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Topic Break Down

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QUESTION NO: 1

What is Erythropoiesis?

A. Red blood cell formation

B. White blood cell formation

C. The destruction of red blood cells.

D. The destruction of white blood cells.

ANSWER: A

Explanation:

Erythropoiesis is red blood cell formation: the regulated process by which the body produces erythrocytes, also called red blood cells. It occurs primarily in the red bone marrow. During this process, hematopoietic stem cells mature through several precursor stages until they become functional erythrocytes. These cells contain hemoglobin and are specialized to transport oxygen from the lungs to body tissues and to help carry carbon dioxide back to the lungs.

The kidneys play an important regulatory role in erythropoiesis. When oxygen delivery to tissues is reduced, the kidneys release erythropoietin, a hormone that signals the bone marrow to increase red blood cell production. Effective erythropoiesis also depends on adequate supplies of nutrients, particularly iron for hemoglobin production, as well as vitamin B12 and folate for normal cell development and maturation. This physiologic response helps maintain an appropriate circulating red blood cell mass and adequate oxygen-carrying capacity. The National Cancer Institute defines erythropoiesis as the formation of red blood cells, and Merck Manual explains that erythropoietin stimulates red blood cell production in bone marrow. See the National Cancer Institute definition of erythropoiesis and the Merck Manual overview of erythropoiesis.

QUESTION NO: 2

Which word means "reddened or ruddy appearance"?

A. Flaccid

B. Distended

C. Flushed

D. Lethargic

ANSWER: C

Explanation:

Flushed means having a noticeably red, warm, or ruddy appearance, most often of the face or skin. In clinical and everyday usage, a person may appear flushed after exercise, during a fever, when embarrassed, or when experiencing increased blood flow near the surface of the skin. The term describes the visible color change itself and is commonly used in health-assessment documentation, such as noting that a patient has “flushed skin” or “flushed cheeks.” Understanding this vocabulary is useful on the HESI A2 because medical terminology and health-care language often rely on precise descriptive words for observable findings. Merriam-Webster defines “flushed” as having a reddish color, especially in the face, and its medical dictionary similarly connects the word with redness caused by increased blood flow. See Merriam-Webster: flushed and Merriam-Webster Medical Dictionary: flush.

QUESTION NO: 3

Which word in the following sentence is the subject?

The opera singer’s solo had a profound impact on the audience.

A. solo

B. impact

C. audience

D. opera singer

ANSWER: A

Explanation:

The correct answer is **solo**. In this sentence, the complete subject is “The opera singer’s solo,” and its simple subject—the main noun that performs the action—is “solo.” The verb, or predicate, is “had,” so asking “What had a profound impact on the audience?” identifies “solo” as the subject. Although “opera singer’s” appears before “solo,” it is a possessive modifier showing whose solo is being discussed; it does not change the fact that the solo is what had the impact. The phrase “a profound impact” receives the action of the verb “had,” while “on the audience” tells where that impact was directed. Identifying the subject by first locating the verb and then asking who or what performs the verb’s action is a reliable strategy for grammar questions. The Purdue Online Writing Lab explains that a sentence’s subject is the person, place, thing, or idea that performs the action or is being described: Purdue OWL: Subject-Verb Agreement. For additional guidance on recognizing subjects and predicates, see Khan Academy: Subjects and predicates.

QUESTION NO: 4

What vein returns blood to the heart, draining the head, neck, and upper torso?

A. Superior vena cava

B. Inferior vena cava

C. Ascending aorta

D. Descending aorta

E. Pulmonary vein

ANSWER: A

Explanation:

The **Superior vena cava** is the large systemic vein that returns deoxygenated blood from structures above the diaphragm to the right atrium of the heart. Its drainage territory includes the head, neck, upper limbs, and thorax (upper torso). Blood from the brain and much of the head and neck enters through the internal jugular veins; blood from the upper limbs enters through the subclavian veins. On each side, these vessels unite to form a brachiocephalic vein. The right and left brachiocephalic veins then join to create the superior vena cava, which carries the collected venous blood directly into the right atrium. This route is an essential part of systemic venous circulation, allowing blood to return to the heart before it is pumped to the lungs for oxygenation. The superior vena cava is therefore specifically identified by its role in draining the body’s upper regions. For an overview of the superior vena cava and its tributaries, see StatPearls: Anatomy, Thorax, Superior Vena Cava. A broader review of the heart’s chambers and the flow of blood into the right atrium is available from the American Heart Association.

QUESTION NO: 5

Where is interstitial fluid found in the body?

A. in the tissues around cells

B. inside the stomach

C. inside of cells

D. around the brain and spinal cord

ANSWER: A

Explanation:

Interstitial fluid is found in the tissues around cells. It is the portion of extracellular fluid that occupies the tiny spaces between body cells, bathing them directly. This location allows it to serve as the immediate exchange medium between blood in capillaries and cells: oxygen, nutrients, and hormones can move from the blood through interstitial fluid to cells, while carbon dioxide and metabolic wastes move from cells into interstitial fluid before entering the circulation for removal. Interstitial fluid is formed largely when fluid filters out of blood capillaries and is continually regulated through reabsorption into capillaries and drainage through the lymphatic system. Maintaining an appropriate interstitial-fluid volume is important for normal tissue perfusion and cellular homeostasis. Some specialized body fluids are classified as transcellular fluid, but the general definition tested here is the fluid located between cells within tissues. See NCBI Bookshelf: Body Fluids and Fluid Compartments and OpenStax Anatomy and Physiology: Body Fluids and Fluid Compartments.

QUESTION NO: 6

Select the correct definition of the underlined word in the sentence.

The toddler's ultrasound contained possible foreign bodies in his abdominal cavity.

A. cavern

B. container

C. empty or hollow space

D. defined area

ANSWER: C

Explanation:

"Empty or hollow space" is correct because *cavity* means a hollow area or space. In anatomy, the word has a more specific use: it describes a space within the body that contains, separates, or surrounds internal organs. The abdominal cavity is the major hollow region below the chest that houses structures such as the stomach, intestines, liver, pancreas, spleen, and kidneys. Thus, in the sentence, "foreign bodies in his abdominal cavity" means that the ultrasound suggested there may be objects located within the hollow internal space of the abdomen. This usage reflects both the general meaning of cavity as a hollow space and its standard medical meaning as an anatomical compartment. Understanding this context is important in medical vocabulary because terms such as abdominal cavity identify the location of a finding rather than simply describing an external feature. Merriam-Webster defines *cavity* as an unfilled space within a mass or body, while the National Cancer Institute describes a body cavity as a space in the body that contains organs. See Merriam-Webster: cavity and the National Cancer Institute definition of body cavity.

QUESTION NO: 7

Select the meaning of the underlined word in the sentence.

The patient's stomach appeared distended, and the physician decided to order an ultrasound.

A. bloated

B. weeping

C. sponge-like

D. robust

ANSWER: A

Explanation:

"bloated" is correct because *distended* describes being enlarged, expanded, or swollen beyond the usual size. In this clinical context, a distended stomach or abdomen appears visibly expanded, often because of gas, fluid, food contents, or another cause of swelling. "Bloated" accurately conveys that sense of abnormal fullness or enlargement and is the appropriate plain-language meaning of the term. Medical references commonly use *distention* to describe swelling or enlargement of a body part, particularly the abdomen. An ultrasound can help a clinician evaluate possible reasons for this appearance, such as fluid, organ enlargement, or other abdominal findings. See MedlinePlus's discussion of abdominal swelling and bloating at MedlinePlus and the Merriam-Webster definition of *distend* at Merriam-Webster.

QUESTION NO: 8

Initially, scientists suspected a high dietary calcium intake of increasing the risk of kidney stones. A high intake of calcium, however, reduces the urinary excretion of oxalate, which is thought to lower the risk. As a result, the concept that a higher dietary calcium intake increases the risk of kidney stones, and the mechanism underlying their formation, required examination. Stanford researchers studied the relationship between dietary calcium intake and the risk of symptomatic kidney stones in a cohort of 35,119 men ranging in age from 40 to 75 years old who had no history of kidney stones. Dietary calcium was measured by means of a semi-quantitative food-frequency questionnaire in 1998. During four years of follow-up, 535 cases of kidney stones were documented by LifeWork analysts. After adjustment for age, dietary calcium intake was inversely associated with the risk of stones; in fact, a high calcium intake decreased the risk of symptomatic kidney stones. Surprisingly, intake of animal protein was directly associated with the risk of stone formation.

What is the main focus of this passage?

A. How dietary calcium affects kidneys.

B. How kidneys function.

C. How kidney research is conducted.

D. How Stanford researchers perform studies.

ANSWER: A

Explanation:

How dietary calcium affects kidneys. is the correct main focus because the passage centers on the relationship between calcium consumed in the diet, kidney processes, and kidney-stone formation. A main-focus question asks for the broad subject that unifies the passage rather than a narrower supporting detail, such as a particular research method or the

general operation of the kidneys. Here, dietary calcium is the key subject, while the kidneys are the body system through which the discussed effect occurs.

This is also medically meaningful: calcium in food can bind oxalate in the digestive tract, reducing the amount of oxalate that reaches the kidneys and may contribute to certain calcium oxalate stones. Therefore, discussions of calcium intake and kidney stones commonly emphasize the effect of dietary calcium on the urinary system rather than simply describing kidney anatomy or a research team's procedures. The National Institute of Diabetes and Digestive and Kidney Diseases explains that adequate calcium from foods can be part of kidney-stone prevention for some people, and the National Kidney Foundation similarly discusses the connection between dietary calcium and oxalate management. See NIDDK: Eating, Diet, & Nutrition for Kidney Stones and National Kidney Foundation: Calcium Oxalate Stones.

QUESTION NO: 9

When placed in a hypotonic solution, what will a cell do?

A. remain the same

B. swell

C. shrink

D. disintegrate

ANSWER: B

Explanation:

swell is correct because a hypotonic solution has a lower solute concentration, and therefore a higher concentration of available water, than the fluid inside the cell. Cell membranes are selectively permeable, allowing water to cross readily while restricting many dissolved solutes. Through osmosis, water moves across the membrane toward the side with the greater solute concentration, reducing the concentration difference between the intracellular fluid and the surrounding solution. Since the cell interior is relatively more concentrated in this situation, water enters the cell. The added water increases the cell's volume, so the cell swells. The eventual outcome depends on the type of cell and how large the osmotic gradient is. An animal cell has no rigid cell wall, so excessive water entry can make it swell substantially and potentially rupture (lysis). Plant cells have a rigid cell wall that resists unlimited expansion; water entry produces turgor pressure and the cell becomes turgid. This principle is a foundational application of osmosis and tonicity in physiology. See OpenStax Biology 2e: Passive Transport and NCBI Bookshelf: Osmosis.

QUESTION NO: 10

Select the best word or words for the blank in the following sentence.

_____ confident that with enough study they can easily pass the final exam.

A. They have

B. There

C. Their

D. They're

ANSWER: D

Explanation:

"They're" is correct because it is a contraction of "they are." Substituting the two full words into the sentence produces: "They are confident that with enough study they can easily pass the final exam." This is a complete, grammatically sound statement: "they" is the plural subject, and "are" is the linking verb that connects the subject to the adjective "confident." The rest of the sentence, beginning with "that," explains what the students are confident about—namely, their ability to pass the final exam after sufficient study.

A useful proofreading strategy for contractions is to expand them. If replacing “they’re” with “they are” makes sense in context, the contraction is appropriate. Here, that replacement reads naturally and preserves the intended meaning. This distinction is especially important in academic writing and admissions-exam language questions, where similarly pronounced words may serve very different grammatical roles. Purdue Online Writing Lab discusses contractions and careful word choice in standard written English at Purdue OWL Grammar. For additional guidance on commonly confused words, including homophones, see UNC Writing Center.

QUESTION NO: 11

The alternative versions of a single gene are known as:

A. traits.

B. characteristics.

C. RNA.

D. alleles.

ANSWER: D

Explanation:

Alleles are alternative forms of the same gene located at the same position, or locus, on corresponding chromosomes. A gene contains instructions that contribute to a heritable feature, while alleles represent different versions of those instructions. For example, a gene associated with a particular inherited characteristic may have one allele sequence that produces one version of the characteristic and another allele sequence that produces a different version. An individual typically inherits one allele for a gene from each parent, although the way those alleles are expressed can depend on patterns such as dominance, recessiveness, codominance, or incomplete dominance. Thus, the term “alleles” specifically identifies variant forms of one gene rather than the observable feature itself. This is a core genetics definition used in introductory biology and health-science coursework. The National Human Genome Research Institute defines an allele as one of two or more versions of a DNA sequence at a particular genomic location. MedlinePlus Genetics likewise describes alleles as different versions of a gene. See NHGRI: Allele and MedlinePlus Genetics: What is DNA?.

QUESTION NO: 12

In the following sentence, what is the indirect object?

The mountain climber tossed the Sherpa the rope.

A. The mountain climber

B. tossed

C. the Sherpa

D. the rope

ANSWER: C

Explanation:

The correct answer is **the Sherpa**. An indirect object identifies the person or thing that receives the direct object, or for whom the action is performed. In this sentence, the action verb is “tossed.” To locate the direct object, ask what the mountain climber tossed: the climber tossed *the rope*. The rope is therefore the direct object because it is the thing directly affected by the action. Next, ask to whom the rope was tossed: it was tossed to *the Sherpa*. That noun phrase names the recipient of the rope and functions as the indirect object. The sentence can also be restated as “The mountain climber tossed the rope to the Sherpa,” which makes the recipient relationship especially clear. Indirect objects commonly occur between a transitive verb and its direct object in sentences with verbs of giving, sending, showing, telling, and tossing. For additional guidance on

identifying objects and complements in English grammar, see the Purdue Online Writing Lab grammar resources and the Cambridge Dictionary explanation of objects.

QUESTION NO: 13

Which of these is the best definition of the word incongruent?

A. discontented

B. discouraged

C. incompatible

D. sinister

ANSWER: C

Explanation:

incompatible is the best definition of *incongruent*. Something is incongruent when it does not match, fit, agree, or harmonize with something else. The term commonly describes elements that are inconsistent with one another—for example, behavior that is incongruent with a person's stated beliefs, or findings that are incongruent with an expected pattern. In health-care communication, congruence can refer to agreement between a patient's verbal message and nonverbal behavior; incongruence indicates that those messages do not align. The core idea is a lack of compatibility or correspondence, making *incompatible* the closest choice. Merriam-Webster defines "incongruent" as not congruent, including "not harmonious" and "inconsistent within itself," which supports this meaning. Vocabulary questions often test recognition of roots and context: the prefix *in-* means "not," while *congruent* refers to agreement or correspondence. Therefore, *incongruent* means not agreeing or fitting together. See Merriam-Webster's definition of incongruent and Cambridge Dictionary's entry for incongruent.

QUESTION NO: 14

Which of the following is correct?

A. 4/8 = 8/17

B. 5/12 = 15/24

C. 3/4 = 9/12

D. 2/3 = 7/10

ANSWER: C

Explanation:

The correct statement is **3/4 = 9/12**. These fractions are equivalent because multiplying both the numerator and denominator of 3/4 by the same nonzero number preserves the fraction's value. In this case, multiplying the numerator 3 by 3 gives 9, and multiplying the denominator 4 by 3 gives 12: (3 × 3)/(4 × 3) = 9/12. The multiplier can also be written as the fraction 3/3, which equals 1. Therefore, 3/4 × 3/3 = 9/12, and multiplying by 1 does not change the original quantity. Equivalently, simplifying 9/12 by dividing both its numerator and denominator by their greatest common factor, 3, gives 3/4. Both forms represent the same proportion and the same numerical value, 0.75. Recognizing equivalent fractions is important in HESI A2 math because it supports comparing fractions, finding common denominators, and performing fraction operations accurately. For further review of equivalent fractions and the rule that the numerator and denominator must be multiplied or divided by the same nonzero value, see Khan Academy's equivalent fractions lesson and Math Is Fun: Equivalent Fractions.

QUESTION NO: 15

How many centimeters are in a meter?

A. 10

B. 100

C. 1000

D. 1/100

ANSWER: B

Explanation:

100 is correct because the metric prefix *centi-* means one hundredth (1/100) of the base unit. Therefore, one centimeter is 1/100 of a meter, and it takes 100 centimeters to make one complete meter. This relationship can be expressed as 1 m = 100 cm. Metric conversions are based on powers of ten, which makes them straightforward: moving from meters to centimeters means converting to a smaller unit, so the numerical value increases by a factor of 100. For example, 2 meters equals 200 centimeters, and 0.5 meter equals 50 centimeters. Knowing this foundational conversion is important for accurately interpreting measurements in health care, science, and everyday situations, such as recording height, measuring wound dimensions, or reading equipment specifications. The National Institute of Standards and Technology identifies the meter as an SI base unit of length and lists the centimeter as equal to 10^{-2} meter, confirming that there are 100 centimeters in one meter. See the NIST overview of SI units and the NIST SI prefixes reference.

QUESTION NO: 16

What is the best description for the term invasive?

A. Inserting or entering into a body part

B. To swallow for digestion

C. To make more susceptible

D. To stop or subdue

ANSWER: A

Explanation:

“Inserting or entering into a body part” is the best description of *invasive* in health care terminology. An invasive procedure involves entering the body, typically by breaking the skin or entering a natural body opening, to examine, diagnose, monitor, or treat a patient. For example, surgery, catheter insertion, endoscopy, and the placement of an intravenous line are commonly described as invasive because an instrument, device, or clinician enters body tissue or an internal space. The term may also describe an organism that enters and spreads through body tissues, but the central meaning remains entry into the body. Recognizing this meaning is useful for HESI-style medical-vocabulary questions because it distinguishes procedures involving internal access from those performed entirely on the body’s surface. Clinical sources use the term similarly: MedlinePlus describes invasive procedures as those in which instruments are inserted into the body, while the National Cancer Institute defines invasive procedures as those that enter the body, usually through a cut or natural opening. See MedlinePlus: Surgery and the National Cancer Institute Dictionary definition of invasive procedure.

QUESTION NO: 17

Which of the following statements about atoms is false?

A. Electrons do not orbit an atom’s nucleus; they exist in electron clouds surrounding the nucleus.

B. As each orbital of an atom is filled to capacity, electrons begin occupying a higher energy orbital.

C. Most of the volume of an atom is empty space.

D. Atoms are most stable when their outer electron shell (valence shell) is incomplete.

ANSWER: D

Explanation:

The false statement is “Atoms are most stable when their outer electron shell (valence shell) is incomplete.” An atom’s chemical behavior is governed largely by its valence electrons, the electrons in its outermost occupied shell. Atoms tend to be relatively stable when that outer shell has a complete, low-energy electron configuration. This is illustrated by the noble gases, whose filled valence shells make them notably unreactive under ordinary conditions. Other atoms commonly participate in chemical reactions because gaining, losing, or sharing electrons can produce a more stable outer-shell arrangement. For many main-group elements, this tendency is summarized by the octet rule: atoms often form bonds or ions in ways that give them eight valence electrons, though there are important exceptions to that simplified rule. An incomplete valence shell therefore generally represents a condition in which an atom can lower its energy through interactions with other atoms, rather than the condition of greatest inherent stability. The U.S. Department of Energy’s overview of atomic structure describes electrons as occupying shells and explains the importance of outer-shell electrons in chemical behavior: DOE Explains: Atoms. The Royal Society of Chemistry also discusses electron arrangements and their connection to element reactivity: Royal Society of Chemistry periodic table.

QUESTION NO: 18

Which is not true of synovial joints?

A. They are found in the intervertebral discs of the spinal column.

B. They are the most common joint in the body.

C. They are the most moveable joint type in the body.

D. They have a fluid-filled capsule that surrounds their articulating surface.

ANSWER: A

Explanation:

“They are found in the intervertebral discs of the spinal column.” is the statement that is not true of synovial joints. Intervertebral discs join the bodies of adjacent vertebrae and are composed primarily of fibrocartilage: a tough outer annulus fibrosus surrounds the gel-like nucleus pulposus. These joints are classified as cartilaginous symphyses, rather than synovial joints. Their fibrocartilaginous structure permits limited movement while also providing shock absorption and resisting compressive forces placed on the vertebral column.

By contrast, synovial joints have a joint cavity, articular cartilage covering the contacting bone surfaces, and an articular capsule. The capsule encloses a synovial cavity containing synovial fluid, which reduces friction during movement. Synovial joints are the most abundant and freely movable class of joints in the body; common examples include the shoulder, hip, knee, and elbow. The distinction matters anatomically because the disc-based connections between vertebral bodies are designed chiefly for stability, load distribution, and only slight motion—not for the freely movable articulation characteristic of a synovial joint. See OpenStax: Synovial Joints and OpenStax: Cartilaginous Joints.

QUESTION NO: 19

How many centimeters are in a millimeter?

A. 10

B. 100

C. 1000

D. 1/10

ANSWER: D

Explanation:

There are **1/10** of a centimeter in 1 millimeter. In the metric system, the prefix *centi-* means one hundredth of a meter, while *milli-* means one thousandth of a meter. Therefore, 1 centimeter equals 10 millimeters. Reversing that relationship shows that 1 millimeter equals 1/10 centimeter, which can also be written as 0.1 centimeter. This conversion is especially useful in health-care calculations and measurements, where metric units are commonly used for dimensions, specimen measurements, and medication-related quantities. A reliable way to check the relationship is to remember that moving from millimeters to centimeters means moving to a larger unit. The numerical value must therefore become smaller: divide the number of millimeters by 10 to obtain centimeters. For one millimeter, 1 ÷ 10 = 0.1, or 1/10, centimeter. The National Institute of Standards and Technology describes the International System of Units and metric prefixes at NIST SI Units. Additional guidance on using SI units and prefixes is available from the International Bureau of Weights and Measures.

QUESTION NO: 20

What area(s) of the brain are the most affected if a person is unable to understand written or verbal speech?

A. Wernicke's area

B. Broca's area

C. Occipital lobe

D. Parietal lobe

E. A and B

ANSWER: A

Explanation:

Wernicke's area is the brain region principally associated with comprehension of language. It is usually located in the dominant hemisphere—most often the left—near the posterior part of the superior temporal lobe. This region processes the meaning of spoken words and contributes to understanding written language. When it is damaged, a person may have receptive aphasia, also called Wernicke aphasia. In this condition, speech can remain fluent and well articulated, but the individual has marked difficulty grasping what others say or interpreting written words. Their own spoken output may also contain inappropriate or meaningless words because language is not being monitored effectively for meaning.

The key feature in the question is impaired understanding rather than a problem with forming speech. Language comprehension depends on networks involving Wernicke's area, with reading also requiring connections to visual-language processing regions. In standard anatomy and nursing-exam terminology, however, Wernicke's area is the primary location identified for inability to understand verbal or written language. The National Institute on Deafness and Other Communication Disorders describes aphasia as a disorder that can impair speaking, understanding speech, reading, and writing. See NIDCD: Aphasia and NCBI Bookshelf: Neuroanatomy, Wernicke Area.

QUESTION NO: 21

What is 5.06 × 0.7?

A. 35.42

B. 3.542

C. 0.3542

D. 0.03542

ANSWER: B

Explanation:

The correct answer is **3.542**. To multiply decimals, first multiply the digits as whole numbers: 506 × 7 = 3,542. Then determine where the decimal point belongs in the product. The number 5.06 contains two digits to the right of its decimal point, and 0.7 contains one digit to the right of its decimal point. Together, the factors contain three decimal places, so the product must have three decimal places: 3.542. This result is also reasonable because multiplying 5.06 by 0.7 means finding seven-tenths of 5.06. Since seven-tenths is less than one, the result should be less than 5.06 but still in the range of several units; 3.542 fits that expected size. Decimal multiplication is commonly checked by estimating with compatible values: 5 × 0.7 = 3.5, which is close to 3.542. For additional guidance on multiplication and decimal-place reasoning, see Khan Academy's decimal multiplication lesson and OpenStax Prealgebra: Multiply and Divide Decimals.

QUESTION NO: 22

Multiply: (226)(55.3) =

A. 24,277.3

B. 12,497.8

C. 32,449.3

D. 11,936.5

ANSWER: B

Explanation:

12,497.8 is correct. Multiply 55.3 by 226 by separating 226 into 200, 20, and 6. First, 55.3 × 200 = 11,060. Next, 55.3 × 20 = 1,106. Finally, 55.3 × 6 = 331.8. Adding these partial products gives 11,060 + 1,106 + 331.8 = 12,497.8. Another reliable method is to temporarily treat 55.3 as 553, multiply 553 × 226, and then restore the decimal point. Since 55.3 contains one digit to the right of the decimal, the final product must contain one decimal place. The whole-number multiplication gives 124,978; placing the decimal one position from the right gives 12,497.8. Estimation also supports this result: 55.3 is close to 55, and 55 × 226 = 12,430, so a product near 12,500 is reasonable. This use of partial products and decimal-place placement follows standard decimal multiplication procedures described by OpenStax Prealgebra and Khan Academy.

QUESTION NO: 23

Despite increasing enrollments of women in medical schools, feelings of isolation among women medical students persist. Women students still have to contend with the social stereotype of a male doctor. In addition, institutions themselves may unintentionally foster feelings of separateness. Comparatively few women are hired for faculty positions, thus offering women students few role models. The pervasive sexual humor of male doctors and students further intensifies women students' alienation. Alienation, in turn, negatively affects individual self-perception. As women enter medical study in increasing numbers, they may feel less at odds with their peers and the teaching establishment. Institutional bias will, no doubt, also change in response to evolving societal values. However, we should not wait passively for gradual social processes to bring changes; schools must provide current students with support services designed to meet women's needs. In a recent study, 48 percent of the women questioned rated a student support group as the most important support service a school can provide.

In terms of its tone and form, the passage is most appropriately described as

A. an impassioned polemic

B. an indignant protest

C. a reasoned appeal

D. a detached summary

ANSWER: C

Explanation:

a reasoned appeal is the most accurate description because the passage combines a measured, evidence-based tone with a clear recommendation for action. Rather than relying on emotional language, personal attacks, or dramatic exaggeration, the writer presents information about the issue, including factual support such as a statistic, and uses that information to build a logical case. This restrained presentation creates a reasoned tone: readers are invited to consider the evidence and the practical implications of the problem.

The passage is also an appeal because it does more than report conditions. Its language urges medical schools to take responsibility and respond to the needs of current students instead of waiting for broader social change. That recommendation gives the passage a persuasive purpose. A reasoned appeal commonly supports a proposed course of action through facts, logical connections, and a calm, credible voice. This approach aligns with rhetorical guidance describing persuasion as the use of claims supported by evidence and reasoning. See the Purdue OWL guide to establishing arguments and the George Mason University Writing Center overview of rhetorical appeals.

QUESTION NO: 24

Which of the words in this sentence is a noun?

The girl likes to run and jump.

A. and

B. run

C. girl

D. likes

ANSWER: C

Explanation:

The correct answer is **girl**. In the sentence, “The girl likes to run and jump,” **girl** names a person. Words that name people, places, things, or ideas are nouns. Here, “The” functions as an article that introduces the noun, and “girl” is the subject of the sentence—the person performing the action expressed by “likes.” Identifying the subject can be a helpful way to locate a noun: ask who or what is doing the action. The answer is “the girl.” More specifically, “girl” is a common noun because it names a general person rather than one particular person’s name. Nouns can serve several roles in sentences, including subject, object, or object of a preposition; in this example, “girl” serves as the subject. For additional guidance on recognizing nouns and their functions in sentences, see the Purdue Online Writing Lab’s overview of nouns and Merriam-Webster’s definition of a noun.

QUESTION NO: 25

Select the phrase that makes this sentence grammatically correct.

Next year, I _____.

A. completed my college degree

B. did complete my college degree

C. will complete my college degree

D. completing my college degree

ANSWER: C

Explanation:

The correct completion is “will complete my college degree” because “next year” establishes that the action is expected to occur in the future. In English, the simple future is commonly formed with *will* followed by the base form of the verb. Here, *will* is the future auxiliary verb and *complete* is the base verb, producing the complete independent clause: “Next year, I will complete my college degree.” This construction clearly communicates a future plan, prediction, or expectation and agrees with the subject “I.” The phrase also supplies both the verb phrase and the object needed to make the sentence complete and grammatical. Future-time expressions such as “next year,” “tomorrow,” and “soon” frequently signal that a future verb form may be appropriate, particularly when the speaker is making a straightforward statement about a later event. The British Council describes *will* as a modal verb used to refer to future events, with the main verb remaining in its base form. Purdue OWL also explains that verbs must be in forms that accurately communicate when an action occurs. See British Council: Talking about the future and Purdue OWL: Verb Tenses.

QUESTION NO: 26

Moving the arm toward the body would be described as a _____ movement, rather than a _____ movement.

A. distal, proximal.

B. proximal, distal.

C. proximal, anterior.

D. anterior, superior.

ANSWER: B

Explanation:

“proximal, distal.” is correct because *proximal* describes a direction or position closer to the trunk of the body or to the point where a limb attaches. For an arm, the shoulder is the attachment point, so movement along the limb in the direction of the shoulder and trunk is movement in a proximal direction. This terminology is especially useful for structures on the limbs, where describing a location as closer to or farther from the trunk is more precise than using terms such as upper or lower. For example, the elbow is proximal to the wrist because it is closer to the shoulder and trunk. Conversely, the wrist lies farther from the limb’s attachment point, which establishes the paired directional relationship tested in this question. In clinical anatomy, proximal and distal provide a consistent way to communicate the relative location of injuries, symptoms, blood vessels, nerves, and other structures within an extremity. The directional-term definitions used here are consistent with standard anatomical terminology described by OpenStax Anatomy and Physiology: Anatomical Terminology and the NCBI Bookshelf overview of anatomical terminology.

QUESTION NO: 27

Which of the following would be a categorized as a flat bone?

A. Vertebrae

B. Metatarsals

C. Femur

D. Scapula

E. Mandible

ANSWER: D

Explanation:

The scapula is correctly categorized as a flat bone. Flat bones are generally thin, broad, and often somewhat curved, a shape that gives them a wide surface for muscle attachment while also helping protect underlying structures. The scapula, commonly called the shoulder blade, is a broad triangular bone on the posterior side of the thorax. It serves as an important attachment site for numerous muscles that move and stabilize the shoulder and upper limb. Its structure also contributes to protection of the posterior upper thoracic region.

Bone classification is based primarily on shape rather than location. Standard anatomical classifications identify flat bones as including the cranial bones, sternum, ribs, and scapulae. Recognizing the scapula as a flat bone is useful because its broad body, thin profile, and prominent surfaces—such as the subscapular fossa and supraspinous and infraspinous fossae—reflect its role in supporting extensive muscular attachments and coordinated shoulder movement. This classification is consistently used in introductory anatomy and physiology materials. See the OpenStax discussion of bone classification and StatPearls overview of the scapula.

QUESTION NO: 28

Reading Material

Smallpox is one of the deadliest and dangerous diseases affecting the human population across the world. The first recorded epidemic was in 1350 BC during the Egyptian-Hittite war, and it was quite prevalent in the late 1800’s through a large part of the 1900’s. Approximately five hundred million people were infected with the disease prior to its eradication in the 1970’s, with the last case being in Somalia in 1977. Symptoms of infection included excessive bleeding, high fever, delirium, vomiting, and a raised pink rash. Most cases of smallpox ended in death and survivors were often seriously maimed by pock marks, blindness, or infertility. The pain and suffering remained for a lifetime after the disease was gone.

There is no known cure for smallpox, only preventative vaccinations. Because smallpox was wiped out in 1970′ s, the World Health Organization (W.H.O.) recommended that all countries stop vaccinating for the disease in 1980. This means that today, most young people are not vaccinated against the disease. Because the disease is considered eradicated, the issue of what to do with the remaining government-held vaccines has been an issue of debate. Should the stored vaccines be destroyed since the disease is no longer a concern, or do we keep them in storage for research or in case of an unexpected outbreak? Experts at the Center for Disease Control (C.D.C.) and the World Health Organization have spent an enormous amount of time researching this issue and have given much educated thought to the matter. Reportedly the W.H.O. wants to destroy all vaccines, however some scientists feel the destruction could do more harm than good.

The issue of bioterrorism adds another layer of complexity to the issue. In the case of smallpox, just a small amount of the virus released in the air could infect thousands of people in 6-24 hours. If such a disease were used as a weapon, we would obviously want the vaccine available for use. However, the fact that the vaccine still exists allows the use of smallpox for bioterrorism in the first place. If we could be sure all of the vaccine was destroyed, the decision may be a bit easier, but what if it the vaccine were only partially destroyed, and the remainder was used by an unfriendly nation?

In this world of global unrest and increasing technology, bioterrorism will come an increasing concern. The smallpox virus could be a serious threat to world health should any nation engage in the act if bioterrorism against an enemy. The question remains: do we run the risk of bioterrorism by continuing to store the medicine for several hundred smallpox vaccinations or do we destroy the vaccine and pray that there is no outbreak of the deadly virus? Because it is unknown at this time if researchers are able to re-create the vaccine, either solution may have permanent consequences.

Which of these statements can be inferred from the second paragraph of the accompanying article on smallpox?

A. The W.H.O. and the C.D.C disagree about how to handle the remaining vaccines.

B. Smallpox is one of the oldest known diseases, dating back to ancient Egypt.

C. There is no dispute as to how the remaining vaccines should be handled.

D. Smallpox is a very deadly disease.

ANSWER: A

Explanation:

The W.H.O. and the C.D.C disagree about how to handle the remaining vaccines. is the supported inference because the paragraph presents an unresolved policy debate involving the organizations and scientists studying the issue. It states that the World Health Organization reportedly favors destroying the remaining stored vaccines, while some scientists believe that destroying them could cause more harm than good. Those competing conclusions establish disagreement over whether the supplies should be eliminated or retained for research and possible future use. The passage does not need to identify every individual scientist’s institutional position for the reader to infer a conflict among the public-health experts and organizations discussed in the paragraph. The debate also makes practical sense in the context of eradication: routine vaccination ended after smallpox was eradicated, but governments and health authorities still consider preparedness, research, and the consequences of an unexpected reappearance. The World Health Organization confirms that smallpox was eradicated in 1980 and that routine vaccination is no longer recommended for the general public. The CDC likewise describes smallpox as eradicated while maintaining preparedness information because of the serious consequences of a possible intentional release. See the World Health Organization’s smallpox overview and the CDC’s smallpox information.

QUESTION NO: 29

Select the meaning of the underlined word.

The nurse considered the patient's irregular breathing an ominous sign.

A. Insignificant

B. Significantly important and dangerous

C. Hopeful

D. Imperceptible

ANSWER: B

Explanation:

“Significantly important and dangerous” is correct because *ominous* describes something that suggests a threatening, harmful, or unfavorable event may happen. In this context, the nurse views the patient’s irregular breathing as a warning sign that could indicate a serious decline in the patient’s condition. The word therefore conveys both the clinical importance of the observation and the concern that it may foreshadow danger. In health-care communication, recognizing ominous signs is important because they can signal a need for prompt assessment and intervention. Major dictionaries define *ominous* as giving the impression that something bad or unpleasant is going to happen, which directly supports this meaning. See the Merriam-Webster definition of “ominous” and the Cambridge Dictionary definition of “ominous”.

QUESTION NO: 30

Which of these is the best definition of the word succinct?

A. angry

B. short

C. old

D. sweet

ANSWER: B

Explanation:

The correct definition is **short**. *Succinct* describes communication that is expressed briefly and clearly, using no more words than necessary to convey the intended meaning. A succinct response is therefore short, direct, and focused on the essential point. For example, instead of giving a lengthy account with unnecessary details, a person might provide a succinct summary that communicates the key information efficiently. In vocabulary questions, recognizing the central meaning of a word is important: *succinct* is commonly used to characterize writing, speech, explanations, and summaries that are concise and to the point. Major dictionaries define the term in this way. Merriam-Webster defines *succinct* as “marked by brevity and clarity,” while Cambridge Dictionary describes it as using few words and being clear. These definitions support choosing **short** as the best available answer, because it captures the core idea of brevity. Although succinct communication is also clear and meaningful, “short” is the closest definition among the provided choices. See Merriam-Webster’s definition of succinct and Cambridge Dictionary’s definition of succinct.

QUESTION NO: 31

What is the decimal equivalent of 3/8?

A. 0.625

B. 0.375

C. 0.875

D. 0.125

ANSWER: B

Explanation:

The decimal equivalent of **3/8** is **0.375**. A fraction represents division: the numerator is divided by the denominator. Therefore, calculate 3 ÷ 8. Since 8 does not go into 3 as a whole number, write a decimal point and continue with zeros: 30 ÷ 8 = 3, with a remainder of 6; 60 ÷ 8 = 7, with a remainder of 4; and 40 ÷ 8 = 5, with no remainder. This produces 0.375. The result can also be confirmed by recognizing that 1/8 equals 0.125. Multiplying 0.125 by 3 gives 0.375, which corresponds to three eighths. Converting common fractions to decimals by division is an important foundational calculation for HESI A2

math questions, particularly when comparing quantities, working with measurements, or solving dosage-style proportion problems. For additional practice with converting fractions to decimals, see Khan Academy's fraction-to-decimal lesson and Math Is Fun's guide to converting fractions and decimals.

QUESTION NO: 32

Select the best word for the blank in the following sentence.

The United States has _____ states than Europe has countries; there are only 47 European countries, but there are 50 states in America.

A. the more

B. most

C. more

D. many

ANSWER: C

Explanation:

The correct word is "more." The sentence directly compares two quantities: the number of U.S. states and the number of European countries. Because the United States has 50 states and Europe has 47 countries, the United States has a greater number. "More" is the comparative form used with countable nouns such as "states" when one quantity is being compared with another, and it correctly pairs with "than": "The United States has more states than Europe has countries." The word also agrees with the numerical evidence supplied in the sentence, which establishes that 50 exceeds 47. Comparative forms are used to show a difference between two people, things, groups, or amounts; standard English grammar commonly forms this comparison with "more + noun + than." The Cambridge Dictionary grammar guide on comparison explains the use of "more" in comparative structures. For additional guidance on comparative adjectives and their use with "than," see the Purdue OWL guide to adjectives and adverbs.

QUESTION NO: 33

Respiration rates are regulated by which of the following?

A. Increasing levels of oxygen

B. Increasing levels of nitrogen

C. Increasing levels of carbon dioxide

D. Decreasing levels of oxygen

E. Decreasing level of carbon dioxide

ANSWER: C

Explanation:

Increasing levels of carbon dioxide is correct because arterial carbon dioxide is the principal short-term chemical regulator of ventilation under normal conditions. Carbon dioxide readily crosses the blood-brain barrier and, in cerebrospinal fluid, contributes to an increase in hydrogen ion concentration. Central chemoreceptors in the medulla respond to this change by signaling respiratory centers to increase the rate and depth of breathing. The resulting increase in alveolar ventilation removes more carbon dioxide from the body, helping return carbon dioxide and acid-base balance toward normal.

This control mechanism is especially important because dissolved carbon dioxide participates in the carbonic-acid/bicarbonate buffer system. A rise in carbon dioxide can lower blood pH, so increasing ventilation is an effective rapid response for limiting respiratory acidosis. In healthy people at rest, this carbon-dioxide-driven response provides the dominant stimulus for respiratory regulation. Peripheral chemoreceptors also contribute to respiratory control in particular

physiologic circumstances, but the key general stimulus tested here is an increase in blood carbon dioxide. See the NCBI StatPearls overview of respiratory physiology and OpenStax's discussion of respiratory regulation.

QUESTION NO: 34

What is the best definition of biopsy?

A. administer a written test

B. enter a conversation

C. remove for observation or study

D. conduct an interview

ANSWER: C

Explanation:

The correct answer is *remove for observation or study*. A biopsy is a medical procedure in which a clinician removes a small sample of cells, tissue, or sometimes fluid from the body so it can be examined, usually under a microscope or with laboratory testing. The purpose is to obtain diagnostic information—for example, to determine whether a growth is benign or malignant, identify inflammation or infection, or evaluate changes in an organ or tissue. The word is formed from terms referring to life and viewing, reflecting the examination of living tissue. Although the wording is brief, "remove for observation or study" accurately captures the essential action and purpose of a biopsy: taking a specimen from the body for professional analysis. Biopsies may be performed using a needle, an endoscope, a punch instrument, or minor surgery, depending on the location and type of tissue being evaluated. The National Cancer Institute defines a biopsy as the removal of cells or tissues for examination by a pathologist, and MedlinePlus similarly describes it as the removal of tissue or cells from the body for examination. National Cancer Institute: Biopsy and MedlinePlus: Biopsy.

QUESTION NO: 35

The release of prolactin during breastfeeding is an example of _____?

A. Negative feedback

B. Positive feedback

C. Gene regulation

D. Protein synthesis

E. Cell permeability

ANSWER: B

Explanation:

Positive feedback is correct. During breastfeeding, infant suckling activates sensory receptors in the nipple and sends neural signals to the hypothalamus. This reduces hypothalamic inhibition of prolactin secretion, allowing the anterior pituitary to release prolactin. Prolactin acts on mammary tissue to support continued milk synthesis. As nursing continues, the repeated suckling stimulus promotes additional prolactin release and helps maintain the milk supply required for feeding.

This is commonly taught as a positive-feedback process because the ongoing response to suckling supports and reinforces continued lactation: more effective nursing produces continued hormonal stimulation and milk production. It is part of the coordinated neuroendocrine response to breastfeeding. The related milk-ejection, or let-down, reflex is mediated primarily by oxytocin, whereas prolactin is the principal hormone supporting milk production. The endocrine regulation of lactation and the roles of prolactin and oxytocin are described in NCBI Bookshelf: Physiology, Lactation and OpenStax Anatomy and Physiology: The Pituitary Gland and Hypothalamus.

QUESTION NO: 36

Foods such as oils, milk, and butter contain high amounts of:

A. proteins.

B. carbohydrates.

C. calcium.

D. lipids.

ANSWER: D

Explanation:

“lipids.” is correct because lipids are fats and fat-like substances that provide a concentrated source of energy and support essential body functions, including cell-membrane structure, insulation, and absorption of the fat-soluble vitamins A, D, E, and K. Oils and butter consist predominantly of dietary fat, chiefly triglycerides, which are the most common form of lipid in foods and in the body. Milk also contains fat, although the amount varies substantially by type; whole milk has more milk fat than reduced-fat, low-fat, or fat-free milk. In nutrition questions, oils and butter are classic examples of foods rich in lipids, and milk is included because dairy foods can contribute fat to the diet. Lipids provide about 9 calories per gram, making them more energy-dense than carbohydrate or protein. The National Institutes of Health explains that dietary fats are an important nutrient and identifies oils, butter, and dairy products among dietary sources of fat. More detail on dietary fats and their functions is available from the National Institute of Diabetes and Digestive and Kidney Diseases and the MedlinePlus dietary fats overview.

QUESTION NO: 37

In which part of the body is keratin NOT found?

A. Hair

B. Skin

C. Nails

D. Teeth

ANSWER: D

Explanation:

Teeth is the correct answer because the mature, visible structures of teeth are not made of keratin. Teeth are composed primarily of highly mineralized tissues: enamel covers the crown and is largely mineral, dentin forms most of the tooth beneath it, and cementum covers the root. Their hardness and function in biting and chewing depend on this mineralized composition, rather than on keratin fibers.

Keratin is a tough structural protein associated with keratinized epithelial structures. In the body, it provides mechanical strength and protection in tissues exposed to friction or the external environment. By contrast, a tooth is a specialized calcified organ whose outer enamel is formed through a developmental process involving enamel proteins and mineral deposition. Once mature, enamel is predominantly hydroxyapatite mineral, which accounts for its exceptional hardness. This distinction between protein-based protective structures and mineralized dental tissues is the key concept tested here. The National Institute of Dental and Craniofacial Research describes enamel as the hard outer layer of a tooth, while MedlinePlus explains keratin’s role as a structural protein in the body. See NIDCR tooth anatomy information and MedlinePlus information on proteins.

QUESTION NO: 38

What is the best description for the word comply?

A. to argue loudly

B. to soften or make malleable

C. to reluctantly agree

D. to follow instructions willingly

ANSWER: D

Explanation:

The best description of *comply* is “to follow instructions willingly.” To comply means to act in accordance with a request, instruction, rule, standard, or requirement. In a health-care or academic setting, a person may comply with safety procedures, follow a medication plan, or meet a program requirement. The central idea is that the person follows what has been asked or required rather than resisting it or doing something different. “Willingly” is a useful part of this description because the usual meaning of comply involves agreeing to conform or cooperate with a direction or expectation. For example, a student who complies with examination procedures follows the stated rules for the exam, while a patient who complies with discharge instructions carries out the care directions provided. Major dictionaries define *comply* as acting in accordance with a request, demand, rule, or condition. See Merriam-Webster’s definition of comply and Cambridge Dictionary’s definition of comply.

QUESTION NO: 39

Phagocytes in the immune system are responsible for the biological action of:

A. Secreting.

B. Consuming.

C. Altering.

D. Building

ANSWER: B

Explanation:

Consuming is correct because phagocytes are immune cells that protect the body by carrying out phagocytosis, a process in which the cell recognizes, surrounds, engulfs, and digests foreign material. This material can include bacteria, fungi, cellular debris, and other particles that may threaten tissue health. Important phagocytes include neutrophils, macrophages, and dendritic cells. Their cell membrane extends around a target and encloses it inside a membrane-bound compartment called a phagosome. The phagosome then fuses with lysosomes, whose enzymes and antimicrobial substances break down the engulfed material. In this sense, “consuming” accurately summarizes the defining action of phagocytes: they take invaders into the cell and destroy them. This activity is a central component of innate immunity, providing a rapid defense before the body develops a more targeted adaptive immune response. Macrophages can also help connect innate and adaptive immunity by processing engulfed material and presenting antigen fragments to lymphocytes. For an overview of phagocytosis and the functions of phagocytic cells, see the NCBI Bookshelf discussion of innate immunity and the Merck Manual overview of immune-system cellular components.

QUESTION NO: 40

The oxidation of the NADH molecules to produce oxygen and water in cellular respiration takes place in a series of steps defined as:

A. Cellular inspiration.

B. Krebs cycle.

C. Electron transport chain.

D. Cellular conversion.

ANSWER: C

Explanation:

The electron transport chain is the series of membrane-associated protein complexes in which NADH is oxidized during aerobic cellular respiration. NADH donates high-energy electrons to the first complex of the chain, regenerating NAD^+. The electrons are then passed through successive carriers embedded in the inner mitochondrial membrane. As this transfer occurs, energy released from the electrons is used to pump protons across the membrane, establishing an electrochemical proton gradient.

Oxygen serves as the terminal electron acceptor at the end of this chain. It accepts electrons and combines with protons to form water. Thus, oxygen is consumed and reduced to water rather than produced. The stored energy in the proton gradient subsequently drives ATP synthase, which produces ATP through oxidative phosphorylation. This linked process explains why the electron transport chain is central to efficient aerobic energy production and why a continuous supply of oxygen is needed for it to proceed. See OpenStax Biology 2e: Oxidative Phosphorylation and NCBI Bookshelf: Oxidative Phosphorylation.

QUESTION NO: 41

Which scientists are responsible for describing the structure of DNA?

A. Watson and Crick.

B. Watson and Holmes.

C. Holmes and Croiger.

D. Brown and Curie.

ANSWER: A

Explanation:

Watson and Crick is correct because James Watson and Francis Crick published the landmark 1953 model describing DNA as a double helix. Their model explained that DNA consists of two nucleotide strands coiled around one another, with specific base pairing between the strands. This structure provided a physical explanation for how genetic information can be stored in DNA and copied during cell division: each strand can serve as a template for construction of a complementary new strand. The double-helix model became a central foundation of modern molecular biology and genetics. Watson and Crick's proposal drew on experimental evidence available at the time, including X-ray diffraction findings and chemical knowledge about the DNA bases. Their original article, "Molecular Structure of Nucleic Acids," appeared in *Nature* in 1953 and concisely presented the double-helical structure and its implications for replication. For an authoritative historical account and the original publication, see Nature: Molecular Structure of Nucleic Acids and NHGRI: Discovery of the DNA Double Helix.

QUESTION NO: 42

A salesman spent $34 at the store in the first week of December. He spent $73 during each of weeks two and three. The last week, he spent another $123. What was his average weekly expense during the month of December?

A. $57.50

B. $75.75

C. $73.00

D. $101.00

ANSWER: B

Explanation:

The correct answer is **$75.75**. An average weekly expense is found by adding the expenses for all four weeks and dividing the total by the number of weeks. The weekly amounts are $34 for the first week, $73 for the second week, $73 for the third week, and $123 for the last week. Their total is $34 + $73 + $73 + $123 = $303. Because December is described here as four weekly spending periods, divide $303 by 4: $303 ÷ 4 = $75.75. Therefore, the salesman's mean weekly expense for the month was $75.75. This calculation uses the arithmetic mean, which represents an equal share of the total amount across each of the four weeks. For a review of calculating an average, see Khan Academy's explanation of mean. For additional practice with averages and arithmetic, see Math Is Fun: How to Calculate the Mean.

QUESTION NO: 43

Which is not a part of the electrical conduction system of the heart?

A. Purkinje fibers

B. bundle of His

C. AV Node

D. chordae tendineae

ANSWER: D

Explanation:

The chordae tendineae are not part of the heart's electrical conduction system. They are strong, fibrous connective-tissue cords located in the ventricles. Their mechanical role is to connect the cusps of the atrioventricular valves—the tricuspid and mitral valves—to papillary muscles in the ventricular walls. When the ventricles contract, papillary muscles tighten the chordae tendineae, helping prevent the valve cusps from prolapsing backward into the atria. This support helps maintain one-way blood flow through the heart during ventricular systole.

In contrast, the electrical conduction system consists of specialized cardiac cells that generate and transmit impulses to coordinate the timing of atrial and ventricular contraction. Its pathway includes the sinoatrial node, atrioventricular node, atrioventricular bundle (bundle of His), bundle branches, and Purkinje fibers. The chordae tendineae do not generate, conduct, or distribute electrical signals; they instead provide structural support for valve function. Therefore, *chordae tendineae* is the correct response to a question asking which structure is not part of cardiac electrical conduction. See StatPearls: Physiology, Cardiac Conduction System and StatPearls: Anatomy, Thorax, Heart Chordae Tendineae.

QUESTION NO: 44

Cystic fibrosis is a disease that is passed down through families. It is caused by a defective gene that makes the body produce abnormally thick and sticky fluid, called mucus. This mucus builds up in the breathing passages of the lungs and in the pancreas. The buildup of mucus results in life-threatening lung infections and serious digestion problems. The disease may also affect the sweat glands and a man's reproductive system. Millions of Americans carry a CF gene, but do not have symptoms. This is because a person with CF must inherit two defective genes, one from each parent. About 1 in 29 Caucasian Americans have the CF gene. It is more common among those of northern or central European descent. Most children with CF are diagnosed by age 2. For a small number, the disease is not detected until age 18 or older. These children often have a milder form of the disease.

Which statement is not a detail from the passage?

A. Most children with CF are diagnosed by age 2.

B. About 1 in 39 Caucasian Americans have the CF gene.

C. Millions of Americans carry a CF gene, but do not have symptoms.

D. Mucus is a thick, sticky fluid that cystic fibrosis sufferers produce internally.

ANSWER: B

Explanation:

“About 1 in 39 Caucasian Americans have the CF gene.” is the statement that is not a detail from the passage because the passage gives the carrier frequency as about 1 in 29 Caucasian Americans, not 1 in 39. The distinction matters because this is a detail-recall question: the task is to compare the exact numerical claim in each statement with the wording and figures supplied in the reading, rather than relying on a general impression of the topic. Cystic fibrosis is an inherited condition caused by changes in the CFTR gene, and people who carry one altered copy generally do not have cystic fibrosis themselves. Carrier-frequency statistics are commonly presented as population estimates, so accurately retaining the number stated in the assigned passage is essential. For additional background on cystic fibrosis inheritance and carrier status, see the Cystic Fibrosis Foundation overview and MedlinePlus Genetics’ cystic fibrosis resource. Thus, the use of “39” makes this statement the one that does not match the passage’s reported detail.

QUESTION NO: 45

Meiosis produces _____ cells and mitosis produces _____ cells.

A. somatic; germ

B. body; somatic

C. germ; gametic

D. germ; somatic

ANSWER: D

Explanation:

Meiosis produces germ cells, while mitosis produces somatic cells. Germ cells are the reproductive-cell lineage that gives rise to gametes, such as eggs and sperm. During meiosis, one diploid precursor cell undergoes two successive divisions, reducing the chromosome number and ultimately producing haploid cells. This reduction is essential because fertilization combines genetic material from two gametes; maintaining a haploid chromosome number in gametes allows the resulting offspring to have the normal diploid number for the species.

Mitosis serves growth, tissue repair, cell replacement, and asexual reproduction in some organisms. It produces daughter cells with the same chromosome number and, barring mutation, the same genetic information as the original cell. These are somatic, or body, cells—the cells that make up most nonreproductive tissues and organs. Thus, the pairing “germ; somatic” accurately identifies the primary cell types associated with meiosis and mitosis. The National Human Genome Research Institute describes meiosis as the process that forms egg and sperm cells, and OpenStax explains that mitosis produces genetically identical daughter cells used in growth and repair. See NHGRI: Meiosis and OpenStax Biology: The Cell Cycle.

QUESTION NO: 46

What type of joint is present in the elbow?

A. Hinge joint

B. Saddle joint

C. Gliding joint

D. Pivot joint

E. Ball and socket joint

ANSWER: A

Explanation:

The elbow is primarily a hinge joint. Its humeroulnar and humeroradial articulations are synovial joints designed chiefly to permit flexion and extension, the movements that bend and straighten the forearm. The shape and arrangement of the joint surfaces, supported by strong collateral ligaments, guide motion mainly along a single axis, much like the movement of a door hinge. This structure lets a person bring the hand toward the shoulder during flexion and return the arm to a straight position during extension. Although the elbow region also includes the proximal radioulnar joint, which contributes to forearm rotation, the standard anatomical classification of the elbow joint itself is a hinge joint. This distinction is useful in anatomy questions: the elbow’s main functional movement is bending and straightening rather than broad multidirectional movement. Authoritative anatomy references describe the elbow as a hinge-type synovial joint and identify flexion and extension as its principal actions. See StatPearls: Anatomy, Shoulder and Upper Limb, Elbow Joint and OpenStax Anatomy & Physiology: Synovial Joints.

QUESTION NO: 47

Which of these is the best definition of the word postulate?

A. move

B. gather

C. claim

D. disagree

ANSWER: C

Explanation:

The correct answer is “claim.” As a verb, *postulate* means to put forward, assume, or assert an idea as true, especially as a basis for further reasoning or discussion. For example, a scientist may postulate that a particular factor causes an observed result, meaning the scientist proposes that claim as a starting point for investigation. In mathematics and logic, the related noun *postulate* refers to a statement accepted as true without proof and used as a foundation for reasoning. The core meaning in both uses is the act of asserting or proposing a statement, which is why “claim” is the closest available definition. Merriam-Webster defines *postulate* as to “assume or claim as true, existent, or necessary,” directly supporting this answer. Cambridge Dictionary similarly describes it as suggesting an idea or theory, often as a basis for further discussion. In vocabulary questions, selecting the closest synonym requires identifying the central action expressed by the word; here, that action is making or advancing an assertion. See Merriam-Webster: postulate and Cambridge Dictionary: postulate.

QUESTION NO: 48

How many feet are there in 2.5 miles?

A. 7,920 feet

B. 10,560 feet

C. 13,200 feet

D. 15,840 feet

ANSWER: C

Explanation:

13,200 feet is correct. One mile contains 5,280 feet. Multiply 2.5 miles by 5,280 feet per mile: 2.5 × 5,280 = 13,200. The mile units cancel, leaving feet. This result can also be found by calculating half of 5,280, which is 2,640, and adding it to 10,560 feet for 2 full miles. For customary-length conversion information, see NIST: SI Units of Length.

QUESTION NO: 49

Which of these sentences is written correctly?

A. Its been a great day.

B. It’s been a great day.

C. Its has been a great day.

D. It’s has been a great day.

ANSWER: B

Explanation:

“It’s been a great day.” is written correctly because *it’s* is the contraction of *it has* in this context. The full, expanded sentence is “It has been a great day,” which is grammatically complete and uses the present-perfect construction *has been*. An apostrophe is required in *it’s* to indicate that letters have been omitted from the contraction. This use is distinct from *its*, which is a possessive pronoun, as in “The dog wagged its tail.” A practical way to check the usage is to replace *it’s* with either “it is” or “it has.” If one of those expansions fits the sentence, the apostrophe is appropriate. Here, “It has been a great day” fits naturally, confirming that *It’s been a great day.* is correct. For further guidance on apostrophes and contractions, see the Purdue Online Writing Lab’s apostrophe guide and the Cambridge Dictionary explanation of it’s versus its.

QUESTION NO: 50

Reading Material

(1) The study, published today in Nature Microbiology, holds promise for a new treatment method against antibiotic-resistant bacteria (commonly known as superbugs). (2) The star-shaped structures are short chains of proteins called ‘peptide polymers’, and were created by a team from the Melbourne School of Engineering.

(3) The team included Professor Greg Qiao and PhD candidate Shu Lam, from the Department of Chemicaland Biomolecular Engineering, as well as Associate Professor Neil O’Brien-Simpson and Professor Eric Reynolds from the Faculty of Medicine, Dentistry and Health Sciences and Bio21 Institute.

(4) Professor Qiao said that currently the only treatment for infections caused by bacteria is antibiotics. (5) However, over time bacteria mutate to protect themselves against antibiotics, making treatment no longer effective. (6) These mutated bacteria are known as ‘superbugs’.

(7) “It is estimated that the rise of superbugs will cause up to ten million deaths a year by 2050. (8) In addition, there have only been one or two new antibiotics developed in the last 30 years,” he said.

(9) Professor Qiao and his team have been working with peptide polymers in the past few years. (10) Recently, the team created a star-shaped peptide polymer that was extremely effective at killing Gram-negative bacteria - a major class of bacteria known to be highly prone to antibiotic resistance - while being non-toxic to the body.

(11) In fact, tests undertaken on red blood cells showed that the star-shaped polymer dosage rate would needto be increased by a factor of greater than 100 to become toxic.

(12) The star-shaped peptide polymer is also effective in killing superbugs when tested in animal models. (13) Furthermore, superbugs showed no signs of resistance against these peptide polymers.

(14) The team discovered that their star-shaped peptide polymers can kill bacteria with multiple pathways,unlike most antibiotics which kill with a single pathway.

(15) They believe that this accounts for the superior performance of the star-shaped peptide polymers overantibiotics. (16) One of these pathways includes ‘ripping apart’ the bacteria cell wall.

(17) While more research is needed, Professor Qiao and his team believe that their discovery is the beginning of unlocking a new treatment for antibiotic-resistant pathogens.

Which of these statements cannot be inferred from the passage?

A. The polymers seem to be effective in killing the bacteria because they kill with multiple pathways as opposed to antibiotics’ one pathway.

B. If we do not develop some kind of treatment, the death rate from superbugs will continue to rise.

C. Scientists need to continue to study the polymers’ effectiveness against superbugs.

D. These new polymers are completely safe to use in humans and will defend against all antibiotic-resistant pathogens.

ANSWER: D

Explanation:

“These new polymers are completely safe to use in humans and will defend against all antibiotic-resistant pathogens.” cannot be inferred because the passage reports promising early findings, not a proven universal treatment. The reported safety evidence is limited to tests involving red blood cells and describes the dosage required to become toxic; it does not establish complete safety for people. Human safety requires further research, including carefully designed clinical studies that assess dosage, side effects, interactions, and outcomes in diverse patients.

Likewise, the passage says the polymers were effective against Gram-negative bacteria and superbugs in animal models, and that no resistance was observed in the testing described. Those findings support potential, but they do not demonstrate protection against every antibiotic-resistant pathogen. The final sentence explicitly says that more research is needed, which confirms that the discovery is at an investigational stage rather than ready for universal human use. This distinction between encouraging preclinical results and established treatment effectiveness is central to sound scientific reading. The University of Melbourne’s report characterizes the work as a potential new approach, and the study record is available through Nature Microbiology. For context on the steps needed before medicines are used in people, see the FDA clinical research overview.

QUESTION NO: 51

The largest organ in the body is the _____.

A. Skin.

B. GI tract.

C. Femur.

D. Stomach.

ANSWER: A

Explanation:

The skin is the body's largest organ. It forms the integumentary system and covers the external surface of the body, creating a broad protective barrier between internal tissues and the outside environment. In an average adult, the skin has an area of roughly 1.5 to 2 square meters and accounts for approximately 15% of total body weight. Its size reflects the many essential functions it performs: limiting water loss, helping regulate body temperature through sweat production and changes in blood flow, detecting touch, pain, pressure, and temperature, and helping protect against physical injury, chemicals, and microorganisms. The skin also contributes to vitamin D production when exposed to ultraviolet light. Although some internal organs may be heavier in particular individuals, standard anatomy references identify the skin as the largest organ based primarily on its surface area and overall extent. This is why "Skin." is the correct completion of the question. See the NCBI StatPearls overview of skin anatomy and the Cleveland Clinic's skin overview for further information.

QUESTION NO: 52

What does lipase do?

A. It breaks down nucleic acids into nucleotides.

B. It breaks down carbohydrates into starch and sugar.

C. It breaks down fats into fatty acids and glycerol.

D. It breaks down proteins into peptides and amino acids.

ANSWER: C

Explanation:

Lipase is a digestive enzyme that hydrolyzes dietary lipids (fats), especially triglycerides. Its action breaks the chemical bonds in triglycerides to produce free fatty acids and glycerol (more precisely, digestion often initially yields free fatty acids and monoglycerides). This process is essential because fats cannot be absorbed efficiently in their original large-molecule form. In the small intestine, bile first emulsifies fat into smaller droplets, increasing the surface area available for pancreatic lipase to act. The resulting digestion products can then combine with bile salts in micelles and be transported to the intestinal surface for absorption. Therefore, "It breaks down fats into fatty acids and glycerol." accurately states lipase's central digestive function. Lipase is produced in several sites, including the pancreas, and pancreatic lipase is the major enzyme responsible for digestion of dietary triglycerides in the small intestine. Understanding enzyme specificity is useful in anatomy and physiology because each digestive enzyme acts on a particular class of nutrient molecule. For further review, see the NCBI Bookshelf overview of pancreatic lipase and OpenStax's discussion of lipid digestion and absorption.

QUESTION NO: 53

What is the best description for the word retain?

A. eliminate

B. keep

C. despair

D. eject

ANSWER: B

Explanation:

The correct answer is **keep**. *Retain* means to continue to have, hold, possess, remember, or preserve something rather than losing, removing, or releasing it. For example, a student may retain information learned in class, meaning the student keeps that knowledge in memory. In a healthcare setting, a patient may retain fluids, meaning the body keeps more fluid than it should. The word can also refer to maintaining possession of an object, such as retaining important medical records or retaining a copy of a form for future reference.

This meaning is consistent across common uses of the word: something retained is something kept or maintained. Recognizing this direct synonym is useful for HESI A2 vocabulary questions, which often test whether you can identify the closest meaning of a word from context or select its most accurate definition. Merriam-Webster defines *retain* as “to keep in possession or use,” while Cambridge Dictionary similarly defines it as continuing to have or use something. See Merriam-Webster: retain and Cambridge Dictionary: retain.

QUESTION NO: 54

Which word means "to stop or subdue"?

A. Predispose

B. Patent

C. Suppress

D. Recur

ANSWER: C

Explanation:

Suppress means to restrain, put an end to, prevent the development or expression of, or subdue something. In health-care and scientific contexts, it is often used for stopping or reducing a process, symptom, reaction, or activity—for example, suppressing a cough, suppressing inflammation, or suppressing the body’s immune response. The word can also describe bringing something under control by force or authority, as in suppressing a rebellion. These uses directly match the meaning “to stop or subdue.” The Merriam-Webster dictionary defines “suppress” in part as putting down by authority or force and keeping from public knowledge or expression, while Cambridge Dictionary includes stopping something from continuing or preventing it from being expressed. Knowing this term is useful in medical vocabulary because it frequently appears in descriptions of treatments that limit a bodily function or response rather than necessarily eliminating its underlying cause. See Merriam-Webster: suppress and Cambridge Dictionary: suppress.

QUESTION NO: 55

A woman’s body usually ovulates around what day in a normal 30-day cycle?

A. Day 5.

B. Day 10.

C. Day 14.

D. Day 22.

E. Day 16.

ANSWER: E

Explanation:

In a regular menstrual cycle, ovulation usually occurs about 14 days before the beginning of the next menstrual period, rather than always on day 14. This timing reflects the relatively consistent length of the luteal phase, which is the phase after ovulation and before menstruation. Therefore, in a 30-day cycle, counting back approximately 14 days from the expected next period places ovulation around day 16. Cycle day 1 is the first day of menstrual bleeding, so this estimate assumes that the cycle is regular and lasts 30 days from the first day of one period to the first day of the next.

Ovulation timing can vary from cycle to cycle, even in people who generally have regular periods. Factors such as illness, stress, travel, and hormonal changes may alter when ovulation occurs. Nevertheless, the standard clinical estimate for an exam question involving a 30-day regular cycle is day 16. The American College of Obstetricians and Gynecologists notes that ovulation generally occurs about 14 days before the next menstrual period. More information is available from ACOG's guidance on trying to get pregnant and the NCBI overview of menstrual physiology.

QUESTION NO: 56

How many ounces are there in a gallon?

A. 32

B. 64

C. 128

D. 1/4

ANSWER: C

Explanation:

128 is correct because the customary U.S. liquid-measure conversion chain is 1 gallon = 4 quarts, 1 quart = 2 pints, 1 pint = 2 cups, and 1 cup = 8 fluid ounces. Multiplying the number of smaller units at each step gives 4 × 2 × 2 × 8 = 128 fluid ounces in 1 gallon. Equivalently, since one quart contains 32 fluid ounces and a gallon contains four quarts, 4 × 32 = 128 fluid ounces. This is the standard conversion used in nursing dosage calculations and HESI-style measurement questions when the prompt refers to gallons and ounces without specifying another measurement system. It is important to understand that this calculation concerns U.S. fluid ounces, a unit of volume, rather than ounces used to measure weight. In clinical math, identifying whether a quantity represents volume or mass helps ensure that the appropriate conversion factor is used. For additional standard conversion references, see the National Institute of Standards and Technology unit-conversion resources and the USA.gov measurement conversion guide.

QUESTION NO: 57

A normal human body temperature in Celsius is:

A. 32 degrees.

B. 35 degrees.

C. 37 degrees.

D. 39 degrees.

ANSWER: C

Explanation:

37 degrees is the best answer because 37°C (98.6°F) is the traditional reference value for normal core body temperature and is commonly used in health-science education, including nursing-admission preparation. Body temperature is regulated by the hypothalamus and represents a balance between heat produced by metabolism and heat lost through the skin, lungs, and other processes. Although an individual's measured temperature can vary somewhat with the time of day, physical activity, age, hormonal state, and the measurement route, 37°C remains the standard single value when a question asks for

normal temperature without additional clinical context. Oral temperatures in healthy adults may fall within a range around this reference point, while rectal readings tend to be slightly higher and axillary readings slightly lower. For a single-choice foundational question, selecting the established benchmark of 37°C accurately reflects normal human body temperature. The U.S. National Library of Medicine identifies 98.6°F/37°C as the average normal body temperature, while noting that normal readings may vary. See MedlinePlus: Body temperature measurement and CDC information on normal temperature and fever.

QUESTION NO: 58

The term pleiotropy is best defined as:

A. A condition in which multiple genes are missing.

B. A situation in which one gene remains unexpressed.

C. One gene influencing multiple, seemingly unrelated phenotypic traits.

D. Two genes affected by a single allele.

ANSWER: C

Explanation:

Pleiotropy is the phenomenon in which a single gene affects two or more distinct phenotypic traits. Genes often encode proteins that participate in biological processes across different tissues or developmental pathways. Consequently, a change in one such gene can produce effects that appear unrelated at first glance, such as changes involving pigmentation, skeletal development, metabolism, or organ function. The effects arise from the same underlying gene, rather than from several separate genes independently influencing each trait.

Therefore, **"One gene influencing multiple, seemingly unrelated phenotypic traits."** is the best definition. This concept is important in genetics and health science because a single inherited variant may account for multiple clinical findings in an individual or family. For example, variation in the *FBN1* gene can affect connective tissue in several body systems, producing the multiple features associated with Marfan syndrome. Recognizing pleiotropy helps connect diverse traits to a shared genetic cause and supports accurate interpretation of inheritance patterns. See the National Human Genome Research Institute glossary definition of pleiotropy and NCBI Bookshelf's discussion of pleiotropy in genetic disease.

QUESTION NO: 59

Select the word or phrase that will make the sentence grammatically correct.

The nurse asked the assistant if she would _____ the bandage.

A. conform

B. erect

C. apply

D. administer

ANSWER: C

Explanation:

"Apply" is correct because it means to put something on a surface or body part, which is the standard verb used when placing a bandage on a patient. In this sentence, the assistant is being asked whether she will perform the action of putting the bandage onto the affected area: "The nurse asked the assistant if she would apply the bandage." The verb also fits the grammatical construction following "would," which requires the base form of a verb. In healthcare communication, "apply" is commonly used with dressings, bandages, ointments, creams, and topical medications when describing placement on the skin or wound area. Clear use of this term helps communicate the intended clinical task precisely. Merriam-Webster defines "apply" as putting or spreading something on a surface, supporting its use with a bandage in this context. See Merriam-

Webster: apply. The Cambridge Dictionary likewise describes “apply” as placing or putting something onto a surface, as in applying a substance or material to the body. See Cambridge Dictionary: apply.

QUESTION NO: 60

Select the best word for the blank in the following sentence.

Neither of the flower bouquets ____ as full as the one we ordered last year.

A. are

B. is

C. were

D. being

ANSWER: B

Explanation:

The correct word is **is**. In this sentence, *neither* is the grammatical subject. Although the prepositional phrase *of the flower bouquets* contains the plural noun *bouquets*, it does not determine the verb’s number. The indefinite pronoun *neither* means “not one and not the other” and is treated as singular in formal standard English when it stands alone as the subject. Therefore, it takes the singular present-tense linking verb *is*: “Neither of the flower bouquets is as full as the one we ordered last year.” The comparison “as full as” describes the subject’s fullness and requires a form of *be* that agrees with that singular subject. The sentence also refers to the bouquets’ current condition, while “we ordered last year” simply identifies the bouquet used for comparison; that past-time phrase does not shift the main verb into the past tense. Purdue OWL explains that indefinite pronouns including *neither* are singular and require singular verbs: Purdue OWL: Subject-Verb Agreement. For additional guidance on agreement with indefinite pronouns, see The Blue Book of Grammar and Punctuation.

QUESTION NO: 61

Which organelle is responsible for generating ATP that is used for chemical energy?

A. ribosome

B. vesicle

C. mitochondria

D. Golgi apparatus

ANSWER: C

Explanation:

The mitochondria are responsible for producing most of the adenosine triphosphate (ATP) used as readily available chemical energy in eukaryotic cells. ATP is made primarily through cellular respiration: energy released as nutrients are broken down is used to generate ATP, particularly through oxidative phosphorylation at the inner mitochondrial membrane. This membrane contains the electron transport chain and ATP synthase, the enzyme that forms ATP. The extensive folds of the inner membrane, called cristae, increase the surface area available for these energy-producing processes. Cells with especially high energy requirements, such as muscle cells, generally contain many mitochondria. Although cells can make a limited amount of ATP through glycolysis in the cytoplasm, mitochondria are the organelles classically identified as the cell’s major ATP-generating structures. The option uses the plural term “mitochondria,” which is appropriate because a cell commonly contains multiple mitochondria; the singular form is “mitochondrion.” For an overview of mitochondrial structure and ATP-producing function, see NCBI Bookshelf: Mitochondria and OpenStax Biology 2e: Eukaryotic Cells.

QUESTION NO: 62

What word meaning “to absorb or intake” fits best in the sentence?

The patient was brought to the emergency room because he had a planned to _____ a lethal amount of Tylenol.

A. inject

B. ingest

C. build

D. summarize

ANSWER: B

Explanation:

The correct word is **ingest**. To ingest means to take a substance, especially food, drink, or medicine, into the body by swallowing it. In clinical and medical contexts, the term is commonly used when documenting that a patient swallowed a medication, chemical, or other substance. Thus, a patient who planned to swallow a lethal quantity of Tylenol would be described as planning to ingest a lethal amount of Tylenol. Tylenol is a brand name for acetaminophen, and acetaminophen ingestion is medically significant because excessive doses can cause severe liver injury. Health professionals may use the noun form, “acetaminophen ingestion,” when assessing a possible overdose, determining the amount and time of exposure, and planning urgent treatment. The wording in the sentence calls for a verb that directly describes taking the medication into the body orally, which is precisely the meaning of ingest. For medical context on acetaminophen poisoning and ingestion, see the Merck Manual’s acetaminophen poisoning overview and MedlinePlus information on acetaminophen overdose.

QUESTION NO: 63

The underlined word in the sentence is which part of speech?

“The panda chewed his bamboo shoot slowly and carefully.”

A. verb

B. pronoun

C. adverb

D. article

ANSWER: C

Explanation:

The correct answer is **adverb**. In the supplied sentence and accompanying explanation, the intended underlined word is *carefully*. It modifies the action *chewed* by telling the reader how the panda performed that action: the panda chewed in a careful manner. A word that modifies a verb in this way functions as an adverb.

Adverbs commonly answer questions such as “how?,” “when?,” “where?,” or “to what extent?” Here, *carefully* answers “How did the panda chew?” The related word *slowly* also describes the manner of chewing, reinforcing that the sentence uses manner adverbs to add detail to the verb. Although many English adverbs end in *-ly*, the grammatical role is determined by the word’s job in the sentence—not solely by its spelling. In this context, *carefully* clearly modifies *chewed*, so it is an adverb. For further guidance on adverbs and their modifying role, see Purdue OWL’s overview of adverbs and Britannica Dictionary’s adverb guide.

QUESTION NO: 64

An unknown element is found to contain 45 protons and an atomic mass of 64, what is its atomic number?

A. It cannot be determined.

B. 19

C. 45

D. 64

ANSWER: C

Explanation:

The correct answer is 45. An element's atomic number is defined as the number of protons in the nucleus of each atom of that element. Because the atom is stated to have 45 protons, its atomic number is necessarily 45. This relationship is fundamental to identifying elements: proton count determines the element's identity and its location on the periodic table. The stated atomic mass of 64 does not change the atomic number. In this context, 64 is the mass number, representing the combined number of protons and neutrons in that particular atom or isotope. With 45 protons and a mass number of 64, the atom would contain 19 neutrons, but neutron count is not needed to answer a question about atomic number. The International Union of Pure and Applied Chemistry defines atomic number as the number of protons in an atomic nucleus, and educational chemistry references likewise distinguish atomic number from mass number. See the IUPAC Gold Book definition of atomic number and Encyclopaedia Britannica's overview of atomic number.