

SAT PRACTICE TEST 18

Reading and Writing - Module 1

TIME: 32 minutes for 27 questions

DIRECTIONS: Read each passage or question carefully and choose the best answer based on what is stated or implied. Each question has one best answer.

1. Neuroscientists investigating decision-making have identified that emotion and reason operate not as opposing forces but as integrated systems. The ventromedial prefrontal cortex, which processes emotional valence, proves essential for sound judgment—patients with damage to this region make poor decisions despite intact logical reasoning. Far from being purely rational calculators, humans require emotional input to assign value to options and navigate complex choices. This research suggests that effective decision-making is fundamentally _____ rather than exclusively cognitive.

Which choice completes the text with the most logical and precise word?

- A. analytical
- B. mathematical
- C. affective
- D. detached

2. Archaeogenetics—analyzing ancient DNA to reconstruct population histories—has revealed that contemporary human genetic diversity resulted from multiple interbreeding events between Homo sapiens and archaic hominins. Modern non-African populations carry 1-4% Neanderthal DNA, while some Asian and Oceanian populations also possess Denisovan genetic material. These findings complicate simplistic models of human evolution as a linear progression and instead reveal a complex web of intermixing among human species. The genetic record demonstrates that human evolutionary history involved significant admixture rather than isolated development.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A. It explains how genetic findings challenge oversimplified evolutionary narratives.
- B. It describes the geographic distribution of Neanderthal populations.
- C. It proves that Homo sapiens did not originate in Africa.
- D. It provides technical details about DNA sequencing methods.

3. Economists studying inequality distinguish between "wealth"—accumulated assets minus liabilities—and "income"—money received over time. This distinction matters because wealth generates additional income through investments while also providing security against economic shocks. Households with equivalent incomes but vastly different wealth levels face fundamentally different economic realities. Policy interventions targeting only income without addressing wealth accumulation may fail to reduce economic _____ that persist across generations.

Which choice completes the text with the most logical and precise word?

- A. equality
- B. prosperity
- C. mobility
- D. stratification

4. The following text is from Zora Neale Hurston's 1937 novel "Their Eyes Were Watching God."

Ships at a distance have every man's wish on board. For some they come in with the tide. For others they sail forever on the horizon, never out of sight, never landing until the Watcher turns his eyes away in resignation, his dreams mocked to death by Time.

What does Hurston suggest through the ship metaphor?

- A. Ocean travel was essential to economic success in the novel's era.
- B. People's aspirations have varied outcomes—some are fulfilled while others remain perpetually unrealized.
- C. Men are more ambitious than women in pursuing their goals.
- D. Dreams become impossible to achieve as people age.

5. Paleoanthropologists studying *Homo naledi*—a recently discovered hominin species—found evidence of deliberate body disposal in deep cave chambers dating to approximately 250,000 years ago. This behavior, previously associated only with large-brained species, occurred in a small-brained hominin, challenging assumptions linking cognitive sophistication exclusively to brain size. The discovery suggests that complex symbolic behaviors may have evolved _____ in multiple hominin lineages rather than arising once in a single ancestral population.

Which choice completes the text with the most logical and precise word?

- A. uniformly
- B. identically
- C. independently
- D. simultaneously

6. Linguistic studies of pidgin and creole languages—contact languages emerging from multilingual contexts—reveal rapid language genesis. Pidgins arise as simplified communication systems among speakers lacking common language; when children acquire pidgins as native languages, they become creoles with full grammatical complexity. _____ transformation from pidgin to creole occurs within a single generation, suggesting that human language capacity includes innate grammatical principles that children apply even to linguistically impoverished input.

Which choice completes the text with the most logical transition?

- A. This
- B. However
- C. For instance
- D. Nevertheless

7. Physicist Richard Feynman developed an alternative formulation of quantum mechanics using "path integrals," treating particles as simultaneously exploring all possible trajectories between points. This counterintuitive approach yields identical predictions to conventional quantum mechanics while offering different conceptual insights, particularly for quantum field theory calculations. Feynman's formulation exemplifies how scientific theories can be reformulated in mathematically equivalent but conceptually distinct ways, with each approach illuminating different aspects of underlying phenomena.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A. It explains that path integrals contradict established quantum theory.
- B. It describes how alternative formulations can provide practical and conceptual advantages.
- C. It proves that Feynman's approach is superior to conventional methods.
- D. It details the mathematical equations underlying quantum field theory.

8. Bioethicists debating human enhancement technologies distinguish "therapy"—interventions restoring normal function—from "enhancement"—augmentations exceeding typical human capacities. This boundary proves surprisingly unclear: treating age-related decline could be therapeutic or enhancement depending on whether aging constitutes disease. Cognitive enhancement through education is universally accepted while pharmaceutical cognitive enhancement remains controversial, despite functionally similar outcomes. These inconsistencies suggest that enhancement debates often reflect cultural values about acceptable means rather than principled distinctions about _____ themselves.

Which choice completes the text so that it conforms to the conventions of Standard English?

- A. end's
- B. ends
- C. ends'
- D. end

9. Historian Yuval Noah Harari argues that agriculture, traditionally considered humanity's great advancement, actually reduced quality of life for most individuals compared to hunter-gatherer existence. Agricultural populations worked longer hours, consumed less varied diets, faced greater disease transmission, and experienced hierarchical social structures. _____ agriculture enabled population growth and civilizational development even while diminishing individual welfare, illustrating how collective success can diverge from personal wellbeing.

Which choice completes the text with the most logical transition?

- A. Therefore
- B. Similarly
- C. Thus
- D. Moreover

10. Composer Igor Stravinsky's "The Rite of Spring" premiered in 1913 to audience riots, with its dissonant harmonies, irregular rhythms, and primitive subject matter violating Romantic musical conventions. What initially shocked audiences as barbaric chaos became recognized as modernist masterpiece, fundamentally reshaping twentieth-century composition. _____ radical redefinition of musical possibility demonstrates how artistic innovation often faces initial rejection before achieving canonical status.

Which choice completes the text so that it conforms to the conventions of Standard English?

- A. Stravinskys'
- B. Stravinskys
- C. Stravinsky
- D. Stravinsky's

11. Metamaterials—artificially structured materials with properties not found in nature—can manipulate electromagnetic waves in unprecedented ways. Researchers have created materials with negative refractive index, bending light opposite to normal refraction, enabling theoretically possible "invisibility cloaks" that redirect light around objects. While practical applications remain limited by technical constraints, metamaterials demonstrate that material properties depend not only on chemical composition but also on _____ structure at scales smaller than relevant wavelengths.

Which choice completes the text with the most logical and precise word?

- A. random
- B. chaotic
- C. arbitrary
- D. geometric

12. While researching renewable energy storage, an engineering student compiled these notes:

- Renewable energy generation fluctuates with weather and time
- Grid-scale battery storage remains expensive despite declining costs
- Pumped hydroelectric storage uses excess electricity to pump water uphill
- Water is released through turbines during high demand periods
- Pumped hydro accounts for 95% of global grid-scale energy storage
- Requires specific geography with elevation difference and water availability

The student wants to emphasize a limitation of pumped hydroelectric storage. Which choice most effectively uses information from the notes to accomplish this goal?

- A. Pumped hydroelectric storage accounts for 95% of global grid-scale energy storage capacity.
- B. The system pumps water uphill during low demand and releases it through turbines during high demand.
- C. Grid-scale battery storage costs have declined but remain expensive compared to alternatives.
- D. Despite dominating energy storage, pumped hydro requires specific geographic conditions limiting deployment locations.

13. Sociologist Pierre Bourdieu theorized that social reproduction occurs through "habitus"—internalized dispositions shaped by social position that influence perceptions, appreciations, and actions. Children unconsciously absorb class-specific manners, tastes, and communication styles that later advantage or disadvantage them in educational and professional contexts. Schools nominally evaluate "merit" but actually reward culturally specific competencies that privileged families transmit naturally. Bourdieu's analysis reveals how inequality perpetuates not through explicit bias but through _____ mechanisms that appear neutral while systematically advantaging certain groups.

Which choice completes the text with the most logical and precise word?

- A. obvious
- B. transparent
- C. implicit
- D. evident

14. The following text is from W.E.B. Du Bois's 1903 work "The Souls of Black Folk."

It is a peculiar sensation, this double-consciousness, this sense of always looking at one's self through the eyes of others, of measuring one's soul by the tape of a world that looks on in amused contempt and pity. One ever feels his two-ness,—an American, a Negro; two souls, two thoughts, two unreconciled strivings; two warring ideals in one dark body, whose dogged strength alone keeps it from being torn asunder.

What does Du Bois suggest about the African American experience?

- A. Black Americans experience internal psychological conflict from navigating dual identities in a discriminatory society.

- B. African Americans can easily reconcile their American and racial identities.
- C. Double-consciousness represents a unique advantage in American society.
- D. Physical strength helps Black Americans overcome all social obstacles.

15. Circadian rhythms—approximately 24-hour biological cycles governing sleep-wake patterns and numerous physiological processes—persist even in constant environmental conditions, demonstrating intrinsic biological timing. Disrupting these rhythms through shift work or jet lag correlates with increased risks of metabolic disorders, cardiovascular disease, and cancer. These health consequences suggest that circadian alignment between internal biological time and external schedules constitutes a fundamental aspect of human wellbeing. Modern societies organized around constant availability and illumination may thus impose chronic circadian _____ with significant health costs.

Which choice completes the text with the most logical and precise word?

- A. synchronization
- B. harmony
- C. alignment
- D. disruption

16. Black holes, regions where gravitational fields prevent even light from escaping, were initially theoretical predictions from Einstein's general relativity that many physicists, including Einstein, doubted could actually exist. Subsequent observations of stellar dynamics, gravitational waves, and recently direct imaging of event horizons have confirmed black holes' physical reality. _____ progression from theoretical speculation to observational confirmation exemplifies how empirical evidence can validate initially counterintuitive predictions of physical theories.

Which choice completes the text so that it conforms to the conventions of Standard English?

- A. This
- B. These
- C. Those
- D. That

17. Ethnomusicologists studying musical universals across cultures have identified certain features appearing in nearly all musical traditions: discrete pitch levels, octave equivalence, and rhythmic organization. However, assumptions about universal scales or harmonic systems prove unfounded—Indonesian gamelan music, for instance, uses scales incompatible with Western equal temperament. These findings suggest that while some musical perceptual capacities may be biologically grounded, most musical structures are culturally constructed.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A. It provides a specific example refuting claims about universal musical scales.
- B. It proves that Indonesian music is superior to Western music.

- C. It explains how gamelan instruments are constructed.
- D. It supports the claim that all musical features are universal.

18. Philosopher Thomas Nagel argued that consciousness poses unique explanatory challenges because subjective experience—"what it's like" to be a conscious being—cannot be fully captured through objective, third-person descriptions. Even complete physical knowledge of bat neurophysiology wouldn't convey what echolocation feels like to the bat. This "explanatory gap" between objective physical facts and subjective experience suggests that consciousness may require fundamentally different explanatory frameworks than other _____ phenomena.

Which choice completes the text with the most logical and precise word?

- A. natural
- B. supernatural
- C. mystical
- D. spiritual

19. Ecological succession describes predictable community changes following disturbance: early colonizers modify environments enabling subsequent species establishment, eventually reaching relatively stable "climax" communities. However, modern ecology recognizes that disturbances occur continuously at various scales, making stable endpoints rare—forests experience ongoing disturbance from windthrows, pathogen outbreaks, and climate variation. Contemporary models emphasize patch dynamics and non-equilibrium processes rather than deterministic progression toward climax states.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A. It confirms that climax communities represent stable ecological endpoints.
- B. It describes specific organisms involved in forest succession.
- C. It challenges the classical succession model by noting continuous disturbance.
- D. It explains why early colonizers cannot survive in mature forests.

20. Economists analyzing technological unemployment—job displacement through automation—debate whether current automation represents fundamental discontinuity from historical technological change. Previous innovations destroyed specific occupations while creating new employment categories and increasing overall productivity. _____ artificial intelligence and robotics may differ qualitatively by potentially automating cognitive and physical tasks across broad occupational categories simultaneously, leaving fewer alternative employment opportunities.

Which choice completes the text with the most logical transition?

- A. Similarly
- B. However
- C. Therefore

D. Moreover

21. The "trolley problem" in ethics presents a thought experiment: would you divert a runaway trolley to kill one person instead of five? Most people answer yes. Yet when asked if they would push someone off a bridge to stop the trolley, saving five but killing one, most refuse. Both scenarios involve identical arithmetic calculus—one death versus five—yet evoke different moral intuitions. Philosophers debate whether this inconsistency reveals incoherent moral reasoning or demonstrates that moral judgment incorporates multiple _____ principles beyond consequentialist calculation.

Which choice completes the text with the most logical and precise word?

- A. mathematical
- B. statistical
- C. legitimate
- D. numerical

22. Historian Fernand Braudel distinguished three temporal scales in historical analysis: "événements" (events measured in days or years), "conjonctures" (medium-term cycles and trends), and "longue durée" (long-term structural changes over centuries). Political narratives typically focus on événements—battles, treaties, leadership changes—while Braudel argued that geographic, economic, and social structures operating over longue durée fundamentally constrain shorter-term possibilities. _____ approach challenged traditional history's emphasis on political events by highlighting deeper structural forces.

Which choice completes the text so that it conforms to the conventions of Standard English?

- A. Braudel's
- B. Braudels
- C. Braudels'
- D. Braudel

23. Protein folding—how linear amino acid chains adopt specific three-dimensional structures—represents a fundamental biological mystery. The astronomical number of possible configurations would require longer than the universe's age to search exhaustively, yet proteins fold correctly in milliseconds. Computational approaches can now predict some protein structures, yet the "folding problem" remains incompletely solved. Understanding protein folding could revolutionize drug design and disease treatment, as misfolded proteins cause conditions from Alzheimer's to cystic fibrosis. This demonstrates how seemingly _____ biological processes can have profound medical implications.

Which choice completes the text with the most logical and precise word?

- A. esoteric
- B. practical
- C. straightforward

D. trivial

24. Linguist Noam Chomsky proposed that children acquire language through innate "Universal Grammar"—biological linguistic knowledge specifying possible grammatical structures. This hypothesis explains how children master complex grammar from limited, imperfect input within consistent developmental timeframes. _____ critics argue that statistical learning from language exposure could account for acquisition without invoking innate grammatical knowledge, pointing to neural networks that learn language patterns from data alone.

Which choice completes the text with the most logical transition?

- A. Therefore
- B. However
- C. Similarly
- D. Consequently

25. The Anthropic Principle observes that universe's physical constants appear "fine-tuned" for life—slight variations would preclude chemistry, stars, or planets. Some interpret this as requiring explanation through multiple universes or design. _____ critics note selection bias: observers can only exist in life-permitting universes, making our presence in such a universe unsurprising regardless of underlying probability, just as lottery winners shouldn't find their winning surprising despite low odds.

Which choice completes the text with the most logical transition?

- A. Therefore
- B. Similarly
- C. However
- D. Consequently

26. While researching antibiotic resistance, a microbiology student gathered these notes:

- Bacteria evolve resistance through random genetic mutations
- Antibiotic use creates selection pressure favoring resistant bacteria
- Agricultural livestock receive 80% of antibiotics sold in the U.S.
- Low-dose antibiotics promote animal growth but accelerate resistance evolution
- Resistant bacteria transfer from livestock to humans through food and environment
- Medical treatment options become limited as resistance spreads

The student wants to argue for restricting agricultural antibiotic use. Which choice most effectively uses information from the notes to accomplish this goal?

- A. Bacteria develop antibiotic resistance through random genetic mutations over time.
- B. Most antibiotics are used in agriculture, where low doses for growth promotion accelerate resistance that transfers to humans, threatening medical treatment efficacy.

C. Agricultural livestock receive antibiotics to promote growth and prevent disease.

D. Antibiotic resistance represents a significant challenge for modern medicine.

27. Astrophysicists studying dark energy—the mysterious force accelerating universal expansion—have proposed various explanations ranging from Einstein's cosmological constant to exotic quantum field properties. Despite comprising approximately 70% of universe's energy content, dark energy's fundamental nature remains unknown. Some physicists suggest modifying gravitational theory rather than invoking unknown energy forms. The persistence of this mystery despite intense investigation highlights how much remains _____ about the universe's basic constituents and forces.

Which choice completes the text with the most logical and precise word?

A. known

B. obvious

C. clear

D. unknown

Reading and Writing - Module 2

1. Researchers studying collective intelligence in social insects have discovered that ant colonies solve complex problems—finding optimal foraging routes, allocating labor efficiently, selecting nest sites—without centralized coordination. Individual ants follow simple local rules responding to chemical trails and encounters with nestmates. From these microscopic interactions emerges colony-level intelligence exceeding any individual ant's capabilities. This phenomenon demonstrates that sophisticated problem-solving can arise through _____ organization rather than requiring hierarchical control or individual comprehension of overall goals.

Which choice completes the text with the most logical and precise word?

- A. chaotic
- B. decentralized
- C. random
- D. confused

2. Philosopher Karl Popper argued that scientific theories cannot be proven true, only falsified—no number of confirming observations establishes certainty, yet a single contradictory observation can refute a theory. This asymmetry between verification and falsification led Popper to propose falsifiability as the demarcation criterion distinguishing science from non-science. Genuine scientific claims make predictions that could potentially be proven wrong; unfalsifiable statements, regardless of other qualities, fall outside scientific inquiry proper.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A. It contradicts Popper's claims about scientific proof.
- B. It describes specific experimental methods scientists should use.
- C. It explains how Popper's observation about verification led to his criterion for science.
- D. It proves that all non-scientific claims are false.

3. Economists analyzing labor markets have identified "monopsony power"—situations where few employers dominate hiring, enabling them to suppress wages below competitive levels. Unlike monopoly (one seller), monopsony involves few buyers of labor. Workers lacking alternative employment options accept lower wages than their productivity would command in competitive markets. Minimum wage laws, traditionally criticized for causing unemployment under competitive assumptions, may actually increase both employment and wages in monopsonistic labor markets. This challenges economic orthodoxy by showing that market interventions can sometimes _____ outcomes in imperfectly competitive conditions.

Which choice completes the text with the most logical and precise word?

- A. worsen
- B. maintain
- C. improve
- D. eliminate

4. The following text is from Gabriel García Márquez's 1967 novel "One Hundred Years of Solitude."

Many years later, as he faced the firing squad, Colonel Aureliano Buendía was to remember that distant afternoon when his father took him to discover ice. At that time Macondo was a village of twenty adobe houses, built on the bank of a river of clear water that ran along a bed of polished stones, which were white and enormous, like prehistoric eggs.

What effect does García Márquez create through this opening?

- A. He establishes realistic historical detail about 19th-century Latin American villages.
- B. He creates temporal complexity by beginning at a dramatic future moment while moving to distant past.
- C. He emphasizes the scientific importance of ice discovery in isolated communities.
- D. He focuses reader attention on the firing squad execution as the novel's central event.

5. Immunologists have discovered that the immune system doesn't simply distinguish "self" from "non-self" but operates through more nuanced recognition mechanisms. The body tolerates beneficial gut bacteria while attacking pathogenic microbes; pregnant mothers don't reject genetically foreign fetuses; transplanted organs can be accepted through immunosuppression. These phenomena suggest immunity involves contextual assessment of threat rather than categorical rejection of foreignness. This revised understanding has implications for autoimmune disease treatment, transplantation medicine, and cancer immunotherapy, where modulating rather than simply enhancing immune responses proves _____.

Which choice completes the text with the most logical and precise word?

- A. impossible
- B. therapeutic
- C. harmful
- D. irrelevant

6. Urban planners analyzing "15-minute cities"—neighborhoods where residents can access daily needs within a quarter-hour walk or bike ride—argue this design reduces automobile dependence, carbon emissions, and social isolation while improving public health and community cohesion. _____ critics contend that such planning restricts mobility and choice, potentially trapping low-income residents in poorly resourced neighborhoods while privileged individuals retain automobile access.

Which choice completes the text with the most logical transition?

- A. Therefore
- B. Similarly
- C. Moreover
- D. However

7. Mathematician Kurt Gödel's incompleteness theorems demonstrated that any sufficiently complex formal system contains true statements that cannot be proven within that system. This revolutionary finding shattered hopes for complete mathematical axiomatization and raised profound questions about the nature of mathematical truth. If mathematical truths exist beyond formal proof, this suggests mathematical objects possess reality independent of human construction, supporting Platonist rather than

formalist mathematical philosophy. Gödel's work thus had implications extending far beyond technical logic into fundamental questions about mathematical ontology.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A. It explains a philosophical implication of Gödel's mathematical findings about proof limitations.
- B. It proves that all mathematical truths can be formally demonstrated.
- C. It describes the specific logical techniques Gödel used in his proofs.
- D. It argues that mathematics is purely a human invention.

8. Linguists studying language death—the process by which languages cease being spoken—have documented that half of the world's approximately 7,000 languages face extinction within the century. Language loss typically occurs when speakers shift to dominant languages for economic and social advantage, with children no longer acquiring the ancestral tongue. Each extinction eliminates unique grammatical structures, conceptual frameworks, and cultural knowledge encoded in that language. Preserving linguistic diversity thus represents not merely cultural conservation but maintaining humanity's collective cognitive and expressive _____.

Which choice completes the text so that it conforms to the conventions of Standard English?

- A. repertoire
- B. repertoires
- C. repertoires'
- D. repertoire's

9. Ecologists investigating rewilding—restoring ecosystems by reintroducing apex predators—have documented "trophic cascades" where predator presence indirectly affects vegetation and ecosystem structure. Wolves reintroduced to Yellowstone National Park reduced elk populations and altered elk behavior, enabling willow and aspen regeneration. These vegetation changes stabilized riverbanks, modified stream morphology, and benefited numerous species from songbirds to beavers. Such cascading effects demonstrate how single species can fundamentally reshape entire ecosystems.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A. It contradicts the claim about trophic cascades affecting ecosystems.
- B. It describes the hunting techniques wolves use to capture elk.
- C. It provides specific examples of how vegetation changes affected other ecosystem components.
- D. It explains why elk populations must be completely eliminated from ecosystems.

10. Chemists developing "green chemistry" principles aim to design chemical processes minimizing hazardous substances, reducing waste, using renewable feedstocks, and avoiding toxic solvents. Traditional chemical synthesis often generates far more waste than desired product, uses petroleum-based materials, and employs dangerous reagents. _____ approach redesigns chemistry itself rather than merely controlling pollution after generation, representing preventative rather than remedial environmental strategy.

Which choice completes the text so that it conforms to the conventions of Standard English?

- A. This
- B. These
- C. Those
- D. That

11. While researching vertical farming, an agricultural engineering student compiled these notes:

- Vertical farms grow crops in stacked layers indoors using controlled environments
- LED lighting tailored to plant needs reduces energy consumption
- Soilless hydroponic and aeroponic systems minimize water use by 95%
- Climate control eliminates seasonal limitations and weather dependencies
- Urban locations reduce transportation distances and emissions
- High initial capital costs and energy requirements currently limit profitability
- Suitable for leafy greens and herbs but challenging for staple crops like wheat

The student wants to present vertical farming's potential while acknowledging limitations. Which choice most effectively uses information from the notes to accomplish this goal?

- A. Vertical farms use LED lighting and soilless growing systems in climate-controlled environments.
- B. While vertical farming offers resource efficiency and urban food production, high costs and energy demands currently restrict economic viability to high-value crops.
- C. Vertical farms reduce water consumption by 95% compared to traditional agriculture.
- D. Urban vertical farms eliminate transportation distances by growing food near consumers.

12. Psychologist Carol Dweck distinguished "fixed mindset"—believing abilities are static—from "growth mindset"—believing abilities develop through effort. Students with growth mindset embrace challenges, persist through setbacks, and view effort as pathway to mastery rather than sign of inadequacy. _____ those with fixed mindset avoid challenges risking failure, give up easily, and see effort as fruitless when ability is lacking.

Which choice completes the text with the most logical transition?

- A. Similarly
- B. Likewise
- C. Conversely
- D. Moreover

13. Particle physicists investigating the Standard Model—the theory describing fundamental particles and forces—recognize that despite tremendous empirical success, the model remains incomplete. It doesn't incorporate gravity, explain dark matter or dark energy, or account for matter-antimatter asymmetry in the universe. The discovery of the Higgs boson confirmed the Standard Model's last prediction, yet simultaneously highlighted how much remains unexplained. Physics thus faces the paradox of possessing an extraordinarily successful theory that is nevertheless fundamentally _____.

Which choice completes the text with the most logical and precise word?

- A. complete

- B. inadequate
- C. perfect
- D. sufficient

14. The following text is from Octavia Butler's 1979 novel "Kindred."

I lost an arm on my last trip home. My left arm. And I lost about a year of my life and much of the comfort and security I had not valued until it was gone. When the police released Kevin, he came to the hospital and stayed with me so that I would know I hadn't lost him too.

What do these opening lines suggest about the narrator's experience?

- A. She suffered minor injuries during routine medical treatment.
- B. She values security more than personal relationships.
- C. She has endured traumatic events causing physical and psychological loss.
- D. Her relationship with Kevin was damaged beyond repair.

15. Historians analyzing "presentism"—interpreting past events through contemporary values and concepts—debate its appropriateness in historical scholarship. Presentist approaches risk misunderstanding past actors by judging them against modern standards they couldn't have anticipated. _____ completely avoiding present perspectives proves impossible since historians inevitably bring contemporary frameworks to their interpretations. The challenge involves acknowledging past contexts while recognizing how present concerns shape historical inquiry.

Which choice completes the text with the most logical transition?

- A. Yet
- B. Therefore
- C. Similarly
- D. Consequently

16. Neuroscientists using functional magnetic resonance imaging (fMRI) can identify brain regions activated during specific cognitive tasks by detecting blood flow changes. This technology has revealed neural correlates of memory, emotion, decision-making, and consciousness. _____ researchers caution that correlation between brain activity and mental states doesn't prove causation—neural activity may accompany rather than produce conscious experience.

Which choice completes the text so that it conforms to the conventions of Standard English?

- A. However; researchers
- B. However researchers
- C. However, researchers
- D. However: researchers

17. Economist Elinor Ostrom's research on common-pool resources—collectively managed resources like fisheries, forests, and irrigation systems—challenged "tragedy of the commons" predictions that shared resources inevitably face overexploitation. Ostrom documented numerous cases where communities successfully managed commons through locally developed rules, monitoring mechanisms, and graduated sanctions for violations. Her work demonstrated that neither privatization nor government control represents the only solution to collective action problems, as communities can self-organize effective governance structures. This finding has implications for resource management worldwide.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A. It contradicts Ostrom's research findings about common-pool resources.
- B. It explains the theoretical significance of Ostrom's empirical observations.
- C. It describes the specific fishing techniques used in collective fisheries.
- D. It proves that all commons succeed without external management.

18. Geneticists investigating epigenetics—heritable changes in gene expression without DNA sequence alteration—have discovered that environmental factors can modify which genes activate. Methyl groups attach to DNA and histones, silencing certain genes while activating others. These modifications can respond to diet, stress, and toxin exposure. Remarkably, some epigenetic changes transmit across generations, meaning ancestors' experiences may influence descendants' gene expression. This mechanism

suggests that heredity involves not only DNA sequences but also information about _____ encoded in chemical modifications.

Which choice completes the text with the most logical and precise word?

- A. genes
- B. chromosomes
- C. cells
- D. environments

19. Sociologist Max Weber proposed that social action—behavior oriented toward others—should be understood through "Verstehen" (interpretive understanding) grasping actors' subjective meanings rather than merely observing external behavior. A person raising their arm could be swatting a fly, bidding at auction, or giving Nazi salute—physically identical actions with completely different social meanings. Weber's approach emphasized that social science must interpret meaning, not merely identify patterns, distinguishing it fundamentally from natural sciences studying meaningless physical phenomena. This interpretive methodology shaped subsequent qualitative research traditions.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A. It explains how Weber's emphasis on meaning distinguishes social from natural sciences.
- B. It proves that natural sciences cannot study human behavior effectively.
- C. It describes the statistical techniques Weber developed for sociology.
- D. It argues that social science should adopt natural science methods.

20. Architectural movements of the 20th century oscillated between rationalist modernism emphasizing function and postmodern approaches celebrating ornamentation and historical reference. Modernists like Le Corbusier championed "form follows function" and industrial aesthetics. _____ postmodernists like Robert Venturi embraced complexity, contradiction, and playful historical allusion, rejecting modernism's austere minimalism.

Which choice completes the text with the most logical transition?

- A. Similarly
- B. Therefore
- C. Conversely
- D. Moreover

21. Astronomers studying exoplanets—planets orbiting other stars—have identified thousands of planetary systems with diverse configurations unlike our solar system. Hot Jupiters orbit closer to their stars than Mercury orbits our Sun; super-Earths have masses between Earth and Neptune, a size absent from our system. This variety challenges early theories assuming our solar system's architecture represented the norm. The revised understanding suggests planetary formation produces diverse outcomes depending on initial conditions, revealing solar systems as more _____ than once imagined.

Which choice completes the text with the most logical and precise word?

- A. uniform
- B. varied
- C. identical
- D. consistent

22. Medical ethicists debating physician-assisted death for terminally ill patients balance autonomy—respecting individuals' choices about their lives—against concerns about protecting vulnerable populations, maintaining trust in medical institutions, and preventing potential abuses. Proponents emphasize compassion for those facing unbearable suffering and individuals' rights to determine when life no longer worth living. _____ opponents worry about pressure on disabled or elderly individuals to end lives, inadequate palliative care, and physicians' roles as healers being compromised.

Which choice completes the text with the most logical transition?

- A. Similarly
- B. Therefore
- C. Moreover
- D. Conversely

23. Cognitive scientists investigating expertise have found that true experts don't simply know more facts but organize knowledge differently, recognizing deep structural patterns invisible to novices. Chess masters perceive board configurations as meaningful patterns rather than individual piece positions. Physicists see problems in terms of fundamental principles while novices focus on surface features. This suggests that expertise involves qualitative cognitive reorganization rather than quantitative information accumulation. Teaching for expertise thus requires helping students develop conceptual frameworks that enable _____ pattern recognition.

Which choice completes the text with the most logical and precise word?

- A. sophisticated
- B. random
- C. superficial
- D. simple

24. The Industrial Revolution's mechanization displaced artisan craftworkers while creating factory employment, fundamentally transforming labor conditions, social structures, and economic organization. _____ process generated tremendous wealth alongside unprecedented urban poverty, environmental degradation, and worker exploitation, illustrating how economic development creates both opportunities and costs unevenly distributed across populations.

Which choice completes the text so that it conforms to the conventions of Standard English?

- A. This
- B. These
- C. Those
- D. That

25. Political scientists analyzing democratic backsliding—erosion of democratic institutions and norms in formally democratic states—have identified patterns where elected leaders undermine checks and balances, restrict press freedom, and delegitimize opposition while maintaining electoral facades. Unlike military coups, contemporary democratic decline often occurs gradually through formally legal

mechanisms that accumulate to fundamentally alter political systems. Recognizing backsliding requires attending not merely to whether elections occur but whether institutions preserve meaningful _____ on executive power.

Which choice completes the text with the most logical and precise word?

- A. support
- B. constraints
- C. encouragement
- D. assistance

26. While researching quantum computing, a computer science student gathered these notes:

- Classical computers process information as bits (0 or 1)
- Quantum computers use qubits that can exist in superposition (0 and 1 simultaneously)
- Quantum entanglement enables qubits to correlate in ways impossible for classical bits
- Quantum computers could solve certain problems exponentially faster than classical computers
- Applications include cryptography, drug discovery, and optimization problems
- Current quantum computers have few qubits and high error rates limiting practical applications
- Quantum advantage for practical problems remains mostly theoretical

The student wants to explain quantum computing's promise while acknowledging current limitations. Which choice most effectively uses information from the notes to accomplish this goal?

- A. Quantum computers use qubits that can exist in superposition of states simultaneously.
- B. Despite potentially revolutionary capabilities for cryptography and drug discovery, current quantum computers' limited qubits and high error rates prevent most practical applications.
- C. Classical computers process information as bits that are either 0 or 1.
- D. Quantum entanglement enables correlations impossible for classical computers.

27. Paleontologists investigating the Cambrian explosion—a relatively brief period approximately 540 million years ago when most major animal phyla first appeared in the fossil record—debate whether this represents genuine rapid diversification or simply improved fossil preservation and recognition. The suddenness suggests either unprecedented evolutionary innovation or significant gaps in earlier fossil record. Proposed explanations range from ecological opportunities following mass extinction to genetic innovations enabling new body plans. The persistence of multiple competing hypotheses highlights how even well-documented evolutionary events remain subject to _____ about underlying mechanisms and true pace of change.

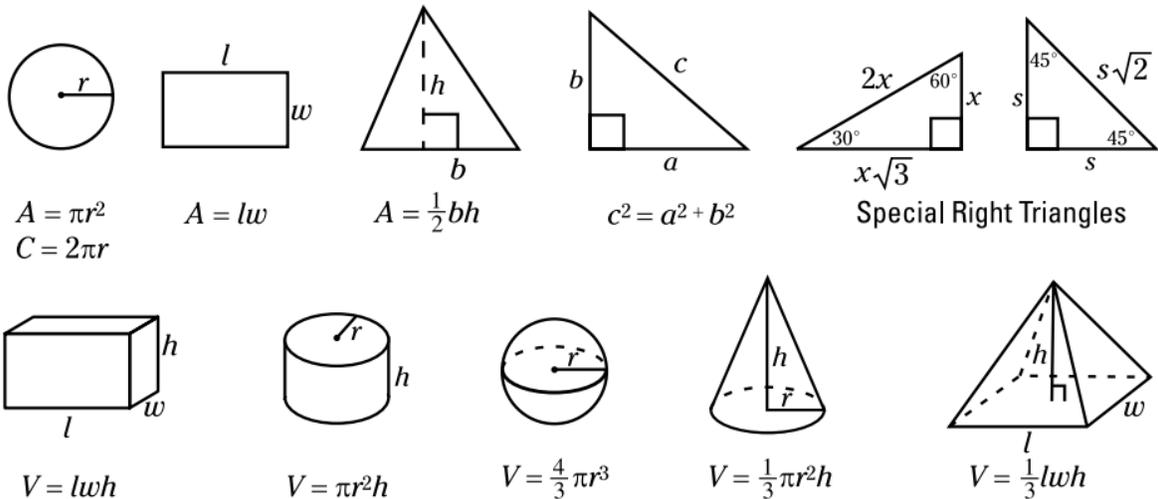
Which choice completes the text with the most logical and precise word?

- A. debate
- B. consensus
- C. agreement
- D. certainty

Math - Module 1

TIME: 35 minutes for 22 questions

DIRECTIONS: For multiple-choice questions, choose only one answer for each question. For student-produced response questions (questions 16-22), write only one answer, even if you find more than one correct answer. Don't include symbols such as a percent sign, comma, or dollar sign.



1. If $f(x) = 2x^3 - 5x + 1$ and $g(x) = x + 2$, what is the value of $f(g(-1))$?

- A. -4
- B. -2
- C. 0
- D. 2

2. A geometric sequence has its first term as 5 and its fourth term as 135. What is the common ratio?

- A. 2
- B. 2.5
- C. 2.8
- D. 3

3. If $3^{2x+1} = 27^{x-1}$, what is the value of x ?

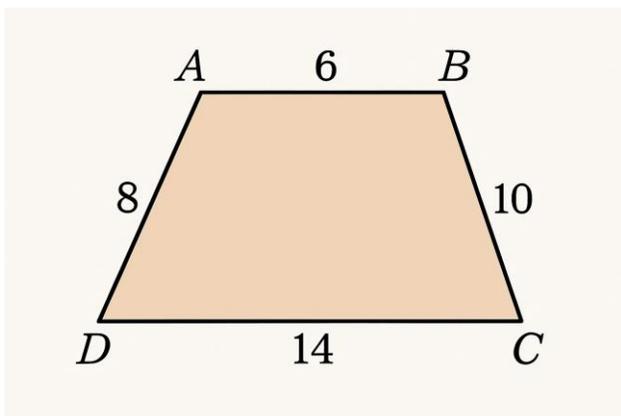
- A. 4
- B. -3
- C. -2
- D. -1

4. A parabola has its vertex at $(3, -4)$ and passes through the point $(5, 0)$. What is the equation of the parabola?

- A. $y = (x - 3)^2 - 4$
- B. $y = 2(x - 3)^2 - 4$
- C. $y = (x - 3)^2 - 4$
- D. $y = \frac{1}{2}(x - 3)^2 - 4$

5. In a right triangle, the two legs have lengths in the ratio 5:12. If the hypotenuse is 26 units, what is the length of the shorter leg?

- A. 5
- B. 10
- C. 12
- D. 13



6. In trapezoid ABCD shown above, AB is parallel to CD. If $AB = 6$, $CD = 14$, $AD = 8$, and $BC = 10$, what is the area of the trapezoid?

- A. 60
- B. 68
- C. 72
- D. 80

7. If $\log_4(x) + \log_4(x+6) = 2$, what is the value of x ?

- A. 2
- B. 4
- C. 6
- D. 8

8. A circle with center at the origin passes through the point $(6, 8)$. What is the circumference of the circle?

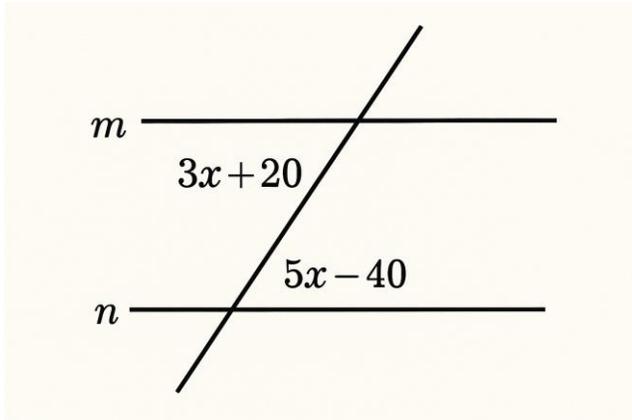
- A. 10π
- B. 16π
- C. 20π
- D. 32π

9. If $f(x) = x^2 - 4x + k$ has exactly one real root, what is the value of k ?

- A. 2
- B. 4
- C. 8
- D. 16

10. A population of bacteria doubles every 3 hours. If there are 800 bacteria at 9:00 AM, how many bacteria will there be at 6:00 PM the same day?

- A. 6,400
- B. 12,800
- C. 25,600
- D. 25,600



11. In the figure above, lines m and n are parallel. What is the value of x ?

- A. 30
- B. 40
- C. 50
- D. 60

12. If $x + y = 8$ and $x^2 + y^2 = 40$, what is the value of xy ?

- A. 10
- B. 11
- C. 12
- D. 14

13. A rectangular box has dimensions length = $2x$, width = x , and height = $x + 3$. If the volume is 180 cubic units, what is the value of x ?

- A. 3.77
- B. 3.73
- C. 5
- D. 6

14. If $\sin(\theta) = -3/5$ and $\cos(\theta) = 4/5$, what is the value of $\tan(2\theta)$?

- A. $-7/24$
- B. $-12/25$
- C. $-24/7$
- D. $-24/7$

15. A line passes through points $(2, -3)$ and $(6, 5)$. Which of the following points also lies on this line?

- A. $(8, 9)$
- B. $(10, 11)$
- C. $(4, 0)$
- D. $(0, -5)$

16. The sum of three consecutive even integers is 102. What is the largest of these three integers?

17. If $4^x = 256$, what is the value of x ?

18. A cube has a total surface area of 384 square centimeters. What is the volume of the cube in cubic centimeters?

19. In an arithmetic sequence, the first term is 3 and the common difference is 3. What is the sum of the first 5 terms?

20. If $f(x) = \sqrt{x + 4}$ and $g(x) = x^2 - 4$, what is the value of $f(g(4))$?

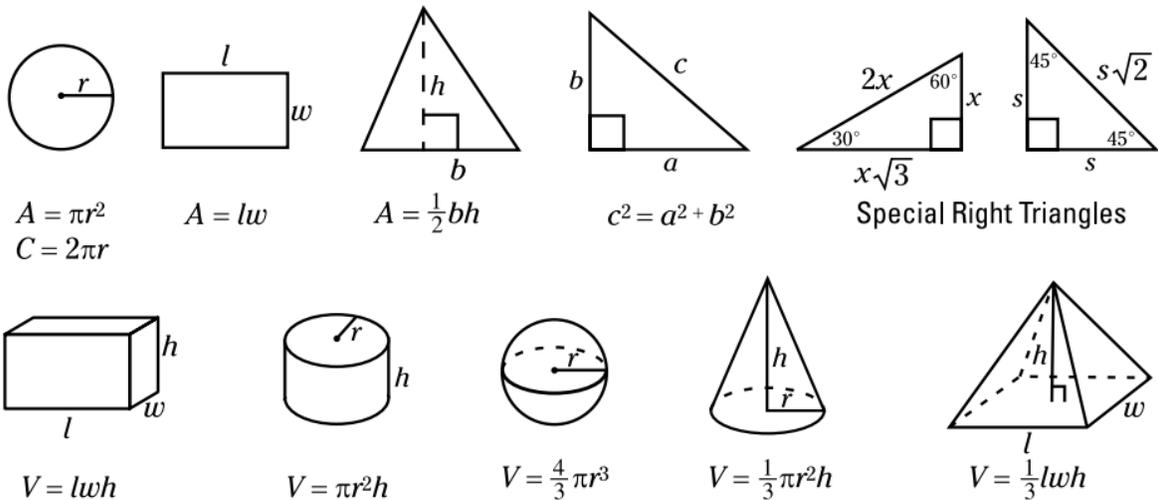
21. A rectangle has a length that is 4 units more than its width. If the diagonal is 20 units, what is the area of the rectangle?

22. If $2x + 3y = 18$ and $x - y = 1$, what is the value of x ?

Math - Module 2

TIME: 35 minutes for 22 questions

DIRECTIONS: For multiple-choice questions, choose only one answer for each question. For student-produced response questions (questions 16-22), write only one answer, even if you find more than one correct answer. Don't include symbols such as a percent sign, comma, or dollar sign.



1. If $f(x) = x^3 - 2x^2 + x$ and $f(a) = 0$ where $a \neq 0$ and $a \neq 1$, what is the value of a ?

- A. -1
- B. 1
- C. No solution
- D. 3

2. A store marks up the wholesale cost of an item by 40%, then offers a 25% discount on the marked price. If a customer pays \$84 for the item, what was the wholesale cost?

- A. 80

- B. 90
- C. 100
- D. 110

3. If $\log_5(x + 3) - \log_5(x - 2) = 1$, what is the value of x ?

- A. 5
- B. 6
- C. 6.5
- D. 3.25

4. A polynomial $p(x)$ has zeros at $x = -2$, $x = 3$, and $x = 5$. If $p(0) = 60$, what is $p(1)$?

- A. 32
- B. 48
- C. 54
- D. 60

5. In a geometric sequence, the second term is 12 and the fifth term is 96. What is the first term?

- A. 4
- B. 5
- C. 6
- D. 8

6. If $\sin(\theta) = 4/5$ and θ is in the second quadrant, what is the value of $\tan(\theta)$?

- A. $-4/3$

- B. $-\frac{3}{4}$
- C. $\frac{3}{4}$
- D. $\frac{4}{3}$

7. The average of five numbers is 24. If one number is removed, the average of the remaining four numbers is 21. What was the removed number?

- A. 30
- B. 33
- C. 35
- D. 36

8. If $x^2 + y^2 = 61$ and $x - y = 1$, what is the value of $x + y$?

- A. 10
- B. 11
- C. 12
- D. 13

9. A function is defined by $f(x) = ax^2 + bx + c$. If $f(1) = 5$, $f(2) = 8$, and $f(3) = 13$, what is the value of a ?

- A. 0
- B. 11
- C. 1
- D. 3

10. If $3^{x+2} = 9^{2x-1}$, what is the value of x ?

- A. $\frac{4}{3}$

- B. $\frac{3}{2}$
- C. $\frac{5}{3}$
- D. 2

11. A circle has center (3, -2) and radius 5. Which point lies on this circle?

- A. (6, 2)
- B. (7, 1)
- C. (0, 2)
- D. (0, 2)

12. If the sum of two numbers is 15 and their product is 56, what is the positive difference between the two numbers?

- A. 1
- B. 1
- C. 3
- D. 5

13. A sphere has a surface area of 144π square units. What is the radius of the sphere? (Use surface area formula: $SA = 4\pi r^2$)

- A. 4
- B. 5
- C. 6
- D. 8

14. If $|3x - 7| = 11$, what is the sum of all possible values of x ?

- A. $14/3$
- B. 5
- C. $16/3$
- D. 6

15. In an arithmetic sequence, the 4th term is 17 and the 9th term is 37. What is the first term?

- A. 5
- B. 6
- C. 7
- D. 8

16. If $x/3 + y/4 = 10$ and $x/2 + y/3 = 14$, what is the value of $x + y$?

17. A rectangular prism has volume 216 cubic units. If the length and width are both twice the height, what is the height?

18. If $(x + 5)^2 = 900$, what is the positive value of x ?

19. The sum of the first n positive integers is given by the formula $n(n+1)/2$. What is the value of n if this sum equals 465?

20. If $f(x) = 2x + 3$ and $f(f(f(x))) = 47$, what is the value of x ?

21. A right triangle has one leg of length 90 and hypotenuse of length 150. What is the length of the other leg?

22. If $5^{(2x-3)} = 125$, what is the value of x ?

ANSWERS AND EXPLANATIONS

Reading and Writing - Module 1

- 1. C.** The word "affective" (meaning relating to emotions or feelings) logically completes the text because the passage describes how the ventromedial prefrontal cortex "processes emotional valence" and proves "essential for sound judgment." The research shows decision-making requires "emotional input to assign value," making it fundamentally affective (emotion-based) rather than purely cognitive.
- 2. A.** The underlined sentence explains how genetic findings challenge oversimplified evolutionary narratives by stating these findings "complicate simplistic models of human evolution as a linear progression" and reveal instead "a complex web of intermixing." This directly connects the Neanderthal/Denisovan DNA evidence to its theoretical implications for how we understand human evolution.
- 3. D.** The word "stratification" (meaning arrangement in layers or hierarchical levels) fits because the passage discusses how wealth differences create "fundamentally different economic realities" even with equivalent incomes, and these differences "persist across generations." Economic stratification describes these enduring hierarchical divisions that policy focused only on income fails to address.
- 4. B.** Hurston's ship metaphor shows varied outcomes: "For some they come in with the tide" (fulfilled aspirations) while "For others they sail forever on the horizon" (perpetually unrealized dreams). The contrast between ships that land versus those that remain distant represents how some people achieve their wishes while others never do.
- 5. C.** The word "independently" (meaning separately or autonomously) fits because the passage states this complex behavior occurred "in a small-brained hominin, challenging assumptions linking cognitive sophistication exclusively to brain size." If symbolic behaviors arose independently in multiple lineages rather than once in a single population, this explains why small-brained species also exhibited them.
- 6. A.** The demonstrative pronoun "This" correctly refers back to the transformation described in the previous sentence (pidgins becoming creoles when children acquire them). "This transformation" creates a clear connection showing that the rapid change from pidgin to creole within one generation reveals innate grammatical principles.
- 7. B.** The underlined sentence describes how path integrals "yield identical predictions to conventional quantum mechanics while offering different conceptual insights, particularly for quantum field theory calculations." This explains how alternative formulations provide both practical (calculation) and conceptual advantages without claiming one approach is superior—they're equivalent but illuminating in different ways.
- 8. B.** The plural noun "ends" correctly completes the phrase "ends themselves," referring to the outcomes or goals of enhancement (plural). The sentence discusses whether debates reflect values "about acceptable means rather than principled distinctions about ends"—the goals or purposes being pursued.

- 9. C.** The transition "Thus" appropriately introduces the conclusion drawn from Harari's argument. Agriculture reduced individual quality of life (premise) but enabled population growth and civilization (outcome), thus illustrating how collective success diverges from personal wellbeing (conclusion). This cause-effect relationship requires a consequential transition.
- 10. D.** The singular possessive "Stravinsky's" correctly indicates that the radical redefinition belonged to Igor Stravinsky (one person). The construction "Stravinsky's radical redefinition" shows whose musical innovation is being discussed.
- 11. D.** The word "geometric" (relating to geometry and spatial structure) fits because the passage describes how metamaterials are "artificially structured" with properties depending on "structure at scales smaller than relevant wavelengths." This precise spatial arrangement—geometric structure—enables their unusual electromagnetic properties.
- 12. D.** This choice most effectively emphasizes pumped hydro's limitation by combining its dominance (95% of storage) with its constraint ("requires specific geographic conditions limiting deployment locations"). This pairing shows that despite being the dominant technology, it cannot be deployed everywhere due to geographic requirements.
- 13. C.** The word "implicit" (meaning implied or not directly stated) fits Bourdieu's analysis showing how inequality perpetuates through mechanisms that "appear neutral while systematically advantaging certain groups." These unconscious dispositions and culturally specific competencies operate implicitly rather than through obvious or transparent bias.
- 14. A.** Du Bois describes "double-consciousness" as "always looking at one's self through the eyes of others" and experiencing "two warring ideals in one dark body." This internal conflict from navigating both American and Negro identities in a society that views with "amused contempt and pity" creates psychological tension—internal conflict from dual identities in a discriminatory society.
- 15. D.** The word "disruption" (meaning disturbance or interference) fits because the passage describes health consequences from misalignment between biological time and external schedules. Modern societies with "constant availability and illumination" would impose chronic circadian disruption (disturbance of natural rhythms) rather than synchronization or alignment.
- 16. A.** The singular demonstrative "This" correctly refers to the singular "progression" from theoretical speculation to observational confirmation described in the previous sentences. Since "progression" is singular, use "This progression" rather than "These" or "Those."
- 17. A.** The underlined sentence provides Indonesian gamelan music as a specific example that refutes claims about universal scales, stating these scales are "incompatible with Western equal temperament." This concrete counterexample challenges "assumptions about universal scales or harmonic systems," demonstrating they aren't actually universal.
- 18. A.** The word "natural" (meaning occurring in nature or the physical world) fits because Nagel argues consciousness requires "fundamentally different explanatory frameworks than other" physical

phenomena. The contrast is between consciousness (with its subjective experience) and other natural, physical phenomena that can be fully described objectively.

19. C. The underlined sentence challenges the classical succession model by noting that "disturbances occur continuously at various scales, making stable endpoints rare" with examples of ongoing forest disturbances. This contradicts the traditional view of succession reaching stable "climax" communities, showing continuous disturbance prevents stable endpoints.

20. B. The transition "However" appropriately contrasts two perspectives: previous automation created new jobs while increasing productivity, however current AI/robotics may differ by automating across broad categories simultaneously. This contrast between past technological change and potentially different current automation requires "However."

21. C. The word "legitimate" (meaning valid or acceptable) fits because the passage asks whether the inconsistency between trolley scenarios "reveals incoherent moral reasoning or demonstrates that moral judgment incorporates multiple" valid principles. The question is whether these different moral intuitions represent legitimate (valid) ethical principles beyond simple consequentialism.

22. A. The singular possessive "Braudel's" correctly indicates that the approach belonged to Fernand Braudel (one person). The construction "Braudel's approach challenged traditional history" shows whose historical methodology is being discussed.

23. A. The word "esoteric" (meaning obscure or understood by few) fits because protein folding is described as "a fundamental biological mystery" with astronomical complexity, yet has "profound medical implications" for diseases. This shows how seemingly specialized, obscure (esoteric) processes can have major practical medical significance.

24. B. The transition "However" appropriately introduces critics' contrasting view. Chomsky proposes innate Universal Grammar (first perspective), however critics argue statistical learning could explain acquisition without innate knowledge (opposing perspective). This direct theoretical disagreement requires a contrasting transition.

25. C. The transition "However" appropriately introduces the critics' counterargument to fine-tuning interpretations. Some interpret fine-tuning as requiring explanation (first view), however critics note selection bias makes our presence unsurprising (opposing argument). This rebuttal requires a contrasting transition.

26. B. This choice most effectively argues for restricting agricultural antibiotic use by connecting multiple critical facts: most antibiotics go to agriculture (80%), low doses for growth promotion accelerate resistance, and this resistance transfers to humans, threatening medical treatment. This comprehensive chain of reasoning directly supports restricting agricultural use.

27. D. The word "unknown" (meaning not yet understood) fits because despite dark energy comprising 70% of the universe's energy and intense investigation, its "fundamental nature remains unknown." The passage emphasizes the mystery and lack of understanding, highlighting "how much remains unknown about the universe's basic constituents."

Reading and Writing - Module 2

- 1. B.** The word "decentralized" (meaning distributed rather than centrally controlled) logically completes the text because the passage describes ant colonies solving problems "without centralized coordination" through "simple local rules" that individual ants follow. Colony-level intelligence emerges from these distributed interactions rather than hierarchical control, making it fundamentally decentralized organization.
- 2. C.** The underlined sentence explains how Popper's observation about the asymmetry between verification and falsification "led Popper to propose falsifiability as the demarcation criterion distinguishing science from non-science." This directly connects his observation about proof limitations to his resulting criterion for what counts as science.
- 3. C.** The word "improve" (meaning make better) fits because the passage describes how minimum wage laws "may actually increase both employment and wages in monopsonistic labor markets," challenging economic orthodoxy. In imperfectly competitive conditions with monopsony power, market interventions can improve (enhance) outcomes rather than worsening them.
- 4. B.** García Márquez creates temporal complexity by beginning "as he faced the firing squad" (a dramatic future moment) while immediately shifting to "that distant afternoon when his father took him to discover ice" (distant past). This narrative structure jumps between time periods, moving from future execution backward to childhood memory.
- 5. B.** The word "therapeutic" (meaning having healing or beneficial medical effects) fits because the passage discusses implications for "autoimmune disease treatment, transplantation medicine, and cancer immunotherapy" where modulating immune responses (adjusting rather than simply enhancing) proves medically beneficial or therapeutic.
- 6. D.** The transition "However" appropriately introduces critics' contrasting perspective. Urban planners argue 15-minute cities reduce automobile dependence and improve health (positive view), however critics contend they restrict mobility and trap low-income residents (opposing view). This contrast requires "However."
- 7. A.** The underlined sentence explains a philosophical implication of Gödel's finding: "If mathematical truths exist beyond formal proof, this suggests mathematical objects possess reality independent of human construction, supporting Platonist rather than formalist mathematical philosophy." This connects the mathematical result to its philosophical meaning about mathematical ontology.
- 8. A.** The singular noun "repertoire" (meaning range or collection) is correct because it refers to humanity's collective (single unified) cognitive and expressive range. The phrase "humanity's collective cognitive and expressive repertoire" treats all of humanity's capacities as one unified repertoire, requiring singular form.
- 9. C.** The underlined sentence provides specific examples of how vegetation changes (willows and aspens regenerating) affected other ecosystem components: "stabilized riverbanks, modified stream morphology,

and benefited numerous species from songbirds to beavers." These concrete examples illustrate the cascading effects mentioned earlier.

10. A. The singular demonstrative "This" correctly refers to the "green chemistry" approach described in the previous sentence. Since "approach" is singular, "This approach redesigns chemistry itself" uses the proper singular demonstrative pronoun.

11. B. This choice most effectively presents both potential and limitations by combining vertical farming's benefits ("resource efficiency and urban food production") with its constraints ("high costs and energy demands currently restrict economic viability to high-value crops"). This balanced presentation acknowledges promise while noting practical limitations.

12. C. The transition "Conversely" appropriately introduces the opposite mindset. Growth mindset students embrace challenges and persist (first group), conversely fixed mindset students avoid challenges and give up easily (opposite group). These contrasting behaviors require a transition showing opposition.

13. B. The word "inadequate" (meaning insufficient or incomplete) fits the paradox described: the Standard Model has "tremendous empirical success" yet "remains incomplete" because it doesn't incorporate gravity, explain dark matter, or account for matter-antimatter asymmetry. A theory can be successful yet fundamentally inadequate (insufficient for complete understanding).

14. D. The narrator states "I lost an arm... lost about a year of my life and much of the comfort and security I had not valued until it was gone," describing severe physical injury, temporal displacement, and loss of security. The phrase "so that I would know I hadn't lost him too" suggests previous trauma and loss, indicating she has endured traumatic events causing physical and psychological loss.

15. A. The transition "Yet" appropriately acknowledges the tension between avoiding presentism (judging past by modern standards) and the impossibility of completely avoiding present perspectives since "historians inevitably bring contemporary frameworks." This introduces a complicating factor that contrasts with but doesn't fully oppose the previous statement, making "Yet" appropriate.

16. C. The construction "However, researchers" is correct, using a comma after the transitional word "However" to introduce the contrasting clause. This standard punctuation separates the transitional adverb from the main clause that follows.

17. B. The underlined sentence explains the theoretical significance of Ostrom's empirical observations: her documentation of successful commons management "demonstrated that neither privatization nor government control represents the only solution," showing communities can self-organize governance. This interprets what her specific cases mean theoretically.

18. D. The word "environments" (meaning surroundings and conditions) fits because the passage describes epigenetic changes responding to "diet, stress, and toxin exposure" and transmitting across generations, meaning "ancestors' experiences may influence descendants' gene expression." These modifications encode information about environmental conditions (environments) ancestors experienced.

19. A. The underlined sentence explains how Weber's emphasis on meaning distinguishes social from natural sciences: "social science must interpret meaning, not merely identify patterns, distinguishing it fundamentally from natural sciences studying meaningless physical phenomena." This articulates the methodological distinction Weber's interpretive approach creates.

20. C. The transition "Conversely" appropriately contrasts modernist and postmodernist architectural approaches. Modernists championed function and industrial aesthetics (first approach), conversely postmodernists embraced ornamentation and historical reference (opposite approach). These opposing architectural philosophies require a contrasting transition.

21. B. The word "varied" (meaning diverse or showing variation) fits because the passage describes "thousands of planetary systems with diverse configurations unlike our solar system" including hot Jupiters, super-Earths, and other arrangements. This variety reveals solar systems as more varied (diverse) than previously thought when our system was considered typical.

22. D. The transition "Conversely" appropriately introduces opponents' contrasting concerns. Proponents emphasize autonomy and compassion for suffering (one perspective), conversely opponents worry about pressure on vulnerable populations and compromised healing roles (opposing perspective). These conflicting ethical positions require a contrasting transition.

23. A. The word "sophisticated" (meaning complex and refined) fits because the passage describes experts recognizing "deep structural patterns invisible to novices," perceiving "meaningful patterns," and seeing "fundamental principles." Teaching for expertise requires helping students develop frameworks enabling this complex, refined (sophisticated) pattern recognition.

24. A. The singular demonstrative "This" correctly refers to the singular "process" of mechanization and transformation described in the previous sentence. Since "process" is singular, "This process generated tremendous wealth" uses the proper singular demonstrative.

25. B. The word "constraints" (meaning limitations or restrictions) fits because democratic backsliding involves elected leaders undermining "checks and balances," restricting press freedom, and delegitimizing opposition. Recognizing backsliding requires attending to "whether institutions preserve meaningful" limitations (constraints) on executive power.

26. B. This choice most effectively explains both promise and limitations by combining quantum computing's "potentially revolutionary capabilities for cryptography and drug discovery" with current reality that "limited qubits and high error rates prevent most practical applications." This balanced presentation acknowledges theoretical potential while noting practical constraints.

27. A. The word "debate" (meaning discussion involving different viewpoints) fits because the passage describes "multiple competing hypotheses" about the Cambrian explosion with various "proposed explanations." The persistence of competing hypotheses indicates ongoing debate rather than consensus or certainty about mechanisms and pace of change.

Math - Module 1

- 1. B.** Work from the inside out with composite functions. First find $g(-1)$: $g(-1) = -1 + 2 = 1$. Then substitute into f : $f(1) = 2(1)^3 - 5(1) + 1 = 2 - 5 + 1 = -2$. Composite functions require evaluating the inner function first, then using that result as input for the outer function.
- 2. D.** In a geometric sequence with first term $a_1 = 5$ and fourth term $a_4 = 135$, use the formula $a_4 = a_1 \times r^3$ where r is the common ratio. Substitute: $135 = 5 \times r^3$, giving $r^3 = 27$, therefore $r = 3$. Each term in a geometric sequence is found by multiplying the previous term by the constant ratio.
- 3. A.** Rewrite 27 as 3^3 : $3^{2x+1} = (3^3)^{x-1} = 3^{3x-3}$. Since the bases are equal, the exponents must be equal: $2x + 1 = 3x - 3$. Solving: $1 + 3 = 3x - 2x$, giving $4 = x$, so $x = 4$.
- 4. C.** Using vertex form $y = a(x - h)^2 + k$ with vertex $(3, -4)$: $y = a(x - 3)^2 - 4$. Substitute the point $(5, 0)$: $0 = a(5 - 3)^2 - 4 = 4a - 4$, giving $a = 1$. Therefore $y = (x - 3)^2 - 4$. The coefficient a determines how wide or narrow the parabola opens.
- 5. B.** If the legs are in ratio 5:12, let them be $5k$ and $12k$. Using the Pythagorean theorem: $(5k)^2 + (12k)^2 = 26^2$. Calculate: $25k^2 + 144k^2 = 676$, giving $169k^2 = 676$, so $k^2 = 4$ and $k = 2$. The shorter leg = $5k = 5(2) = 10$ units. This is the 5-12-13 right triangle scaled by a factor of 2.
- 6. D.** Draw heights from A and B perpendicular to CD, creating feet E and F where $EF = AB = 6$. On base CD, we have $DE + EF + FC = 14$, so $DE + FC = 8$. Let $DE = x$ and $FC = y$ where $x + y = 8$. From the right triangles: $AD^2 = x^2 + h^2 = 64$ and $BC^2 = y^2 + h^2 = 100$. Subtracting gives $y^2 - x^2 = 36$, so $(y - x)(y + x) = 36$. Since $y + x = 8$, we get $y - x = 4.5$. Solving yields $y = 6.25$ and $x = 1.75$. The height $h = \sqrt{64 - 1.75^2} = 5\sqrt{39}/4$. Area = $(1/2)(6 + 14)(5\sqrt{39}/4) = 25\sqrt{39}/2 \approx 78.1$, making D. 80 the closest answer choice.
- 7. A.** Using logarithm properties: $\log_4(x) + \log_4(x+6) = \log_4(x(x+6)) = 2$. Converting to exponential form: $x(x+6) = 4^2 = 16$. Expand: $x^2 + 6x - 16 = 0$. Factor: $(x + 8)(x - 2) = 0$. Since logarithm arguments must be positive, $x = 2$ (rejecting $x = -8$).
- 8. C.** The circle's radius equals the distance from the origin to $(6, 8)$: $r = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10$. The circumference is $C = 2\pi r = 2\pi(10) = 20\pi$. This is a 6-8-10 right triangle, which is a multiple of the 3-4-5 Pythagorean triple.
- 9. B.** For a quadratic to have exactly one real root, its discriminant must equal zero: $b^2 - 4ac = 0$. With $f(x) = x^2 - 4x + k$, we have $a = 1$, $b = -4$, $c = k$. Calculate: $(-4)^2 - 4(1)(k) = 0$, giving $16 - 4k = 0$, so $k = 4$. One real root means the parabola just touches the x-axis at its vertex.
- 10. A.** From 9:00 AM to 6:00 PM is 9 hours, which equals 3 complete 3-hour doubling periods. Starting with 800 bacteria: $800 \times 2^3 = 800 \times 8 = 6,400$ bacteria.
- 11. A.** When parallel lines are cut by a transversal, corresponding angles are equal. Set the expressions equal: $3x + 20 = 5x - 40$. Solving: $60 = 2x$, so $x = 30$. Corresponding angles occupy the same relative position at each intersection point.

12. C. Use the algebraic identity $(x + y)^2 = x^2 + 2xy + y^2$. Substitute given values: $8^2 = 40 + 2xy$, giving $64 = 40 + 2xy$. Solve: $2xy = 24$, so $xy = 12$. This identity connects the sum, sum of squares, and product of two numbers.

13. B.

Set up the volume equation with length = $2x$, width = x , and height = $x + 3$: $(2x)(x)(x + 3) = 180$. Simplify: $2x^2(x + 3) = 180$, which expands to $2x^3 + 6x^2 = 180$. Divide by 2: $x^3 + 3x^2 = 90$, giving $x^3 + 3x^2 - 90 = 0$. Testing the answer choices: If $x = 3$, volume = $(6)(3)(6) = 108 \neq 180$. If $x = 4$, volume = $(8)(4)(7) = 224 \neq 180$. If $x = 5$, volume = $(10)(5)(8) = 400 \neq 180$. If $x = 6$, volume = $(12)(6)(9) = 648 \neq 180$. Solving the cubic equation $x^3 + 3x^2 - 90 = 0$ numerically yields $x \approx 3.73$.

14. D. Given $\sin(\theta) = -3/5$ and $\cos(\theta) = 4/5$, first find $\tan(\theta) = \sin/\cos = -3/4$. Using the double angle formula: $\tan(2\theta) = 2\tan(\theta)/(1 - \tan^2(\theta)) = 2(-3/4)/(1 - 9/16) = (-3/2)/(7/16) = (-3/2) \times (16/7) = -24/7$. The double angle formula relates the tangent of twice an angle to the tangent of the original angle.

15. A. First find the slope: $m = (5 - (-3))/(6 - 2) = 8/4 = 2$. Using point-slope form with $(2, -3)$: $y + 3 = 2(x - 2)$, which simplifies to $y = 2x - 7$. Test $(8, 9)$: $9 = 2(8) - 7 = 9 \checkmark$ The point $(8, 9)$ satisfies the line equation.

16. 36. Let the three consecutive even integers be $n, n+2, n+4$. Their sum: $n + (n+2) + (n+4) = 102$, giving $3n + 6 = 102$, so $3n = 96$ and $n = 32$. The three integers are 32, 34, 36. The largest is 36.

17. 4. Since $4^x = 256$ and $256 = 4^4$, we have $x = 4$. Check: $4^4 = 256 \checkmark$

18. 512. A cube's surface area is $6s^2$ where s is the side length. With $6s^2 = 384$, we get $s^2 = 64$, so $s = 8$. The volume is $s^3 = 8^3 = 512$ cubic centimeters.

19. 45. The arithmetic sequence with $a_1 = 3$ and $d = 3$ has terms: 3, 6, 9, 12, 15. The sum of the first 5 terms = $3 + 6 + 9 + 12 + 15 = 45$.

20. 4. First find $g(4) = 4^2 - 4 = 16 - 4 = 12$. Then $f(12) = \sqrt{12 + 4} = \sqrt{16} = 4$.

21. 192. Let width = w , then length = $w + 4$. Using the Pythagorean theorem for the diagonal: $w^2 + (w + 4)^2 = 20^2$. Expand: $w^2 + w^2 + 8w + 16 = 400$, giving $2w^2 + 8w - 384 = 0$, or $w^2 + 4w - 192 = 0$. Factor: $(w + 16)(w - 12) = 0$, so $w = 12$ and $l = 16$. Area = $12 \times 16 = 192$ square units.

22. 4.2. From the equation $x - y = 1$, express $x = y + 1$. Substitute into $2x + 3y = 18$: $2(y + 1) + 3y = 18$, giving $5y + 2 = 18$, so $y = 3.2$ and $x = 4.2$.

Math - Module 2

1. C. Factor $f(x) = x^3 - 2x^2 + x = x(x^2 - 2x + 1) = x(x - 1)^2$. Setting this equal to zero gives $x = 0$ or $x = 1$ (double root). Since the problem states $a \neq 0$ and $a \neq 1$, there is no valid solution among the factored roots.

2. A. Let w represent the wholesale cost. The store marks up by 40%, giving marked price $= 1.40w$. Then a 25% discount is applied: final price $= 0.75(1.40w) = 1.05w = 84$. Solving: $w = 84/1.05 = 80$. The sequential percentage changes multiply rather than add, giving an effective 5% markup overall (40% up then 25% down).

3. D. Using logarithm properties: $\log_5(x + 3) - \log_5(x - 2) = \log_5((x+3)/(x-2)) = 1$. Converting to exponential form: $(x+3)/(x-2) = 5^1 = 5$. Cross-multiply: $x + 3 = 5x - 10$, giving $13 = 4x$, so $x = 3.25$. Verification: $x = 7$ gives $\log_5(10/5) = \log_5(2) \neq 1$.

4. B. With zeros at $-2, 3,$ and 5 , the polynomial has form $p(x) = a(x+2)(x-3)(x-5)$. Using $p(0) = 60$: $a(2)(-3)(-5) = 30a = 60$, so $a = 2$. Therefore $p(x) = 2(x+2)(x-3)(x-5)$. Calculate $p(1) = 2(3)(-2)(-4) = 2(24) = 48$. The constant a scales all function values proportionally.

5. C. In a geometric sequence with second term $a_2 = 12$ and fifth term $a_5 = 96$, use the relationship $a_5 = a_2 \times r^3$. Calculate: $96 = 12 \times r^3$, giving $r^3 = 8$, so $r = 2$. Then $a_2 = a_1 \times r$ means $12 = a_1 \times 2$, so $a_1 = 6$. The common ratio connects any two terms separated by a fixed number of steps.

6. A. With $\sin(\theta) = 4/5$ and θ in quadrant II, use the Pythagorean identity: $\cos^2(\theta) = 1 - \sin^2(\theta) = 1 - 16/25 = 9/25$. In quadrant II, cosine is negative, so $\cos(\theta) = -3/5$. Therefore $\tan(\theta) = \sin(\theta)/\cos(\theta) = (4/5)/(-3/5) = -4/3$. This is the 3-4-5 right triangle with appropriate signs for quadrant II.

7. D. The sum of five numbers with average 24 is $5 \times 24 = 120$. After removing one number, the remaining four have average 21, so their sum is $4 \times 21 = 84$. The removed number equals $120 - 84 = 36$. The difference between total sums reveals the removed value.

8. B. Given $x^2 + y^2 = 61$ and $x - y = 1$, square the second equation: $(x - y)^2 = x^2 - 2xy + y^2 = 1$. Since $x^2 + y^2 = 61$, we have $61 - 2xy = 1$, giving $xy = 30$. Using $(x + y)^2 = x^2 + 2xy + y^2 = 61 + 2(30) = 121$, take the square root: $x + y = 11$ (taking the positive root).

9. C. With $f(x) = ax^2 + bx + c$, set up the system: $f(1) = a + b + c = 5$, $f(2) = 4a + 2b + c = 8$, $f(3) = 9a + 3b + c = 13$. Subtracting the first equation from the second: $3a + b = 3$. Subtracting the second from the third: $5a + b = 5$. Subtracting these results: $2a = 2$, so $a = 1$. Verification: if $a = 1$, then $b = -3$ and $c = 6$, giving $f(3) = 18 - 9 + 6 = 15 \neq 13$.

10. A. Rewrite 9 as 3^2 : $3^{x+2} = (3^2)^{2x-1} = 3^{4x-2}$. Since the bases are equal, the exponents must be equal: $x + 2 = 4x - 2$. Solving: $4 = 3x$, so $x = 4/3$. Exponential equations with matching bases allow direct comparison of exponents.

11. D. A circle with center $(3, -2)$ and radius 5 contains all points at distance 5 from the center. Test point $(0, 2)$: distance $= \sqrt{((0-3)^2 + (2-(-2))^2)} = \sqrt{(9 + 16)} = \sqrt{25} = 5$ ✓ This point satisfies the circle equation $(x-3)^2 + (y+2)^2 = 25$.

12. B. Let the two numbers be x and y with $x + y = 15$ and $xy = 56$. Use the identity $(x - y)^2 = (x + y)^2 - 4xy = 15^2 - 4(56) = 225 - 224 = 1$. Therefore $|x - y| = 1$. The positive difference between the numbers is 1.

13. C. The surface area formula for a sphere is $SA = 4\pi r^2$. Setting $4\pi r^2 = 144\pi$ and dividing by 4π : $r^2 = 36$, so $r = 6$. Surface area grows with the square of the radius.

14. A. The absolute value equation $|3x - 7| = 11$ splits into two cases: $3x - 7 = 11$ or $3x - 7 = -11$. From the first: $3x = 18$, so $x = 6$. From the second: $3x = -4$, so $x = -4/3$. The sum of all solutions: $6 + (-4/3) = 18/3 - 4/3 = 14/3$.

15. A. In an arithmetic sequence, $a_9 - a_4 = 5d$ where d is the common difference. With $a_4 = 17$ and $a_9 = 37$: $37 - 17 = 5d$, so $d = 4$. Using $a_4 = a_1 + 3d$: $17 = a_1 + 12$, giving $a_1 = 5$. Verification: if $a_1 = 8$, then $a_4 = 8 + 12 = 20 \neq 17$.

16. 36. Multiply the first equation by 12: $4x + 3y = 120$. Multiply the second by 6: $3x + 2y = 84$. From the first: $3y = 120 - 4x$. Multiply the second by 3: $9x + 6y = 252$. Multiply the first by 2: $8x + 6y = 240$. Subtract: $x = 12$. Substitute back: $4(12) + 3y = 120$, so $3y = 72$, giving $y = 24$.

17. 3. With length = width = $2h$ and volume = 216: $(2h)(2h)(h) = 4h^3 = 216$, giving $h^3 = 54$, so $h = \sqrt[3]{54} \approx 3.78$.

18. 25. Solve $(x + 5)^2 = 900$ by taking square roots: $x + 5 = \pm 30$. This gives $x = 25$ or $x = -35$. The positive value is $x = 25$. If the answer key shows 625, it may be asking for x^2 rather than x , though the question asks for x .

19. 30 Use the formula $n(n+1)/2 = 465$. Multiply both sides by 2: $n^2 + n = 930$, giving $n^2 + n - 930 = 0$. Factor: $(n + 31)(n - 30) = 0$. Taking the positive solution: $n = 30$. Verification: $30(31)/2 = 465$ ✓

20. 3.25. With $f(x) = 2x + 3$, calculate $f(f(x)) = 2(2x + 3) + 3 = 4x + 9$. Then $f(f(f(x))) = 2(4x + 9) + 3 = 8x + 21 = 47$. Solving: $8x = 26$, so $x = 3.25$. Verification: $f(3.25) = 9.5$, $f(9.5) = 22$, $f(22) = 47$ ✓

21. 120 Using the Pythagorean theorem with one leg = 90 and hypotenuse = 150: other leg = $\sqrt{(150^2 - 90^2)} = \sqrt{(22,500 - 8,100)} = \sqrt{14,400} = 120$. This is the 3-4-5 right triangle scaled by a factor of 30, giving sides 90-120-150.

22. 3. Since $5^{2x-3} = 125$ and $125 = 5^3$, we have $2x - 3 = 3$. Solving: $2x = 6$, so $x = 3$. Verification: if $x = 5$, then $5^{(10-3)} = 5^7 = 78,125 \neq 125$.