A) 8
 - (B) 12
 - (C) 62
 - (D) 70

Questions 7–8 are based on the pie chart below.

BUDGET FOR SCHOOL TRIP

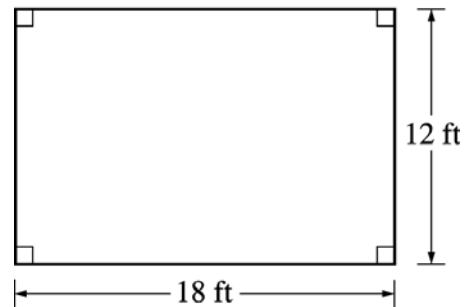


Total Budget: \$12,000

7. How much money was budgeted for transportation for the school trip?
- (A) \$2,700
 (B) \$2,810
 (C) \$3,060
 (D) \$3,240
8. Which of the following is closest to the fraction of the total budget that was budgeted for food and lodging combined?
- (A) $\frac{1}{2}$
 (B) $\frac{3}{5}$
 (C) $\frac{2}{3}$
 (D) $\frac{7}{10}$

Question 9 refers to the following diagram.

ANN'S LIVING ROOM



9. Ann plans to place a continuous wallpaper border on the walls of her living room, shown above. Each roll cost \$6.47, and no partial rolls are sold. If each roll of border is 8 feet long, what is the minimum amount Ann can spend on rolls of border to complete her project?
- (A) \$45.29
 (B) \$51.76
 (C) \$103.50
 (D) \$174.69
10. To make 36 five-inch pancakes, mix $4\frac{1}{2}$ cups of water with two pounds of pancake mix.

When Mark goes shopping at the Food Warehouse, he often buys food in large quantities in order to save money. A problem that sometimes arises is that large packages give directions for making food for large groups. Last week he brought home pancake mix with the directions shown above. If Mark wants to make 10 five-inch pancakes, how many cups of water should he use?

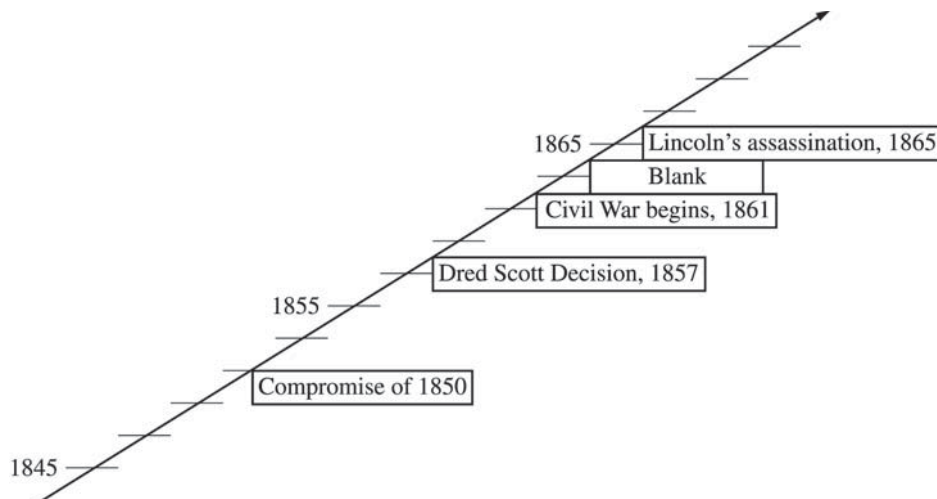
- (A) $4\frac{1}{20}$ cups
 (B) $1\frac{3}{4}$ cups
 (C) $1\frac{1}{2}$ cups
 (D) $1\frac{1}{4}$ cups

Citizenship and Social Sciences

Question 11 refers to the following quote.

New York newspaperman John L. O’Sullivan is credited with coining the term Manifest Destiny, “. . .the fulfillment of our manifest destiny to overspread the continent allotted by Providence for the free development of our yearly multiplying millions. . .”

11. The idea of Manifest Destiny was used in the United States primarily to justify which of the following?
- (A) The emancipation of slaves
 - (B) The expansion of slavery in the Western states
 - (C) The creation of trade barriers
 - (D) The acquisition of Indian, Mexican, and Canadian lands
12. According to the United States Constitution, the President is given the power to do which of the following?
- (A) Impeach judges
 - (B) Pass laws
 - (C) Coin money
 - (D) Veto bills



13. Which event could be inserted into the blank space on the timeline above?
- (A) California gold rush
 - (B) Grant becomes President
 - (C) Emancipation Proclamation
 - (D) The South surrenders at Appomattox



Map 1



Map 2



Map 3



Map 4

14. Egypt is located in which of the regions shown in the maps above?

- (A) Map 1
- (B) Map 2
- (C) Map 3
- (D) Map 4

15. Which of the following is an effect of inflation?

- (A) Consumer buying power decreases.
- (B) Consumer buying power increases.
- (C) Interest rates generally decline.
- (D) Exports increase.



16. Which of the following is true for both Martin Luther King, Jr. and Mahatma Gandhi, shown above?

- (A) They based their movements for social change on Christian faith.
- (B) They led mass movements based on nonviolent civil disobedience.
- (C) They believed in achieving their goals by any means necessary.
- (D) They urged their followers to cooperate with the rules laid down by established authorities.

Science

17. Homeostasis in a living organism is regulated by feedback. This process is most similar to which of the following?

- (A) An electric light switch
- (B) An escalator between floors of a store
- (C) The thermostat on a central heating system
- (D) The gas pedal on an automobile

18. According to some scientists, Earth’s average surface temperature is rising because of an enhanced greenhouse effect. An increase in the atmospheric concentration of which of the following gases is considered to be primarily responsible for this temperature increase?

- (A) Helium
- (B) Nitrogen
- (C) Sulfur dioxide
- (D) Carbon dioxide

19. Which of the following food chains would provide a human with the largest percentage of energy that was captured and stored by the primary producer?

- (A) Water grass → insect → frog → fish → human
- (B) Plankton → shrimp → tuna → human
- (C) Grass → cow → human
- (D) Corn → human

20. A scientific experiment was conducted to determine the effect of a newly developed synthetic growth hormone, PGH, on pea seedlings. One group of seedlings was treated with PGH while another group of the same variety was left untreated. All environmental conditions were kept the same for both groups of seedlings. Data collected over 10 days are provided in the table below.

Time (days)	Average Height (cm)	
	Treated Group	Untreated Group
1	3.0	2.5
3	3.6	3.0
4	4.7	3.9
5	5.6	4.6
7	6.2	5.0
9	6.9	5.4
10	7.4	5.8

Based on the results of this experiment, which of the following is the best conclusion about the effect of PGH?

- (A) PGH can be used to stimulate growth in many different agricultural crops.
- (B) PGH is as effective as natural growth factors in pea plants.
- (C) PGH can be used to increase the yield of peas per acre for this variety of peas.
- (D) PGH stimulates growth in seedlings of this variety of peas.

21. During the nineteenth century, some bird species, such as starlings, were introduced into the United States from Europe. Since then they have spread throughout the country and become a nuisance, or pest species, especially in urban areas. They often drive native birds out of their habitats. Factors that have contributed to the starling’s success in the United States most likely include all of the following EXCEPT

- (A) appropriate locations for nesting
- (B) suitable range of temperatures
- (C) an abundance of natural predators
- (D) availability of a variety of food sources

Answers

English Language Arts

- The correct answer is C. The statement “She closes her eyelids” is referring back to the night mentioned in line 7. Since there is no light from the Sun or the stars (lines 4–5), the sky is dark and the night can be said to have closed its eyelids, or blocked out the light.
- The correct answer is A. While other people are hurrying to get out of the “intense cold,” the man and woman seem unaffected by that cold because they are taking a “long summerlike pause.”
- The correct answer is B. The passage describes the body language of the man and woman, noting that they are still, their elbows are “some inches apart,” and they are “riveted not to each other but to what she said.” The passage also describes their clothing of “thick coats” and “bulwarks of fur and cloth.”
- The correct answer is C. The boys bump against the “low ceiling of their actual possibilities,” suggesting that the actual possibilities in the boys’ lives have been restricted. Similarly, “the darkness of their lives” is “closing in on them,” or beginning to restrict the boys’ experiences and possibilities.
- The correct answer is B. In the final sentence of the passage, Safire suggests that if we stop engaging with the written word (“the art of composition”), we may also “lose contact with our minds,” or miss out on the intellectual rewards of the written word.

Mathematics

- This question requires you to apply the given definition of range.
According to the table, the lowest record low temperature, in degrees Fahrenheit, is -31 and the highest record low temperature is 39 . Using the definition given, subtract -31 from 39 :
 $39 - (-31) = 70$
Thus, the range is 70 degrees. The correct answer is D.
- According to the graph, the total amount budgeted for the school trip is $\$12,000$ and the percent of the total budget allocated to transportation is 27% . To find 27% of $\$12,000$, express 27% as a decimal 0.27 and multiply $\$12,000$ by that decimal.
 $0.27 \times \$12,000 = \$3,240$
Thus, $\$3,240$ is the amount budgeted for transportation. The correct answer is D.

- According to the graph, the percent of the total budget allocated for food is 22% , and for lodging it is 39% . The percent allocated for food and lodging is the sum of these two percents.

$$22\% + 39\% = 61\%$$

To express 61% as a fraction, divide 61 by 100 .

$$\frac{61}{100}$$

Since the question asks which of the given fractions is closest,

round 61 to 60 , and simplify $\frac{60}{100}$.

$$\frac{61}{100} \approx \frac{60}{100} = \frac{3}{5}$$

The correct answer is B.

- The minimum length of wallpaper border needed to decorate the room is equal to the perimeter of Ann’s living room. Since the perimeter is the sum of the lengths of the four sides of the room, the perimeter can be written: $18\text{ ft} + 18\text{ ft} + 12\text{ ft} + 12\text{ ft}$ and is equal to 60 feet.

The number of rolls of border needed is determined by dividing the perimeter by the length of each roll of border.

$$\frac{60\text{ ft}}{8\text{ ft}} = 7\frac{1}{2}\text{ rolls}$$

Since Ann needs a minimum of $7\frac{1}{2}$ rolls and no partial rolls are sold, she must buy 8 rolls. The cost of 8 rolls of the border is found by multiplying the cost of each roll, $\$6.47$, by the number of rolls needed.

$$\$6.47 \times 8 = \$51.76$$

The correct answer is B.

10. According to the recipe, 36 five-inch pancakes require $4\frac{1}{2}$ cups of water. The proportion of the number of pancakes to the number of cups of water is:

$$\frac{\text{Number of five-inch pancakes}}{\text{Number of cups of water}} = \frac{36}{4\frac{1}{2}} = \frac{36}{\frac{9}{2}} = \frac{72}{9} = \frac{8}{1}$$

Since Mark is using the same recipe to make 10 five-inch pancakes, the proportion of the number of pancakes to the number of cups of water is still:

$$\frac{\text{Number of five-inch pancakes}}{\text{Number of cups of water}} = \frac{8}{1}$$

The number of cups of water needed to make 10 five-inch pancakes is:

$$\frac{\text{Number of five-inch pancakes}}{\text{Number of cups of water}} = \frac{8}{1} = \frac{10}{\text{Number of cups of water}}$$

By cross multiplying, $\frac{8}{1} = \frac{10}{\text{Number of cups of water}}$ can be

written as: Number of cups of water = $\frac{10}{8}$, which is equal to $1\frac{1}{4}$ cups of water. The correct answer is (D).

Citizenship and Social Science

11. The correct answer is D. The idea of “Manifest Destiny” proposed that the United States had a right to spread its civilization across the continent. Though economic gain motivated much of the westward expansion in the 1800s, the notion of a Manifest Destiny provided an ideological basis for conquering and/or acquiring Native American, Mexican, and Canadian lands in North America.

12. The correct answer is D. Article II of the United States Constitution spells out the powers of the President. Among them is the power to reject, or veto, a law that is passed by the Congress. Only the House of Representatives has the power to impeach a federal official or a judge A. Passing laws, B, is the duty of the Congress and coining money, C, is a power reserved to the Congress.

13. The correct answer is C. Abraham Lincoln issued the Emancipation Proclamation in 1863. The Civil War had already begun. Grant did not become president, B, until after the war, and the South surrendered, D, in the same year that Lincoln was assassinated. The height of the California gold rush, A, took place between 1849 and 1852.

14. The correct answer is A. Egypt is in the northeastern part of the continent of Africa, which is pictured in Map 1. Map 2 depicts South America and most of North America. Map 3 depicts Central and East Asia as well as Australia. Map 4 shows the continent of Antarctica.

15. The correct answer is A. Inflation is an economic condition characterized by a general rise in prices throughout an economy. In periods of high inflation, the same amount of money buys far fewer goods, therefore consumer buying power, in general, decreases.

16. The correct answer is B. Both Gandhi and Martin Luther King, Jr. led movements for social change based on principles of nonviolence. King was a Christian minister, but Gandhi did not base his movement on Christian faith, A. “By any means necessary,” C, is a phrase often associated with Malcolm X, another civil rights leader in the United States in the 1960s. D is incorrect: Both King and Gandhi urged their followers to conduct nonviolent acts of civil disobedience when faced with unjust laws or policies.

Science

17. The correct answer is C. Homeostasis refers to any process that living things use to actively maintain fairly stable conditions necessary for survival. For example, the human body maintains levels of temperature and other vital conditions that are within an acceptable range. Feedback arises out of balances between forces and factors that mutually influence each other. Thus, internal conditions are monitored and, based on feedback received, adjustments are made to conditions to keep them within an acceptable range. This is very much like the manner in which a thermostat works. Air temperature is monitored by the thermostat and when the air temperature drops below a preset level, the thermostat signals the heater to turn on. When the air temperature returns to the preset level, the thermostat signals the heater to turn off. In this way a fairly stable level of air temperature is maintained.

18. The correct answer is D. Although there are several gases, such as methane, water vapor, and nitrous oxide that are considered to be greenhouse gases, carbon dioxide accounts for the largest percentage of the annual human-caused input of greenhouse gases.

19. The correct answer is D. The primary producers in each of the food chains listed are the photosynthetic organisms at the beginning of the food chain. These organisms are responsible for capturing light energy and converting it into the chemical energy that ultimately supports the rest of the food chain. Much of the energy an organism acquires is used to maintain its own life processes, and only a small portion is actually stored. This is true at each level of the food chain, and therefore the largest percentage of the original energy captured by the producer would be available to the human in the shortest food chain.

20. The correct answer is D. The data show that for the particular variety of peas used in the experiment, seedlings treated with PGH were taller than the control group seedlings each day that a measurement was taken. The results do not suggest a mechanism by which PGH is stimulating growth. In addition, no other factors or types of plants were tested. The only statement that accurately describes the results, therefore, is D.

21. The correct answer is C. The European starling was introduced into the United States in 1890. Environmental conditions in the United States were appropriate for the reproduction and survival of this species. However, as happens with many exotic species, there are few if any natural predators or competitors in their new habitats. This allowed starlings to thrive in their new ecosystems and reduce populations of native species. An abundance of predators would have kept the number of starlings from increasing greatly and, therefore, choice C would *not* be a factor that contributed to their success.



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