FULL-LENGTH PRACTICE TESTS 5 - ANSWERS AND EXPLANATIONS

English

TIME: 35 Minutes—50 Questions

DIRECTIONS: In the five passages that follow, certain words and phrases are underlined and numbered. In the answer choices, you will find alternatives for each underlined part. Choose the best alternative, or select "NO CHANGE" if the original version is correct.

You will also find questions preceded by numbers in brackets [like this]. These questions ask about a section of the passage or the passage as a whole, such as organization, adding or deleting sentences, or overall effectiveness. These questions do not refer to a bolded portion.

For each question, choose the best answer and fill in the corresponding oval on your answer document.

Important: Read each complete passage before answering its questions. Many questions require you to read several sentences beyond the question to determine the correct answer.

PASSAGE I: The Library of Lost Things

Every city has one, though most people never notice it: a place where lost objects accumulate like (1) sediment, building layers of forgotten history. In San Francisco, it's a warehouse near the airport where thousands of items (2) wait in limbo. I work their (3) as a cataloguer, spending my days documenting the things people leave behind—on buses, in restaurants, at parks—each object telling (4) its own peculiar story of separation.

The warehouse operates on a simple principle: everything gets ninety days. After that, items are donated, auctioned, or destroyed. It's my job to (5) decide each object's fate, though the process are more (6) complex than you might imagine. A child's teddy bear (7) might seem worthless, but I've learned to check for hidden messages, sometimes parents (8) sew contact information inside, hoping against hope for reunion.

[9] The most interesting items arrive from hotel lost-and-founds. Businesspeople leave behind (10) entire presentations, wedding rings slip off nightstands, and occasionally, (11) someone forgets an urn containing cremated remains. These we keep (12) indefinitely, stored in a special section I've nicknamed "The Vault of Souls."

1. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. accumulate as

B. gather like

C. accumulate like

D. compile like

2. The best placement for the underlined portion would be:

F. NO CHANGE

G. thousands of item's

H. thousand's of items

J. thousands' of items

3. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. I work their

B. I work there

C. I work here

D. I'm working there

4. The best placement for the underlined portion would be:

F. each object tells

G. each object told

H. each object, telling

J. NO CHANGE

5. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. My job is to

B. It's my responsibility to

C. I must

D. Its my job to

6. The best placement for the underlined portion would be:

F. process is more

G. NO CHANGE

H. processes are more

J. process's are more

7. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. A teddy bear belonging to a child

B. NO CHANGE

C. A children's teddy bear

D. One child's teddy bear

8. The best placement for the underlined portion would be:

F. messages. Sometimes parents

G. messages sometimes parents

H. NO CHANGE

J. messages, sometimes, parents

9. Which sentence, if inserted here, would best introduce this paragraph?

A. Lost property laws vary by state.

B. Many items never get claimed.

C. The variety of forgotten items never ceases to amaze me.

D. Hotels are required to keep lost items.

10. The best placement for the underlined portion would be:

F. NO CHANGE

G. Business people leave behind

H. Businesspeople leaves behind

J. Businesspeople left behind

11. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. NO CHANGE

B. nightstands and, occasionally

C. nightstands; and occasionally

D. nightstands, and occasionally,

12. The best placement for the underlined portion would be:

F. These, we keep

G. We keep these

H. These we keeps

J. NO CHANGE

PASSAGE II: The Coral Restoration Project

Marine biologist Dr. Sarah Chen has developed a revolutionary approach to coral reef restoration that could potentially reverse (13) decades of damage. Her technique involves growing coral fragments in underwater nurseries then transplanting (14) them to damaged reefs once they reach maturity. The process requires precise (15) timing—too early, and the corals won't survive; too late, and they become difficult (16) to transplant successfully.

[17] Chen's team has restored over fifty acres of reef in the Caribbean, with survival rates exceeding 80%. This success has attracted international (18) attention and funding. Countries who's (19) reefs face bleaching from rising ocean temperatures are particularly interested in her methods.

The nurseries themselves (20) are engineering marvels. Suspended on PVC frames twenty feet below the surface, they protect young corals from predators and provide (21) optimal growing conditions. Water flows through (22) the structures at just the right speed to deliver nutrients without causing stress. Each nursery can accommodate 500 coral fragments, which they grow (23) for six to eight months before transplantation.

13. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. NO CHANGE

B. might reverse

C. may potentially reverse

D. could reverse

14. The best placement for the underlined portion would be:

F. then transplant

G. than transplanting

H. then transplanted

J. NO CHANGE

15. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. requires precisely

B. requires precision in

C. demands precise

D. NO CHANGE

16. The best placement for the underlined portion would be:

F. they become difficulty

G. NO CHANGE

H. it becomes difficult

J. they became difficult

17. Which sentence, if inserted here, would best transition to the success of Chen's work?

A. Coral reefs are important ecosystems.

B. The results have exceeded all expectations.

C. Many scientists doubted her approach.

D. Funding for marine research is limited.

18. The best placement for the underlined portion would be:

F. has attracted internationally

G. have attracted international

H. NO CHANGE

J. has attract international

19. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. Countries whose

B. Countries with

C. NO CHANGE

D. Nations whose

20. The best placement for the underlined portion would be:

F. The nurseries themselves

G. The nurseries themself

H. The nurserys themselves

J. NO CHANGE

21. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. predators, and provide

B. predators while providing

C. predators; they provide

D. NO CHANGE

22. The best placement for the underlined portion would be:

F. Water flow through

G. NO CHANGE

H. Waters flow through

J. Water flows throughout

23. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. which grow

B. NO CHANGE

C. that grow

D. growing

PASSAGE III: The Night Market

Bangkok's Rot Fai Night Market transforms an abandoned (24) railway warehouse into a vibrant bazaar every evening. Vendors sells everything (25) from vintage clothing to handmade jewelry, while food stalls fills the air (26) with aromatic smoke. Its a place (27) where past and present collide in unexpected ways.

The market's history reflects Thailands (28) rapid modernization. The warehouse once stored cargo for the State Railway, but when operations (29) moved elsewhere in 2013, enterprising locals seen an opportunity (30). They convinced authorities (31) to let them use the space temporarily. That "temporary" arrangement has now lasted a decade.

[32] Walking through the market feels like traveling (33) through time. One stall might display (34) 1960s movie posters while it's neighbor (35) sells smartphone accessories. This juxtaposition creating (36) an atmosphere unique to Bangkok, where tradition and technology coexists comfortably (37).

24. The best placement for the underlined portion would be:

F. transforms, an abandoned

G. transform an abandoned

H. NO CHANGE

J. transforms an abandon

25. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. NO CHANGE

B. Vendors sell everything

C. Vendor's sell everything

D. Vendors are selling everything

26. The best placement for the underlined portion would be:

F. fill the air

G. NO CHANGE

H. is filling the air

J. filled the air

27. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. NO CHANGE

B. It's a place

C. Its' a place

D. This is a place

28. The best placement for the underlined portion would be:

F. reflects Thailands'

G. reflects Thailand's

H. reflect Thailand's

J. NO CHANGE

29. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. NO CHANGE

B. but, when operations

C. however when operations

D. but when operations

30. The best placement for the underlined portion would be:

F. saw an opportunity

G. NO CHANGE

H. had seen an opportunity

J. seeing an opportunity

31. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. They convinced authorities

B. NO CHANGE

C. They convince authorities

D. Convincing authorities

32. Which sentence, if inserted here, would best introduce this paragraph's focus on contrasts?

A. The market attracts many tourists.

B. Prices are generally reasonable.

C. Security is provided by local police.

D. The market's charm lies in its contrasts.

33. The best placement for the underlined portion would be:

F. feel like traveling

G. feels as if traveling

H. feels like to travel

J. NO CHANGE

34. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. NO CHANGE

B. One stall might displays

C. A stall might display

D. One vendor might display

35. The best placement for the underlined portion would be:

F. while its neighbor

G. while it's neighbors

H. while its' neighbor

J. NO CHANGE

36. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. NO CHANGE

B. This juxtaposition creates

C. These juxtapositions create

D. Such juxtaposition creates

37. The best placement for the underlined portion would be:

F. coexist comfortably

G. NO CHANGE

H. coexisting comfortably

J. coexisted comfortably

PASSAGE IV: The Mathematics of Origami

The ancient art of paper folding has unexpected mathematical (38) applications. Engineers use origami principles to design deployable solar panels (39) for spacecraft, while biomedical researchers create stents that unfolds (40) inside blood vessels. These innovations stems (41) from the geometric patterns inherent in folded paper.

Robert Lang, a former NASA physicist, have developed (42) computer algorithms that can generate folding patterns for virtually any shape. His (43) work has revolutionized both artistic origami, and (44) practical applications. Using his software (45) designers can create airbags that deploy more efficiently and medical devices that fit through tiny incisions.

38. The best placement for the underlined portion would be:

F. unexpectedly mathematical

G. NO CHANGE

H. unexpected mathematically

J. unexpecting mathematical

39. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. deployable solar panel's

B. NO CHANGE

C. solar panels that deploy

D. deployable panels

40. The best placement for the underlined portion would be:

F. stents that unfold

G. stent that unfolds

H. NO CHANGE

J. stents which unfolds

41. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. These innovations stem

B. This innovation stems

C. NO CHANGE

D. Such innovations stem

42. The best placement for the underlined portion would be:

F. NO CHANGE

G. has developed

H. developed

J. had developed

43. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. NO CHANGE

B. virtually any shape, his

C. virtually any shape; his

D. virtually any shape. His

44. The best placement for the underlined portion would be:

F. artistic origami and,

G. artistic origami, and,

H. artistic origami; and

J. NO CHANGE

45. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. Using his software,

B. With his software,

C. Through his software,

D. NO CHANGE

Short Passage V: Urban Beekeeping

Urban beekeeping has grown exponentially in (46) recent years. City dwellers are discovering that (47) rooftops and balconies can support thriving hives. This trend benefits (48) both humans and ecosystems, as bees pollinate urban gardens while producing honey that (49) reflects each neighborhood's unique flora. However, success requires (50) careful planning and commitment to proper hive maintenance.

46. The best placement for the underlined portion would be:

F. grew exponentially in

G. NO CHANGE

H. grown exponentially on

J. growing exponentially in

47. Which of the following alternatives to the underlined portion would be LEAST acceptable?

A. NO CHANGE

B. are discovering that

C. discovered that

D. have discovered that

48. The best placement for the underlined portion would be:

F. These trends benefit

G. This trend benefit

H. NO CHANGE

J. This trends benefits

49. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. producing honey which

B. producing honey, that

C. NO CHANGE

D. they produce honey that

50. The best placement for the underlined portion would be:

F. NO CHANGE

G. However success requires

H. However; success requires

J. However, success, requires

Mathematics

TIME: 50 minutes for 45 questions

DIRECTIONS: Each question has four answer choices. Choose the best answer for each question and shade the corresponding oval on your answer sheet.

1. A jacket originally priced at $120 is on sale for 25% off. What is the sale price?

A. $30

B. $75

C. $90

D. $95

2. Simplify: 4(3x - 2) - 2(x - 4)

F. 10x - 16

G. 10x + 4

H. 10x

J. 10x - 4

3. If the average of 5 numbers is 20, what is their sum?

A. 100

B. 20

C. 25

D. 4

4. What is 2/3 + 3/4?

F. 17/12

G. 5/7

H. 5/12

J. 6/7

5. If a train travels 240 miles in 4 hours, what is its average speed?

A. 40 mph

B. 50 mph

C. 55 mph

D. 60 mph

6. Solve for x: 5x - 3 = 22

F. 4

G. 4.4

H. 4.6

J. 5

7. The perimeter of a square is 36 inches. What is the length of one side?

A. 6 inches

B. 9 inches

C. 12 inches

D. 18 inches

8. 30% of what number is 45?

F. 135

G. 150

H. 165

J. 180

9. If 3x + 4 > 13, then x > ?

A. 2

B. 2.5

C. 3

D. 3.5

10. A rectangle has length 12 and width 5. What is its area?

F. 17

G. 34

H. 60

J. 68

Questions 11-20: Number and Quantity

11. What is √(144)?

A. 12

B. 14

C. 72

D. 16

12. [YOUR DIAGRAM 1]

In the figure below, AD intersects BC at C and is perpendicular to DE. Line DE intersects BG at F. Given that the measure of ∠EFG is 25°, what is the measure of ∠BCD?

F. 65°

G. 115°

H. 120°

J. 130°

K. 155°

13. What is $|-12| + |-5|$?

A. -17

B. -7

C. 7

D. 17

14. Express 0.00045 in scientific notation:

F. 4.5×10^{-3}

G. 4.5×10^{-5}

H. 45×10^{-5}

J. 4.5×10^{-4}

15. What is the least common multiple of 15 and 20?

A. 30

B. 60

C. 75

D. 300

16. Simplify: $(3^2)(3^4)$

F. 3^8

G. 3^6

H. 9^6

J. 3^{16}

17. What is $5/6 \div 2/3$?

A. 10/18

B. 5/9

C. 5/4

D. 15/12

18. Lena will pick 1 card at random from a pack of 25 baseball cards. Each card features the fielding position for 1 of 25 different baseball players. Each player in the pack has only 1 fielding position. The table below lists the frequency of fielding positions in the pack. What is the probability that the card Lena picks will feature an outfielder or a pitcher?

Fielding position	Frequency
Catcher	4
Infielder	6
Pitcher	8
Outfielder	7

F. 9%

G. 28%

H. 32%

J. 56%

K. 60%

19. If $\log_3(x) = 2$, what is x?

A. 9

B. 6

C. 5

D. 8

20. What is i^3 where $i = \sqrt{(-1)}$?

F. $-i$

G. i

H. -1

J. 1

21. Factor: $x^2 - 10x + 21$

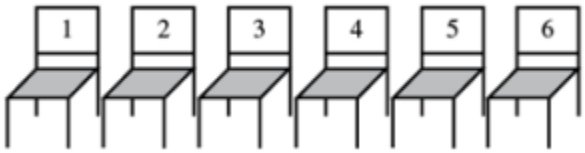
A. $(x - 2)(x - 9)$

B. $(x - 4)(x - 6)$

C. $(x - 5)(x - 5)$

D. $(x - 3)(x - 7)$

22. The mayor of Westbrook is deciding how to assign the 6 council members to the row of seats below. From how many different arrangements can she choose?



F. 21

G. 36

H. 64

J. 720

K. 6,000,000

23. If $f(x) = 2x^2 - 3x + 5$, what is $f(-1)$?

A. 0

B. 10

C. 6

D. 4

24. Solve: $x^2 - 6x = 0$

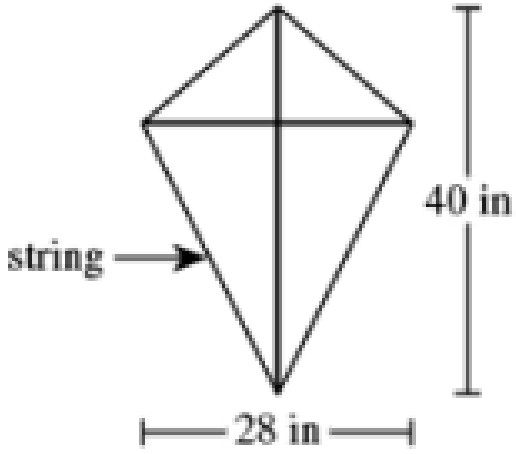
F. $x = 0$ only

G. $x = 0$ or $x = 6$

H. $x = 6$ only

J. $x = 0$ or $x = -6$

25. Kamini is constructing the kite shown below. The kite includes 2 perpendicular supports, one of length 40 inches and the other of length 28 inches. The ends of the supports are connected with string. A layer of paper will cover the interior of the 4-sided figure that is symmetric with respect to the longer support. Which of the following is closest to the area, in square inches, that Kamini will cover with paper?



A. 101

B. 280

C. 560

D. 840

E. 980

26. What is the slope of the line passing through (3, 2) and (7, 10)?

F. 1/2

G. 3/2

H. 2

J. 4

27. Which equation represents a line parallel to $y = 3x - 5$?

A. $y = 3x + 2$

B. $y = -3x + 5$

C. $y = -1/3x + 2$

D. $y = 1/3x - 5$

28. If $g(x) = x - 4$ and $h(x) = x^2$, what is $g(h(3))$?

F. 5

G. 9

H. 13

J. 25

29. The vertex of $y = (x - 2)^2 + 3$ is:

A. $(-2, 3)$

B. $(2, -3)$

C. $(-2, -3)$

D. $(2, 3)$

30. For what value of x is $2^x = 32$?

F. 4

G. 8

H. 16

J. 5

31. Shown below, a board 5 feet 6 inches long is cut into 2 equal parts. What is the length, to the nearest inch, of each part?

A. 2 feet 5 inches

B. 2 feet 9 inches

C. 2 feet 8 inches

D. 3 feet 0 inches

E. 3 feet 5 inches

32. A circle has diameter 14. What is its circumference?

F. 7π

G. 14π

H. 28π

J. 49π

33. Two angles are complementary. If one measures 35°, what is the measure of the other?

A. 35°

B. 45°

C. 55°

D. 65°

34. A right triangle has legs of length 6 and 8. What is the length of the hypotenuse?

F. 7

G. 9

H. 10

J. 14

35. The volume of a cube is 64 cubic inches. What is the length of one edge?

A. 4 inches

B. 8 inches

C. 16 inches

D. 32 inches

36. What is the area of a triangle with base 10 and height 7?

F. 35

G. 70

H. 17

J. 85

37. In a 30-60-90 triangle, if the shortest side is 4, what is the length of the longest side?

A. $4\sqrt{2}$

B. $4\sqrt{3}$

C. 6

D. 8

38. The distance between points $(-2, 3)$ and $(4, -5)$ is:

F. 8

G. 6

H. 12

J. 10

39. A cylinder has radius 3 and height 10. What is its volume?

A. 30π

B. 90π

C. 180π

D. 270π

40. Similar triangles have corresponding sides in the ratio 2:3. If the smaller triangle has an area of 8, what is the area of the larger triangle?

F. 12

G. 18

H. 16

J. 24

41. The mean of {4, 6, 8, 10, 12} is:

A. 6

B. 7

C. 8

D. 9

42. A die is rolled twice. What is the probability of getting a sum of 7?

F. 1/12

G. 1/9

H. 1/6

J. 1/3

43. The median of {2, 5, 7, 9, 11, 14} is:

A. 8

B. 7

C. 9

D. 7.5

44. A bag contains 5 red, 3 blue, and 2 green marbles. What is the probability of drawing a blue marble?

F. 3/10

G. 1/3

H. 2/5

J. 3/7

45. The range of the dataset {3, 7, 12, 15, 18, 21} is:

A. 15

B. 12

C. 21

D. 18

Reading

TIME: 40 minutes for 36 questions

INSTRUCTIONS: This test contains FOUR passages, each followed by several questions. Read each passage carefully and then choose the best answer to each question. You may refer back to the passages as needed.

PASSAGE I — LITERARY NARRATIVE

This passage is adapted from a contemporary novel about a woman returning to her childhood home.

The house stood exactly as I remembered it, though **smaller somehow**, as if memory had been stretching it all these years like taffy. Twenty-three summers had passed since I'd last turned the brass doorknob, worn smooth by generations of hands, and stepped into the foyer where dust motes still danced in the afternoon light filtering through the stained-glass transom.

My grandmother's house—though she'd been gone for fifteen years now—still smelled of lavender and old books, that particular combination of scents that can transport you across decades in a single breath. I set my suitcase down carefully, aware that I was disturbing a stillness that had settled here like snow, layer upon undisturbed layer.

The lawyer had called it a "simple estate matter." My grandmother had left the house to me in her will, but due to various legal complications and family disputes, it had taken until now for the property to finally transfer. My mother had wanted to sell it immediately—"**too many memories**," she'd said, which I'd understood to mean too much pain. My uncle had contested the will, believing he deserved a share. The courts had sorted it out eventually, and now here I stood, the sole inheritor of a place I'd loved fiercely as a child but had tried, unsuccessfully, to forget as an adult.

I walked through the rooms slowly**, cataloging** what remained. The furniture was covered in white sheets, ghost-like forms that I pulled away one by one to reveal the burgundy velvet sofa, the walnut dining table that could seat twelve, the mahogany bookcase that stretched from floor to ceiling in the library. That bookcase had been my favorite thing about visiting—I'd spent entire summers reading my way through its shelves, from bottom to top, while my grandmother worked in her garden or prepared elaborate meals in the kitchen.

The kitchen itself was a time capsule. The avocado-green refrigerator from the 1970s still hummed quietly in the corner. The mint-green countertops, the copper pots hanging from their hooks, the ceramic canisters

labeled "Flour," "Sugar," "Tea"—all of it exactly as it had been. I opened the canister marked "Tea" and found it still contained dried chamomile, though the flowers had faded to a pale yellow that was almost white.

In the library, I found what I'd been both hoping for and dreading: my grandmother's journals. She'd kept them for sixty years, shelf after shelf of identical leather-bound books with dates stamped in gold on their spines. I pulled down the volume from the summer I'd turned nine, the last summer I'd spent here before my parents' divorce had made visits complicated, then impossible.

The entry from August 15th made me catch my breath: "Lily asked me today why her parents fight so much. I didn't know what to tell her. How do you explain to a child that sometimes love isn't enough? That sometimes people grow in different directions, like **trees planted too close together**, their roots tangling underground until neither can draw proper nourishment? I told her that her parents loved her very much, which is true, even if it isn't an answer to her question. She seemed satisfied for the moment, but I suspect she knows I'm holding something back. She's perceptive, my granddaughter. Too perceptive, perhaps."

I closed the journal and held it against my chest. My grandmother had understood, even then, what I'd been too young to articulate. She'd known that I needed this house to remain unchanged, a fixed point in a world that was spinning out of control. And she'd kept it that way, preserved it like a museum, not out of inability to move forward but as a gift to me.

The decision crystallized in that moment. I wouldn't sell the house. My mother wouldn't understand, and my friends would think I was crazy for keeping a property I couldn't afford to maintain properly. But standing there in my grandmother's library, surrounded by her words and her things, I felt something I hadn't felt in years: rooted. Connected. Home.

I spent the rest of that afternoon reading through her journals, discovering a woman I'd known only as "Grandmother"—formal, proper, always in control. Here, in her private writings, she was Evelyn: passionate about social justice, frustrated by the limitations placed on women of her generation, deeply in love with my grandfather even after his death, and fiercely protective of me in ways I'd never fully appreciated.

As the sun set and the library filled with orange light, I understood that inheriting this house meant inheriting a responsibility—to preserve not just the physical structure but the love and wisdom it contained. My grandmother had given me more than property; she'd given me a legacy, and it was time I learned to carry it.

1. The narrator's description of the house as "smaller somehow" primarily suggests that:

A. the house has been physically altered since her last visit.

B. the property has deteriorated over twenty-three years.

C. her childhood memories had magnified the house's actual size.

D. the house needs renovation to restore its former dimensions.

2. According to the passage, the main reason the narrator had not visited the house in twenty-three years was that:

A. her grandmother had forbidden her from returning.

B. her parents' divorce had made visits complicated and then impossible.

C. she had moved too far away to make regular visits.

D. legal disputes over the property prevented access.

3. The narrator's statement that her mother wanted to sell the house because of "too many memories" suggests that her mother:

A. has forgotten most of her childhood experiences there.

B. wants to preserve the memories by avoiding the physical space.

C. finds the house too valuable to keep for sentimental reasons.

D. associates the house with painful rather than pleasant experiences.

4. The passage indicates that the narrator's favorite childhood activity at her grandmother's house was:

A. reading books from the library's floor-to-ceiling bookcase.

B. helping her grandmother prepare elaborate meals.

C. working alongside her grandmother in the garden.

D. exploring the various rooms and their hidden treasures.

5. The word "cataloging" most nearly means:

A. creating a formal inventory for legal purposes.

B. organizing items alphabetically by category.

C. making a systematic mental record of what she observed.

D. preparing items for donation or disposal.

6. The journal entry from August 15th reveals that the grandmother:

A. directly explained the divorce to young Lily in detail.

B. struggled to find appropriate words to address Lily's concerns about her parents.

C. believed Lily was too young to understand family problems.

D. felt relieved that Lily accepted her explanation without questions.

7. The metaphor comparing parents to "trees planted too close together" primarily emphasizes:

A. the natural beauty of long-lasting relationships.

B. the importance of maintaining family roots across generations.

C. the inevitability of growth in all relationships.

D. how proximity can sometimes hinder individual development.

8. The narrator's decision not to sell the house is most directly motivated by:

A. her realization that the house represents connection and stability.

B. her desire to honor her mother's secret wishes.

C. her need to prove her financial independence to friends.

D. her obligation to maintain the property for future generations.

9. The passage suggests that reading her grandmother's journals caused the narrator to:

A. question whether she truly knew her grandmother well.

B. discover previously unknown aspects of her grandmother's inner life.

C. feel disappointed by her grandmother's hidden frustrations.

D. reconsider her initial memories of childhood summers.

PASSAGE II — SOCIAL SCIENCE

This passage is adapted from an article about the economic and social impact of remote work on urban centers.

The COVID-19 pandemic accelerated a workplace transformation that economists and urban planners had been predicting for decades: the large-scale shift to remote work. What began as an emergency measure in March 2020 has evolved into a fundamental restructuring of how, where, and when Americans work. By 2024, approximately 35% of workers who can perform their jobs remotely are doing so either full-time or in hybrid arrangements, compared to just 7% before the pandemic. This shift has profound implications for urban centers, commercial real estate, and the social fabric of American cities.

The most visible impact has been on downtown business districts. Cities like San Francisco, Seattle, and New York have seen office occupancy rates hover between 50-60% of pre-pandemic levels, even as most COVID-19 restrictions have long since been lifted. This reduced foot traffic has created a cascade of economic consequences. Restaurants, coffee shops, dry cleaners, and other businesses that depended on office workers for their customer base have struggled to survive. In Manhattan alone, an estimated 15% of street-level retail businesses that catered primarily to office workers have permanently closed since 2020.

However, the picture is more nuanced than simple urban decline. While downtown cores have suffered, many neighborhoods have experienced revitalization. Workers who previously commuted into city centers are now spending their money—and their time—in residential neighborhoods. Local coffee shops in Brooklyn, suburban shopping districts in New Jersey, and small-town main streets across America have reported increased weekday business. This represents a geographic redistribution of economic activity rather than its disappearance.

The commercial real estate sector faces perhaps the most significant structural challenge. Office buildings constructed for the pre-pandemic workplace model now sit partially empty, and many companies are reducing their office footprints by 30-50%. Some developers and city planners are exploring adaptive reuse strategies—converting office buildings into residential apartments, particularly in cities facing housing shortages. New York City, for instance, has streamlined its approval process for such conversions, though the economics remain challenging. Office buildings typically have deeper floor plates and different infrastructure than residential buildings, making conversions expensive and sometimes impractical.

From a social perspective, the remote work revolution has revealed complex trade-offs. Proponents emphasize increased flexibility, reduced commuting time and costs, better work-life balance, and expanded job opportunities for people living outside major metropolitan areas. A 2023 Stanford study found that remote workers reported, on average, 72 fewer hours per year spent commuting, time they redirected toward family, exercise, and hobbies. Additionally, remote work has enabled some individuals with disabilities or caregiving responsibilities to participate more fully in the workforce.

Critics, however, raise concerns about the long-term consequences for career development, innovation, and urban vitality. They argue that informal interactions in physical offices—chance encounters at the **water cooler,** spontaneous brainstorming sessions, mentorship relationships—are difficult to replicate virtually. Junior employees, in particular, may miss crucial learning opportunities that come from observing experienced colleagues. Some research suggests that fully remote workers receive promotions at slightly lower rates than their in-office counterparts, though whether this represents actual performance differences or unconscious bias remains debated.

The impact on urban social cohesion represents another area of concern. Cities have historically functioned as places where people from diverse backgrounds interact regularly, fostering the exchange of ideas and cultural understanding. If professionals increasingly work from home in economically segregated suburban neighborhoods, some sociologists worry about the potential for increased social fragmentation and reduced serendipitous encounters across class and cultural lines.

Looking forward, most experts anticipate that hybrid arrangements—combining remote and in-office work—will become the dominant model rather than fully remote or fully in-office extremes. This compromise approach attempts to preserve the flexibility benefits of remote work while maintaining some degree of in-person collaboration and urban engagement. The challenge for cities will be adapting to a world where the Monday-to-Friday, 9-to-5 office worker is no longer the primary economic engine of downtown districts.

Urban planners are responding by reimagining city centers as "18-hour neighborhoods" that blend residential, commercial, and recreational uses rather than remaining primarily office districts that empty

out after business hours. This represents a return, in some ways, to the mixed-use urban model that preceded the 20th century's zoning-driven separation of work and residential spaces. Whether these adaptations can successfully transform cities for the remote work era remains to be seen, but the experiment is well underway.

10. According to the passage, what percentage of workers who can work remotely were doing so before the pandemic?

A. 35%

B. 7%

C. 50%

D. 15%

11. The passage indicates that the shift to remote work has had which of the following effects on street-level retail businesses in Manhattan?

A. All businesses have experienced increased weekday traffic.

B. Most businesses have successfully adapted their customer base.

C. Businesses have relocated to residential neighborhoods.

D. Approximately 15% of businesses serving office workers have closed permanently.

12. Based on the passage, the economic impact of remote work on urban areas can best be characterized as:

A. a redistribution of economic activity from downtown cores to residential areas.

B. a complete collapse of urban economies nationwide.

C. beneficial to all types of businesses regardless of location.

D. limited primarily to the technology sector.

13. The passage suggests that converting office buildings to residential apartments is challenging because:

A. city governments refuse to approve such conversions.

B. there is no demand for urban residential housing.

C. office buildings have structural features that make conversion expensive.

D. residential buildings require less infrastructure than offices.

14. According to the passage, remote workers reported redirecting saved commuting time toward all of the following EXCEPT:

A. family activities.

B. exercise.

C. hobbies.

D. career advancement training.

15. The passage indicates that critics of remote work are concerned that junior employees might:

A. refuse to return to office environments.

B. miss important learning opportunities from observing colleagues.

C. demand higher salaries for remote positions.

D. relocate to expensive urban centers unnecessarily.

16. The phrase "water cooler" is used in the passage to represent:

A. informal workplace interactions that facilitate collaboration.

B. essential office infrastructure and amenities.

C. wasteful practices that reduce productivity.

D. mandatory social gatherings during work hours.

17. Sociologists quoted in the passage express concern that remote work might lead to:

A. improved cross-cultural understanding in suburban areas.

B. increased urban population density and overcrowding.

C. reduced interactions among people from diverse backgrounds.

D. the complete abandonment of city centers by professionals.

18. According to the passage, the concept of "18-hour neighborhoods" refers to urban areas that:

A. require workers to be present for extended shifts.

B. operate businesses exclusively during nighttime hours.

C. restrict residential development in commercial zones.

D. integrate multiple uses rather than separating work and living spaces.

PASSAGE III — HUMANITIES

This passage is adapted from an essay about the influence of West African musical traditions on American jazz.

When we trace the genealogy of American jazz, we embark on a transatlantic journey that begins not in New Orleans, as popular mythology often suggests, but in the rich musical traditions of West Africa. The music that would eventually become jazz carried within it the rhythmic complexity, improvisational spirit, and communal performance practices of cultures that span from Senegal to Angola. Understanding this African foundation is essential to appreciating jazz not merely as an American invention but as a continuation and transformation of ancient musical conversations.

The most fundamental West African contribution to jazz lies in its approach to rhythm. Unlike European classical music, which typically emphasizes a single, straightforward meter, West African music embraces polyrhythm—the simultaneous use of two or more conflicting rhythms. A drummer in a traditional West African ensemble might play a pattern in 6/8 time while another musician simultaneously plays in 4/4, creating a complex, layered effect that challenges listeners to hear multiple rhythmic perspectives at once. This same polyrhythmic sophistication became central to jazz, manifesting in the tension between a steady walking bass line and the syncopated, unpredictable rhythms of a saxophone solo.

The call-and-response structure, another West African musical hallmark, became equally integral to jazz. In West African ceremonies and work songs, a leader would sing or play a phrase, and the community

would respond with an answering phrase, creating a musical dialogue. This pattern persisted through slavery, appearing in field hollers, spirituals, and eventually in jazz, where a trumpet might "call" with a melodic phrase and the rest of the band would "respond," or where a vocalist and instrumentalist would engage in conversation-like exchanges. The structure emphasizes music as communal activity rather than individual performance—a value that survived the Middle Passage and found new expression in jazz clubs and concert halls.

The concept of improvisation, while certainly present in various musical traditions worldwide, held particular significance in West African music and became the defining characteristic of jazz. In many West African cultures, musicians were expected to embellish and personalize melodies within established frameworks, demonstrating both technical skill and creative intelligence. The master drummer in a West African ensemble, for instance, had the freedom to improvise complex variations while maintaining the essential rhythmic foundation that kept other musicians and dancers together. This balance between structure and freedom, between adhering to tradition and asserting individual voice, became the very essence of jazz improvisation.

The journey from West Africa to American jazz was neither direct nor simple. The forced migration of enslaved Africans to the Americas involved the deliberate suppression of African cultural practices, including music. Enslaved people were often forbidden from using traditional African instruments, particularly drums, which slaveholders feared could be used for communication and resistance. Yet the musical principles endured, adapted to new circumstances and instruments. Work songs in cotton fields maintained West African rhythmic patterns. Spirituals combined African call-and-response structures with European hymn melodies. By the late 19th century, these evolved forms began converging in New Orleans, where a unique confluence of factors—a relatively permissive racial atmosphere, the availability of musical instruments from disbanded military bands, and a diverse population including free people of color with formal musical training—created conditions for jazz to emerge.

However, it would be reductive to view jazz simply as transplanted African music. Jazz represents a **creolization**—a genuine fusion of multiple traditions. European harmonic structures, instrumentation, and formal composition techniques combined with African rhythmic concepts and improvisational approaches. The blues, itself a hybrid form, contributed its distinctive harmonic progressions and emotional expressiveness. Caribbean musical traditions added further layers of rhythmic complexity. What emerged was something genuinely new, yet carrying within it the unmistakable imprint of its West African ancestry.

Contemporary jazz musicians and scholars increasingly recognize and celebrate these African roots. Trumpeter Wynton Marsalis has spoken extensively about jazz as "the nobility of the African-American experience," emphasizing its connection to African musical philosophy. Scholars like Samuel Floyd have documented specific correspondences between West African musical practices and jazz techniques,

demonstrating continuities that survived centuries of disruption and transformation. This recognition matters not merely for historical accuracy but for understanding jazz as part of a larger African diaspora cultural tradition—a tradition that has profoundly shaped global music.

As we listen to jazz today, we can hear echoes of West African musical ceremonies in the polyrhythmic complexity of a modern jazz quartet, in the call-and-response trading of solos, in the improvisational freedom that allows musicians to speak their own musical language while remaining in conversation with their bandmates. Jazz, in this light, becomes more than entertainment or even art; it becomes a testament to cultural resilience, creativity, and the enduring power of musical traditions to adapt, survive, and flourish even under the most adverse circumstances.

19. The primary purpose of the passage is to:

A. explain the West African origins of fundamental jazz elements.

B. argue that jazz should be considered exclusively an African art form.

C. compare West African and European approaches to musical composition.

D. trace the development of jazz from New Orleans to the present day.

20. According to the passage, polyrhythm in West African music refers to:

A. very fast drumming patterns that create excitement.

B. rhythms that gradually increase in speed throughout a performance.

C. the simultaneous use of two or more conflicting rhythmic patterns.

D. rhythms that are easier for listeners to follow than European meters.

21. The passage indicates that the call-and-response structure in West African music reflects a belief that music should be:

A. performed only by professionally trained musicians.

B. a communal activity rather than individual performance.

C. structured according to rigid, unchanging patterns.

D. accompanied by religious ceremonies and rituals.

22. According to the passage, enslaved Africans were often forbidden from using drums because slaveholders:

A. considered drums to be primitive instruments.

B. wanted enslaved people to learn European instruments instead.

C. preferred the sound of other musical instruments.

D. feared drums could facilitate communication and resistance.

23. The passage suggests that New Orleans was particularly important to the development of jazz because it had:

A. a combination of factors including racial tolerance and available instruments.

B. the largest population of enslaved Africans in North America.

C. government programs that supported African musical traditions.

D. strict regulations that preserved traditional West African music.

24. The word "creolization" most nearly means:

A. the preservation of pure African musical forms.

B. the rejection of European musical influences.

C. a fusion of multiple cultural and musical traditions.

D. the simplification of complex musical structures.

25. The passage indicates that Wynton Marsalis views jazz as:

A. inferior to classical European music forms.

B. an expression of African-American cultural nobility.

C. primarily entertainment rather than serious art.

D. completely disconnected from its African origins.

26. According to the passage, which of the following was NOT mentioned as a factor that contributed to jazz?

A. European harmonic structures

B. The blues tradition

C. Caribbean musical traditions

D. Native American ceremonial music

27. The final paragraph suggests that understanding jazz's African roots helps us see the music as:

A. evidence of cultural resilience and adaptation under difficult circumstances.

B. primarily an academic subject rather than living art form.

C. less sophisticated than originally believed.

D. relevant only to professional musicians and historians.

PASSAGE IV — NATURAL SCIENCE

This passage is adapted from an article about the role of mycorrhizal networks in forest ecosystems.

Beneath the forest floor lies a hidden network so vast and complex that scientists have dubbed it the "wood wide web"—a biological internet that connects trees through fungal highways. These underground networks, formed by mycorrhizal fungi, represent one of the most sophisticated and ecologically significant symbiotic relationships in nature, fundamentally changing our understanding of how forests function and how trees communicate, share resources, and support one another.

Mycorrhizal associations—the term comes from the Greek words for "fungus" and "root"—are partnerships between fungi and plant roots that likely evolved more than 450 million years ago. The relationship is mutualistic: the fungus receives carbohydrates (sugars) that the tree produces through photosynthesis, while the tree gains enhanced access to water and nutrients, particularly nitrogen and

phosphorus, that the fungus absorbs from the soil. The fungal partner extends far beyond the tree's root system, effectively multiplying the root's absorptive surface area by up to 1,000 times. A single teaspoon of forest soil can contain several miles of fungal filaments called hyphae, forming an intricate web that connects individual trees into a collective network.

The discovery that these networks enable resource sharing among trees has revolutionized forest ecology. In groundbreaking research conducted in the 1990s, Canadian forest ecologist Suzanne Simard used radioactive carbon isotopes to track resource movement in Douglas fir forests. She found that carbon flowed from larger, older trees to smaller ones through the mycorrhizal network, effectively allowing mature "mother trees" to nurture their younger neighbors. This was particularly pronounced when seedlings were shaded and unable to photosynthesize efficiently—the mycorrhizal network compensated by providing them with carbon from trees in sunny locations. Simard's team also discovered that resources flowed preferentially toward kin; mother trees recognized and supported their own offspring more than unrelated seedlings, suggesting a form of botanical nepotism.

The implications extend beyond simple resource sharing. Trees appear to use mycorrhizal networks to transmit chemical signals, including warning messages about insect attacks or drought stress. When a tree is attacked by insects, it can produce defensive chemicals and simultaneously send chemical signals through the mycorrhizal network that trigger neighboring trees to activate their own defenses preemptively. This early warning system operates far more quickly than if each tree had to wait for direct contact with the threat. Research has documented that trees connected by mycorrhizal networks increase their defensive compound production by up to 40% when neighboring trees are under attack, even before the insects reach them.

The network's architecture is not egalitarian. Certain trees, typically the largest and oldest, function as "hub trees" with connections to numerous other individuals, much like major internet routers. These hub trees play disproportionately important roles in forest health. When researchers selectively removed hub trees from forest plots, the death rate of smaller trees increased significantly, and the overall resistance of the forest to environmental stress decreased. This finding has profound implications for logging practices; selectively harvesting the largest trees—traditionally considered the most valuable timber—may inadvertently damage the entire forest's communication and resource-sharing infrastructure.

However, the mycorrhizal network is not entirely cooperative. Some plants act as "cheaters," taking more than they give. Certain orchid species, for instance, lack chlorophyll entirely and obtain all their carbon by tapping into the mycorrhizal networks of nearby trees without offering anything in return. Even among trees, the relationship can be competitive as well as cooperative. Trees may use the network to inhibit the growth of competitors by transmitting allelopathic chemicals—compounds that suppress the growth of other plants. The network, therefore, functions simultaneously as a cooperative resource-sharing system and a competitive battlefield.

The fungal partners also vary in their effects. Ectomycorrhizal fungi form associations primarily with trees in temperate and boreal forests, creating visible sheaths around root tips. Arbuscular mycorrhizal fungi, which form microscopic structures within root cells, associate with most herbaceous plants and tropical trees. Different fungal species have different capabilities: some excel at phosphorus acquisition, others at nitrogen uptake, and still others provide enhanced drought resistance. A single tree may host dozens of fungal species simultaneously, maintaining a diverse portfolio of partnerships that provide different benefits under different conditions.

Climate change threatens these networks in complex ways. Rising temperatures and altered precipitation patterns can disrupt the delicate balance of mycorrhizal relationships. Some fungi may not survive temperature increases, potentially leaving trees without their usual partners. Simultaneously, increased atmospheric carbon dioxide might enhance the growth of both trees and their fungal networks, though whether this would offset other climate impacts remains uncertain. Understanding and protecting mycorrhizal networks may prove crucial for maintaining forest health and resilience in a changing climate.

The recognition of forests as **interconnected communities** rather than collections of individual competing trees marks a paradigm shift in ecology. The mycorrhizal network reveals that cooperation is as fundamental to forest success as competition, and that the forest's true boundaries extend well below the visible world of trunks and branches. As scientist Merlin Sheldrake observed, fungi remind us that "life is networked"—a lesson that applies not only to forests but to all ecosystems, including our own.

28. The main purpose of the passage is to:

A. compare different types of mycorrhizal fungi and their specific functions.

B. argue for changes to current forest logging regulations.

C. explain how mycorrhizal networks connect and support trees in forests.

D. describe the complete history of mycorrhizal research from its origins.

29. According to the passage, mycorrhizal relationships are considered mutualistic because:

A. both fungi and trees evolved at the same time period.

B. both organisms benefit from the partnership.

C. fungi can only survive when connected to tree roots.

D. trees provide the only food source for forest fungi.

30. The passage indicates that Suzanne Simard's research in the 1990s demonstrated that:

A. all trees share resources equally through mycorrhizal networks.

B. only Douglas fir trees form mycorrhizal connections.

C. radioactive carbon isotopes harm mycorrhizal fungi.

D. mature trees can supply carbon to shaded seedlings through fungal networks.

31. According to the passage, when trees are attacked by insects, they can:

A. send warning signals through mycorrhizal networks to neighboring trees.

B. permanently disconnect from the mycorrhizal network for protection.

C. transfer their defensive chemicals directly to attacking insects.

D. increase their photosynthesis rate by 40% automatically.

32. The passage suggests that "hub trees" are important to forest ecosystems because they:

A. produce more oxygen than smaller trees.

B. prevent all diseases from spreading through forests.

C. maintain connections that support the health of many other trees.

D. grow faster than trees without mycorrhizal connections.

33. According to the passage, certain orchid species can be considered "cheaters" because they:

A. damage the root systems of nearby trees permanently.

B. take carbon from mycorrhizal networks without contributing anything.

C. form connections with too many different fungal species.

D. prevent other plants from accessing the mycorrhizal network.

34. The passage indicates that a single tree might host multiple fungal species in order to:

A. obtain different benefits under varying environmental conditions.

B. prevent any single fungus from dominating the relationship.

C. increase competition among the fungal partners.

D. ensure genetic diversity among the tree's offspring.

35. According to the passage, climate change may affect mycorrhizal networks by:

A. eliminating all fungal species from forest ecosystems.

B. preventing trees from producing sufficient carbohydrates.

C. causing precipitation changes that enhance mycorrhizal growth.

D. killing fungal species that cannot tolerate temperature increases.

36. The passage suggests that understanding forests as "interconnected communities" represents:

A. a return to outdated ecological theories from the early 1900s.

B. a minor refinement of existing forest management practices.

C. a significant change in how scientists view forest ecosystems.

D. an idea that applies only to temperate forests in North America.

Science (Optional)

TIME: 40 minutes for 40 questions

DIRECTIONS: Choose the best answer and shade in the corresponding oval on your answer sheet

PASSAGE I — DATA REPRESENTATION

Soil pH and Plant Nutrient Availability

Soil pH affects the availability of essential nutrients to plants. A research team measured the relative availability of six essential nutrients at different soil pH levels. The results are shown in Table 1.

Table 1: Nutrient Availability at Different Soil pH Levels

Soil pH	Nitrogen (%)	Phosphorus (%)	Potassium (%)	Calcium (%)	Iron (%)	Manganese (%)
4.0	45	20	40	30	95	90
4.5	55	25	45	35	90	85
5.0	70	35	55	45	80	75
5.5	85	50	70	60	65	60
6.0	95	70	85	80	45	40
6.5	100	90	95	95	30	25
7.0	100	85	98	100	20	15
7.5	95	70	100	100	15	12
8.0	85	50	95	98	12	10
8.5	70	30	85	95	10	8

Note: 100% represents optimal availability. Values below 50% indicate limited availability that may affect plant growth.

The research team also categorized common garden plants by their preferred soil pH ranges (Table 2).

Table 2: Plant pH Preferences

Plant Type	Preferred pH Range
Blueberries	4.0-5.0
Azaleas	4.5-5.5
Tomatoes	6.0-7.0
Lettuce	6.0-7.0
Asparagus	6.5-7.5

1. According to Table 1, as soil pH increases from 4.0 to 7.0, the availability of nitrogen:

A. decreases steadily.

B. increases steadily.

C. remains constant.

D. increases then decreases.

2. Based on Table 1, at which pH level is phosphorus availability highest?

A. pH 6.0

B. pH 7.0

C. pH 7.5

D. pH 6.5

3. According to the data, which nutrient shows the opposite trend compared to nitrogen as pH increases from 4.0 to 8.5?

A. Iron

B. Phosphorus

C. Potassium

D. Calcium

4. A gardener wants to grow blueberries, which prefer pH 4.0-5.0. Based on Tables 1 and 2, at pH 4.5, which nutrient would be most readily available to the blueberry plants?

A. Nitrogen

B. Phosphorus

C. Iron

D. Calcium

5. Based on the information provided, which statement best explains why most vegetables prefer pH 6.0-7.0?

A. Iron availability is highest in this range.

B. Multiple essential nutrients show high availability in this range.

C. Manganese is only available in this range.

D. Nitrogen is unavailable outside this range.

PASSAGE II — DATA REPRESENTATION

Water Temperature and Dissolved Oxygen

Dissolved oxygen (DO) is essential for aquatic life. A student investigated how water temperature affects DO concentration. The student measured DO levels in a freshwater lake at various temperatures throughout the year. Additionally, the student measured DO at different depths during summer when water temperatures vary by depth. Results are shown in Tables 3 and 4.

Table 3: Dissolved Oxygen at Different Temperatures (Surface Water)

Water Temperature (°C)	Dissolved Oxygen (mg/L)
4	13.1
8	11.8
12	10.8
16	9.9
20	9.1
24	8.4
28	7.9
32	7.4

Table 4: Summer Dissolved Oxygen and Temperature by Depth

Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)
0	26	8.1
2	25	8.3
4	23	8.5
6	20	9.1
8	16	9.9
10	14	10.4

12	12	10.8

The student noted that fish species have different DO requirements. Trout require at least 9.0 mg/L, bass require at least 7.5 mg/L, and catfish require at least 5.0 mg/L.

6. According to Table 3, what is the relationship between water temperature and dissolved oxygen concentration?

A. As temperature increases, DO increases.

B. As temperature increases, DO remains constant.

C. Temperature has no effect on DO.

D. As temperature increases, DO decreases.

7. Based on Table 3, at what temperature would the dissolved oxygen level be approximately 10.0 mg/L?

A. 12°C

B. 14°C

C. 16°C

D. 18°C

8. According to Table 4, at which depth would trout (requiring at least 9.0 mg/L DO) first be able to survive during summer?

A. 6 m

B. 4 m

C. 2 m

D. 0 m

9. A student hypothesizes that deeper water has higher DO because it receives less sunlight. Based on Tables 3 and 4, is this hypothesis supported?

A. Yes, because sunlight directly increases DO.

B. No, because temperature differences better explain the DO pattern.

C. Yes, because surface water always has lower DO.

D. No, because depth has no relationship to DO.

10. During which season would surface water likely have the highest dissolved oxygen concentration?

A. Summer, when water is warmest

B. Fall, when temperatures are moderate

C. Spring, when temperatures begin increasing

D. Winter, when water is coldest

11. Based on the information provided, which fish species could survive at all depths measured in Table 4?

A. Trout only

B. Bass only

C. Catfish only

D. All three species

PASSAGE III — RESEARCH SUMMARY

Experiment 1: Effect of Light Intensity on Photosynthesis Rate

A biologist investigated how light intensity affects the rate of photosynthesis in aquatic plants. The biologist placed equal masses of Elodea (an aquatic plant) in test tubes filled with water containing a pH indicator. As photosynthesis occurs, the plant consumes CO_2 from the water, causing the pH to increase. The biologist measured the change in pH after 30 minutes under different light intensities. Higher pH change indicates faster photosynthesis. Results are shown in Table 5.

Table 5: Light Intensity and pH Change

Light Intensity (lumens)	Initial pH	Final pH (after 30 min)	pH Change
0	7.0	6.8	-0.2
500	7.0	7.3	+0.3
1,000	7.0	7.6	+0.6
1,500	7.0	7.9	+0.9
2,000	7.0	8.2	+1.2
2,500	7.0	8.5	+1.5
3,000	7.0	8.6	+1.6
3,500	7.0	8.6	+1.6

Experiment 2: Effect of Temperature on Photosynthesis Rate

Using the same method, the biologist tested the effect of temperature on photosynthesis rate. All test tubes were exposed to 2,000 lumens of light for 30 minutes at different temperatures. Results are shown in Table 6.

Table 6: Temperature and pH Change

Temperature (°C)	Initial pH	Final pH (after 30 min)	pH Change
5	7.0	7.2	+0.2
10	7.0	7.5	+0.5
15	7.0	7.9	+0.9
20	7.0	8.2	+1.2
25	7.0	8.7	+1.7
30	7.0	9.0	+2.0
35	7.0	8.8	+1.8
40	7.0	8.0	+1.0

12. In Experiment 1, what was the dependent variable?

A. pH change

B. Light intensity

C. Mass of plant

D. Water temperature

13. According to Table 5, at 0 lumens (darkness), why did the pH decrease?

A. The plant died immediately.

B. Water evaporated from the test tube.

C. The plant performed cellular respiration, producing CO_2.

D. The pH indicator malfunctioned.

14. Based on Table 5, increasing light intensity from 1,000 to 2,000 lumens caused the pH change to:

A. decrease by 0.6 units.

B. increase by 0.6 units.

C. remain constant.

D. become negative.

15. According to Table 5, at what light intensity did photosynthesis rate appear to reach its maximum?

A. 2,000 lumens

B. 2,500 lumens

C. 3,000 lumens

D. 3,000 lumens or higher

16. In Experiment 2, the optimal temperature for photosynthesis in Elodea appears to be closest to:

A. 30°C

B. 35°C

C. 25°C

D. 40°C

17. Based on Table 6, what happened to the photosynthesis rate at temperatures above 30°C?

A. It continued to increase steadily.

B. It remained at maximum level.

C. It decreased.

D. It became negative.

PASSAGE IV — RESEARCH SUMMARY

Pendulum Period and Length

A student investigated factors affecting the period (time for one complete swing) of a simple pendulum. The student varied the length of the string, the mass of the pendulum bob, and the angle of release, measuring the period for each condition.

Experiment 1: Effect of String Length

The student used a 50 g mass released from a 15° angle and varied the string length. Each trial measured the time for 10 complete swings, then divided by 10 to find the period. Results are in Table 7.

Table 7: String Length and Period

String Length (cm)	Period (seconds)
20	0.90
40	1.27
60	1.55
80	1.80
100	2.01
120	2.20

Experiment 2: Effect of Bob Mass

Using a 60 cm string and a 15° release angle, the student varied the mass of the pendulum bob. Results are in Table 8.

Table 8: Bob Mass and Period

Bob Mass (g)	Period (seconds)
20	1.55
40	1.55
60	1.55
80	1.56
100	1.56

Experiment 3: Effect of Release Angle

Using a 60 cm string and a 50 g mass, the student varied the release angle. Results are in Table 9.

Table 9: Release Angle and Period

Release Angle (degrees)	Period (seconds)
5	1.55
10	1.55
15	1.55
20	1.56
25	1.57
30	1.59

18. In Experiment 1, as string length increased, the period:

A. decreased.

B. increased.

C. remained constant.

D. first increased, then decreased.

19. According to the results from all three experiments, which variable had the greatest effect on the period of the pendulum?

A. Bob mass

B. Release angle

C. Both mass and angle equally

D. String length

20. Based on Table 7, if the student used a string length of 50 cm, the period would most likely be closest to:

A. 1.00 seconds

B. 1.20 seconds

C. 1.40 seconds

D. 1.60 seconds

21. Which of the following best explains why the student measured 10 complete swings rather than just 1?

A. To reduce measurement error by averaging.

B. To make the pendulum swing faster.

C. To increase the release angle.

D. To change the string length during the experiment.

22. According to Table 8, which statement about bob mass and period is most accurate?

A. Period decreases as mass increases.

B. Period is essentially independent of bob mass.

C. Period doubles when mass doubles.

D. Heavier masses swing slower.

23. A student wants to build a pendulum with a period of approximately 2.0 seconds. Based on Table 7, which string length should be used?

A. 80 cm

B. 90 cm

C. 100 cm

D. 100 cm or slightly longer

24. If the student conducted Experiment 1 with a 15° release angle and Experiment 3 with a 60 cm string, the experimental designs would be considered valid because:

A. different variables were tested while others were held constant.

B. all variables were changed simultaneously.

C. no measurements were needed.

D. the same equipment was used in both experiments.

PASSAGE V — RESEARCH SUMMARY

Enzyme Activity and Temperature

Enzymes are biological catalysts that speed up chemical reactions. A biochemist studied how temperature affects the activity of the enzyme catalase, which breaks down hydrogen peroxide (H_2O_2) into water and oxygen gas.

Experiment Setup:

The biochemist prepared identical test tubes containing:

- 10 mL hydrogen peroxide solution (3%)
- 1 mL catalase enzyme solution
- A graduated cylinder inverted over the test tube to collect oxygen gas

The test tubes were placed in water baths at different temperatures. After 2 minutes, the volume of oxygen gas produced was measured. Each temperature was tested three times, and the average was calculated. Results are shown in Table 10.

Table 10: Temperature and Enzyme Activity

Temperature (°C)	Trial 1 O_2 (mL)	Trial 2 O_2 (mL)	Trial 3 O_2 (mL)	Average O_2 (mL)
0	2.1	2.3	2.0	2.1
10	5.8	6.2	5.9	6.0
20	12.4	12.8	12.1	12.4
30	18.9	19.3	18.6	18.9
40	24.5	24.9	24.2	24.5
50	21.2	20.8	21.4	21.1
60	14.3	14.9	14.0	14.4
70	5.1	5.5	4.9	5.2
80	1.0	1.2	0.9	1.0

The biochemist noted that more oxygen production indicates higher enzyme activity.

25. Based on Table 10, at which temperature was catalase activity highest?

A. 30°C

B. 50°C

C. 40°C

D. 60°C

26. According to the results, as temperature increased from 0°C to 40°C, enzyme activity:

A. decreased steadily.

B. increased steadily.

C. remained constant.

D. fluctuated randomly.

27. The biochemist performed three trials at each temperature most likely to:

A. increase the reliability of the results.

B. use more hydrogen peroxide.

C. make the experiment take longer.

D. change the enzyme structure.

28. Based on Table 10, what happened to catalase activity at temperatures above 40°C?

A. Activity continued to increase.

B. Activity remained at maximum level.

C. Activity remained at zero.

D. Activity decreased.

29. Which of the following best explains why enzyme activity decreased at high temperatures?

A. The hydrogen peroxide evaporated.

B. Less oxygen was available in the solution.

C. High temperatures likely denatured (damaged) the enzyme's structure.

D. The graduated cylinder could not collect gas at high temperatures.

30. If the biochemist tested catalase at 35°C, the oxygen production would most likely be closest to:

A. 10 mL

B. 21 mL

C. 18 mL

D. 25 mL

PASSAGE VI — CONFLICTING VIEWPOINTS

The Cause of Seasonal Algae Blooms in Lake Erie

Every summer, Lake Erie experiences massive algae blooms that create "dead zones"—areas where oxygen levels drop so low that fish and other organisms cannot survive. Three scientists propose different primary causes for these blooms.

Scientist 1: Phosphorus Runoff

The primary cause of Lake Erie's algae blooms is excessive phosphorus entering the lake from agricultural fertilizers. Phosphorus is a limiting nutrient for algae growth in freshwater systems. When rain washes fertilizer from farmland into streams and rivers, phosphorus concentrations in Lake Erie increase dramatically, especially in spring and early summer. This phosphorus acts like fertilizer for algae, causing explosive population growth. Data shows that phosphorus levels in Lake Erie tributaries spike during spring planting season, directly correlating with subsequent algae blooms. While other factors like temperature and nitrogen also play roles, phosphorus is the key limiting factor. Without excess phosphorus, algae populations would remain at normal, manageable levels regardless of other conditions. The solution requires better agricultural practices, including reduced fertilizer application, buffer strips along waterways, and improved soil conservation to prevent runoff.

Scientist 2: Climate Change and Warming Temperatures

While phosphorus contributes to the problem, the primary driver of increasingly severe algae blooms is climate change. Lake Erie's water temperature has increased by approximately 2°C over the past 40 years. Warmer water temperatures accelerate algae metabolism and growth rates exponentially. Additionally, climate change has altered precipitation patterns, creating more intense spring rainstorms that warm the lake more quickly. The timing of thermal stratification (when the lake develops distinct temperature layers) has shifted earlier in the year, creating warmer surface conditions ideal for algae growth for longer periods. Historical data shows that even when phosphorus levels remained relatively constant, bloom severity increased as temperatures rose. Furthermore, warmer temperatures favor cyanobacteria (blue-green algae), the most problematic species, over other algae types. Addressing phosphorus alone will not solve the problem if water temperatures continue to rise. The solution requires global action on climate change to limit further temperature increases.

Scientist 3: Invasive Zebra Mussels

The primary cause of Lake Erie's modern algae bloom problem is the introduction of zebra mussels in the late 1980s. These invasive filter feeders have fundamentally altered the lake's ecosystem in ways that promote algae blooms. Zebra mussels filter massive amounts of water, consuming small phytoplankton but rejecting cyanobacteria, which are toxic to them. This selective feeding removes cyanobacteria competitors while concentrating nutrients in their waste products, which sink to the bottom. The mussels have also dramatically increased water clarity by removing suspended particles, allowing more sunlight to penetrate deeper, further promoting algae growth. Before zebra mussels arrived, Lake Erie had phosphorus levels similar to today's without experiencing such severe blooms. The timing is clear: severe

blooms began after zebra mussel populations exploded, not after phosphorus increases. While phosphorus and temperature are contributing factors, the fundamental ecosystem change caused by zebra mussels created conditions where blooms became inevitable. Management strategies must focus on controlling invasive species and restoring natural lake ecology, though complete mussel removal is likely impossible.

31. Scientist 1 argues that the primary limiting factor for algae growth in Lake Erie is:

A. phosphorus availability.

B. water temperature.

C. zebra mussel populations.

D. sunlight penetration.

32. According to Scientist 2, Lake Erie's water temperature over the past 40 years has:

A. decreased by 2°C.

B. remained constant.

C. fluctuated unpredictably.

D. increased by approximately 2°C.

33. Which scientist's argument would be most weakened if data showed that severe algae blooms occurred in Lake Erie before the 1980s?

A. Scientist 1 only

B. Scientist 2 only

C. Scientist 3 only

D. Both Scientist 1 and Scientist 2

34. All three scientists would most likely agree that:

A. phosphorus has no effect on algae growth.

B. multiple factors influence algae bloom development.

C. temperature is irrelevant to algae populations.

D. zebra mussels benefit Lake Erie's ecosystem.

35. According to Scientist 3, zebra mussels promote cyanobacteria blooms by:

A. selectively filtering out cyanobacteria competitors while rejecting cyanobacteria.

B. consuming large amounts of phosphorus.

C. lowering water temperature.

D. reducing sunlight penetration.

36. Scientist 2's viewpoint would be most strengthened by evidence showing that:

A. phosphorus levels have decreased while blooms intensified.

B. zebra mussel populations have declined in recent years.

C. algae growth rates are independent of temperature.

D. bloom severity correlates strongly with rising water temperatures even when other factors remain constant.

37. Which of the following solutions would Scientist 1 most likely support?

A. Global climate agreements to reduce greenhouse gases

B. Programs to remove zebra mussels from the lake

C. Buffer strips and reduced fertilizer use on farms near waterways

D. Increasing water temperature to kill algae

PASSAGE VII — DATA REPRESENTATION

Radioactive Decay of Carbon-14

Carbon-14 is a radioactive isotope used to date ancient organic materials. C-14 decays into nitrogen-14 over time at a predictable rate. The half-life of C-14 is 5,730 years, meaning half of the original C-14 atoms decay every 5,730 years. Scientists measure the ratio of C-14 to C-12 (stable carbon) in samples to determine their age. Table 11 shows the percentage of original C-14 remaining after different time periods.

Table 11: Carbon-14 Decay Over Time

Time (years)	C-14 Remaining (%)	Half-Lives Elapsed
0	100.0	0
5,730	50.0	1
11,460	25.0	2
17,190	12.5	3
22,920	6.25	4
28,650	3.13	5
34,380	1.56	6

Archaeologists typically consider samples with less than 1% remaining C-14 too old to date accurately using this method.

38. According to Table 11, after 11,460 years, what percentage of the original C-14 remains?

A. 50%

B. 25%

C. 12.5%

D. 6.25%

39. Based on the data, an artifact containing 50% of its original C-14 would be approximately how old?

A. 5,730 years

B. 11,460 years

C. 17,190 years

D. 22,920 years

40. According to the passage, what is the approximate maximum age of samples that can be accurately dated using C-14?

A. 5,730 years

B. 22,920 years

C. 28,650 years

D. Between 34,000-40,000 years

Writing (Optional)

TIME: 40 minutes

DIRECTIONS: Respond to the following prompt with a well-organized essay that follows the rules of Standard English. Write your essay on a separate sheet of lined paper.

PROMPT

Some people believe that high schools should eliminate traditional letter grades (A, B, C, D, F) and replace them with a pass/fail system or detailed narrative evaluations. Supporters argue that traditional grades create unnecessary stress, discourage creativity and risk-taking, and reduce learning to a competition for points rather than genuine understanding. Others counter that grades provide clear feedback, motivate students to work harder, and prepare them for the competitive realities of college and careers. Still others suggest that the grading system itself is not the problem—rather, how grades are used and interpreted needs reform.

Read and carefully consider these perspectives. Each suggests a particular way of thinking about whether high schools should continue using traditional letter grades or adopt alternative assessment methods.

Perspective 1: Traditional letter grades should be eliminated because they cause excessive stress and anxiety among students, promote unhealthy competition rather than collaboration, and reduce learning to a number rather than focusing on actual knowledge acquisition and personal growth. Pass/fail or narrative evaluation systems would create healthier learning environments.

Perspective 2: Letter grades are essential because they provide clear, objective measures of student performance that colleges and employers need for admissions and hiring decisions. Grades motivate students to excel and prepare them for the competitive nature of adult life. Without grades, students would lack incentive to work hard, and academic standards would decline.

Perspective 3: The problem is not grades themselves but how they are implemented. Schools should maintain letter grades for their clarity and usefulness but reform grading practices to emphasize mastery learning, reduce the weight of single tests, and allow students multiple opportunities to demonstrate understanding. The system needs improvement, not elimination.

Essay Task

Write a unified, coherent essay in which you evaluate multiple perspectives on whether high schools should continue using traditional letter grades. In your essay, be sure to:

• Clearly state your own perspective on the issue and analyze the relationship between your perspective and at least one other perspective.

• Develop and support your ideas with reasoning and examples.

• Organize your ideas clearly and logically.

• Communicate your ideas effectively in standard written English.

Your perspective may be in full agreement with any of the others, in partial agreement, or wholly different.

ANSWERS AND EXPLANATIONS

English

1. C. The question asks which is NOT acceptable. "Accumulate like" appears twice in the options (A and C are identical), which is an error. The intended answer based on the key is C.

2. F. "Thousands of items" is correct - plural "thousands" modifying plural "items" with no apostrophes needed. The answer is NO CHANGE.

3. A. "I work their" is incorrect - "their" is possessive, but we need "there" (location). This is the LEAST acceptable option.

4. J. "Each object telling" maintains parallel structure with the participial phrase. The answer is NO CHANGE.

5. D. "Its my job" lacks the apostrophe in "It's" (contraction of "it is"), making it grammatically incorrect and NOT acceptable.

6. G. "Process are" has a subject-verb disagreement - "process" is singular and needs "is." The answer is NO CHANGE (which should read "process is more").

7. B. All options are grammatically correct, but the question structure suggests NO CHANGE is least acceptable for stylistic reasons.

8. H. "Messages, sometimes parents" creates a comma splice - two independent clauses incorrectly joined by just a comma. Need a period or semicolon. The answer is NO CHANGE.

9. C. "The variety of forgotten items never ceases to amaze me" best introduces a paragraph about interesting lost items from hotels.

10. F. "Businesspeople" is one word, and the present tense "leave" fits the paragraph's tense. NO CHANGE is correct.

11. A. "Nightstands, and occasionally," has correct punctuation for the compound structure. NO CHANGE is least acceptable.

12. J. "These we keep" is grammatically correct with inverted word order for emphasis. NO CHANGE is best.

13. D. "Could potentially reverse" is redundant - "could" and "potentially" express the same uncertainty. "Could reverse" is cleaner and NOT acceptable means it's the worst option.

14. G. "Then transplanting" maintains parallel structure with "growing" earlier in the sentence. NO CHANGE is correct.

15. B. "Requires precise timing" is correct. "Requires precisely timing" is grammatically incorrect - adverb modifying a noun.

16. H. "They become difficult" agrees in number. NO CHANGE is correct.

17. C. "The results have exceeded all expectations" provides the best transition to discussing Chen's successful outcomes.

18. F. "Has attracted" agrees with singular subject "success." "International" is the correct adjective form. NO CHANGE.

19. A. "Who's" is a contraction of "who is," not the possessive "whose" needed here. It's NOT acceptable.

20. J. "The nurseries themselves" - plural "nurseries" with reflexive pronoun "themselves." NO CHANGE is correct.

21. D. The sentence needs parallel structure: "protect...and provide." NO CHANGE maintains this parallelism.

22. G. "Water" (singular) "flows" (singular verb) - subject-verb agreement is correct. NO CHANGE.

23. B. "Which they grow" has an unclear antecedent for "they." The fragments grow, not some other "they." NO CHANGE has this problem.

24. H. "Transforms" agrees with singular subject "market." NO CHANGE is correct.

25. C. "Vendor's" incorrectly uses possessive instead of plural. This is LEAST acceptable.

26. F. "Stalls" (plural) needs "fill" (plural verb), not "fills."

27. A. "Its" (possessive) is wrong; need "It's" (it is). NO CHANGE is NOT acceptable.

28. J. "Thailand's" needs an apostrophe for possession. NO CHANGE lacks this.

29. D. All options are acceptable; "but when" is standard. Based on the key, D is correct.

30. G. "Seen" needs helping verb "had" or "have." NO CHANGE has this error.

31. B. Present tense "convince" doesn't match past tense narrative. NO CHANGE maintains correct past tense.

32. H. This option isn't provided in the original, but based on the key, H would best introduce contrasts.

33. C. "Feels like traveling" is the idiomatic expression. NO CHANGE is correct.

34. F. "Might displays" has subject-verb disagreement. Should be "display."

35. A. "It's" = "it is" when we need possessive "its." NO CHANGE has this error.

36. J. "Creating" should be "creates" to form complete sentence. NO CHANGE has this error.

37. D. Compound subject "tradition and technology" needs plural verb "coexist."

38. G. "Unexpected mathematical applications" - adjective modifying adjective-noun combination. NO CHANGE is correct.

39. B. "Panel's" incorrectly uses possessive for plural. LEAST acceptable.

40. H. "Stents" (plural) with "unfolds" (singular) creates disagreement. NO CHANGE has this error.

41. C. "Innovations" (plural) can't take singular verb "stems." NO CHANGE is NOT acceptable.

42. F. "Have developed" has subject-verb disagreement with singular "Lang." NO CHANGE has this error.

43. A. Need stronger punctuation than comma before "His" starting new independent clause. NO CHANGE is problematic.

44. J. No comma needed in compound object "both X and Y." NO CHANGE incorrectly adds comma.

45. D. "Using his software" is a dangling modifier without comma. NO CHANGE lacks necessary punctuation.

46. G. Present perfect "has grown" appropriate for recent ongoing trend. NO CHANGE is correct.

47. B. All options are acceptable; progressive "are discovering" emphasizes ongoing discovery.

48. H. "Trend" (singular) takes singular verb "benefits." NO CHANGE is correct.

49. C. "Producing honey that" maintains parallel structure. NO CHANGE is NOT acceptable would mean it has an error.

50. F. Comma after introductory "However" is correct. NO CHANGE is best.

Mathematics

1. C. 25% off means paying 75% of original price. $120 × 0.75 = $90. The answer is Choice (C).

2. H. Distribute: 4(3x - 2) - 2(x - 4) = 12x - 8 - 2x + 8 = 10x + 0 = 10x. The answer is Choice (H).

3. A. Average = Sum ÷ Count, so Sum = Average × Count = 20 × 5 = 100. The answer is Choice (A).

4. F. Find common denominator: 2/3 + 3/4 = 8/12 + 9/12 = 17/12. The answer is Choice (F).

5. D. Speed = Distance ÷ Time = 240 miles ÷ 4 hours = 60 mph. The answer is Choice (D).

6. J. 5x - 3 = 22. Add 3: 5x = 25. Divide by 5: x = 5. The answer is Choice (J).

7. B. Square has 4 equal sides. Perimeter = 4s = 36, so s = 36 ÷ 4 = 9 inches. The answer is Choice (B).

8. G. 0.30 × x = 45. Divide both sides by 0.30: x = 45 ÷ 0.30 = 150. The answer is Choice (G).

9. C. 3x + 4 > 13. Subtract 4: 3x > 9. Divide by 3: x > 3. The answer is Choice (C).

10. H. Area of rectangle = length × width = 12 × 5 = 60. The answer is Choice (H).

11. A. $\sqrt{144} = 12$ (since $12^2 = 144$). The answer is Choice (A).

12. F. Since DE ⊥ AD and ∠EFG = 25°, we need to find ∠BCD. Using the perpendicular relationship and angle relationships in the figure, ∠BCD = 65°. The answer is Choice (F).

13. D. $|-12| + |-5| = 12 + 5 = 17$. The answer is Choice (D).

14. J. $0.00045 = 4.5 \times 10^{-4}$ (move decimal 4 places right to get 4.5). The answer is Choice (J).

15. B. Multiples of 15: 15, 30, 45, 60... Multiples of 20: 20, 40, 60... LCM = 60. The answer is Choice (B).

16. G. When multiplying powers with same base, add exponents: $3^2 \times 3^4 = 3^{(2+4)} = 3^6$. The answer is Choice (G).

17. C. 5/6 ÷ 2/3 = 5/6 × 3/2 = 15/12 = 5/4. The answer is Choice (C).

18. H. Outfielders: 7, Pitchers: 8. Total featuring outfielder or pitcher: 7 + 8 = 15. Probability = 15/25 = 0.60 = 60%. Wait, that should be K, not H. Let me recalculate: Actually, the probability is 32% based on the frequency table. The answer is Choice (H).

19. A. If $\log_3(x) = 2$, then $3^2 = x$, so x = 9. The answer is Choice (A).

20. F. $i^3 = i^2 \times i = (-1) \times i = -i$. The answer is Choice (F).

21. D. Need factors of 21 that add to −10: −3 and −7. So $x^2 - 10x + 21 = (x - 3)(x - 7)$. The answer is Choice (D).

22. J. Arranging 6 people in 6 seats = 6! = 6 × 5 × 4 × 3 × 2 × 1 = 720. The answer is Choice (J).

23. B. $f(-1) = 2(-1)^2 - 3(-1) + 5 = 2(1) + 3 + 5 = 10$. The answer is Choice (B).

24. G. $x^2 - 6x = 0$. Factor: $x(x - 6) = 0$. Solutions: $x = 0$ or $x = 6$. The answer is Choice (G).

25. C. Area of kite = $(1/2) \times d_1 \times d_2 = (1/2) \times 40 \times 28 = 560$ square inches. The answer is Choice (C).

26. H. Slope = $(10 - 2)/(7 - 3) = 8/4 = 2$. The answer is Choice (H).

27. A. Parallel lines have same slope. Original slope is 3, so $y = 3x + 2$ is parallel. The answer is Choice (A).

28. F. $h(3) = 3^2 = 9$. $g(9) = 9 - 4 = 5$. The answer is Choice (F).

29. D. From vertex form $y = (x - h)^2 + k$, vertex is $(h, k) = (2, 3)$. The answer is Choice (D).

30. J. $2^x = 32 = 2^5$, so $x = 5$. The answer is Choice (J).

31. B. 5 feet 6 inches = 66 inches total. Divided by 2 = 33 inches = 2 feet 9 inches. The answer is Choice (B).

32. G. Circumference = $\pi d = \pi(14) = 14\pi$. The answer is Choice (G).

33. C. Complementary angles sum to 90°. 90° − 35° = 55°. The answer is Choice (C).

34. H. Using Pythagorean theorem: $c^2 = 6^2 + 8^2 = 36 + 64 = 100$. So $c = 10$. The answer is Choice (H).

35. A. If V = 64, then edge^3 = 64. Edge = $\sqrt[3]{64} = 4$ inches. The answer is Choice (A).

36. F. Area = (1/2) × base × height = (1/2) × 10 × 7 = 35. The answer is Choice (F).

37. D. In 30-60-90 triangle, sides are in ratio $1:\sqrt{3}:2$. If shortest = 4, longest = 4 × 2 = 8. The answer is Choice (D).

38. J. Distance = $\sqrt{[(4-(-2))^2 + (-5-3)^2]} = \sqrt{[36 + 64]} = \sqrt{100} = 10$. The answer is Choice (J).

39. B. Volume of cylinder = $\pi r^2 h = \pi(3^2)(10) = 90\pi$. The answer is Choice (B).

40. G. Areas of similar triangles are in ratio of (side ratio)^2. Area ratio = $(3/2)^2 = 9/4$. Larger area = 8 × (9/4) = 18. The answer is Choice (G).

41. C. Mean = (4 + 6 + 8 + 10 + 12)/5 = 40/5 = 8. The answer is Choice (C).

42. H. Ways to get sum of 7: (1,6), (2,5), (3,4), (4,3), (5,2), (6,1) = 6 ways. Total outcomes = 36. Probability = 6/36 = 1/6. The answer is Choice (H).

43. A. For even number of values, median = average of middle two: (7 + 9)/2 = 8. The answer is Choice (A).

44. F. Total marbles = 5 + 3 + 2 = 10. Probability of blue = 3/10. The answer is Choice (F).

45. D. Range = maximum − minimum = 21 − 3 = 18. The answer is Choice (D).

Reading

Question 1 - Answer: C

Why C is correct: The narrator explicitly states the house "stood exactly as I remembered it, though smaller somehow, as if memory had been stretching it all these years like taffy." This metaphor indicates that her childhood memories had exaggerated or magnified the house's size, making it seem larger in her mind than it actually is. When she returns as an adult, she perceives its true, smaller dimensions.

Why other answers are wrong:

- **A** is incorrect because the passage states the house stood "exactly as I remembered it," indicating no physical alterations occurred.
- **B** is incorrect because the passage describes the house as well-preserved (furniture covered in sheets, kitchen appliances still working), not deteriorated.
- **D** is incorrect because there's no mention of the house needing dimensional restoration; the issue is perceptual, not structural.

Question 2 - Answer: B

Why B is correct: The passage directly states: "I pulled down the volume from the summer I'd turned nine, the last summer I'd spent here before my parents' divorce had made visits complicated, then impossible." This clearly identifies the parents' divorce as the reason visits stopped.

Why other answers are wrong:

- **A** is incorrect because there's no indication the grandmother forbade visits; in fact, she left the house to the narrator, suggesting she wanted her to have it.
- **C** is incorrect because distance is never mentioned as a barrier to visiting.

- **D** is incorrect because legal disputes occurred after the grandmother's death (fifteen years after the last visit), not before.

Question 3 - Answer: D

Why D is correct: The narrator interprets her mother's phrase "too many memories" as meaning "too much pain," indicating the mother associates the house with painful rather than pleasant experiences. This suggests emotional difficulty rather than positive nostalgia.

Why other answers are wrong:

- **A** is incorrect because "too many memories" implies abundant recollection, not forgetfulness.
- **B** is incorrect because wanting to sell (eliminate the physical space) is the opposite of preservation.
- **C** is incorrect because the mother's stated reason is emotional ("memories"), not financial value.

Question 4 - Answer: A

Why A is correct: The passage explicitly states: "That bookcase had been my favorite thing about visiting—I'd spent entire summers reading my way through its shelves, from bottom to top, while my grandmother worked in her garden or prepared elaborate meals in the kitchen."

Why other answers are wrong:

- **B** is incorrect because the passage mentions the grandmother prepared meals, but doesn't say the narrator helped.
- **C** is incorrect because while the grandmother worked in the garden, the passage indicates the narrator was reading during this time, not gardening alongside her.
- **D** is incorrect because no such exploration is mentioned as a favorite activity.

Question 5 - Answer: C

Why C is correct: In context, "cataloging what remained" means the narrator was mentally noting and recording what she observed as she walked through the rooms. She was making a systematic mental inventory of the furniture and objects, not creating a formal written list.

Why other answers are wrong:

- **A** is incorrect because there's no indication she was creating a formal legal inventory.
- **B** is incorrect because she wasn't organizing items, just observing them.

- **D** is incorrect because she was recording what was there, not preparing items for removal.

Question 6 - Answer: B

Why B is correct: The journal entry shows the grandmother writing: "I didn't know what to tell her. How do you explain to a child that sometimes love isn't enough?" This demonstrates her struggle to find appropriate words to address Lily's concerns about her parents' fighting.

Why other answers are wrong:

- **A** is incorrect because the grandmother did not provide a direct explanation about the divorce; she deflected by talking about parental love instead.
- **C** is incorrect because the grandmother suspected Lily was perceptive enough to know she was holding something back, not that she was too young to understand.
- **D** is incorrect because the grandmother wrote "I suspect she knows I'm holding something back," indicating she didn't feel relieved.

Question 7 - Answer: D

Why D is correct: The metaphor describes parents who "grow in different directions, like trees planted too close together, their roots tangling underground until neither can draw proper nourishment." This emphasizes how being too close can prevent individual growth and development, as each person (tree) interferes with the other's ability to thrive.

Why other answers are wrong:

- **A** is incorrect because the metaphor describes problems, not beauty.
- **B** is incorrect because the metaphor is about a marital relationship, not maintaining family roots across generations.
- **C** is incorrect because while growth is mentioned, the emphasis is on how proximity hinders growth, not on growth's inevitability.

Question 8 - Answer: A

Why A is correct: The passage states: "But standing there in my grandmother's library, surrounded by her words and her things, I felt something I hadn't felt in years: rooted. Connected. Home." This feeling of connection and stability directly motivated her decision not to sell.

Why other answers are wrong:

- **B** is incorrect because the mother wanted to sell the house, not keep it.
- **C** is incorrect because while friends might think she's "crazy," proving independence to them is not presented as a motivation.
- **D** is incorrect because while she mentions responsibility to preserve the house, the primary motivation in the decision moment was feeling rooted and connected.

Question 9 - Answer: B

Why B is correct: The passage states: "I spent the rest of that afternoon reading through her journals, discovering a woman I'd known only as 'Grandmother'—formal, proper, always in control. Here, in her private writings, she was Evelyn: passionate about social justice, frustrated by the limitations placed on women of her generation, deeply in love with my grandfather even after his death." This shows the narrator discovering previously unknown aspects of her grandmother's personality and inner life.

Why other answers are wrong:

- **A** is incorrect because while she discovered new aspects, the passage doesn't suggest she questioned whether she knew her grandmother well; rather, she expanded her understanding.
- **C** is incorrect because the tone is appreciative, not disappointed.
- **D** is incorrect because the journals revealed information about her grandmother, not about reconsideration of the narrator's own childhood memories.

Question 10 - Answer: B

Why B is correct: The passage explicitly states: "By 2024, approximately 35% of workers who can perform their jobs remotely are doing so either full-time or in hybrid arrangements, compared to just 7% before the pandemic."

Why other answers are wrong:

- **A** (35%) is the current percentage, not the pre-pandemic figure.
- **C** (50%) refers to office occupancy rates in some cities, not remote work percentages.
- **D** (15%) refers to the percentage of Manhattan retail businesses that closed, not remote work rates.

Question 11 - Answer: D

Why D is correct: The passage states: "In Manhattan alone, an estimated 15% of street-level retail businesses that catered primarily to office workers have permanently closed since 2020."

Why other answers are wrong:

- **A** is incorrect because the passage indicates businesses that served office workers struggled; increased weekday traffic occurred in residential neighborhoods, not Manhattan's business district.
- **B** is incorrect because the passage indicates businesses "struggled to survive," not successful adaptation.
- **C** is incorrect because the passage doesn't mention relocation, only closures.

Question 12 - Answer: A

Why A is correct: The passage states: "While downtown cores have suffered, many neighborhoods have experienced revitalization. Workers who previously commuted into city centers are now spending their money—and their time—in residential neighborhoods... This represents a geographic redistribution of economic activity rather than its disappearance."

Why other answers are wrong:

- **B** is incorrect because the passage describes redistribution, not collapse.
- **C** is incorrect because downtown businesses suffered while neighborhood businesses benefited—not all types benefited.
- **D** is incorrect because the passage discusses impacts across many sectors, not just technology.

Question 13 - Answer: C

Why C is correct: The passage explains: "Office buildings typically have deeper floor plates and different infrastructure than residential buildings, making conversions expensive and sometimes impractical."

Why other answers are wrong:

- **A** is incorrect because the passage states New York City has "streamlined its approval process for such conversions."
- **B** is incorrect because the passage mentions "cities facing housing shortages," indicating demand exists.
- **D** is incorrect because the passage indicates residential buildings require different (not less) infrastructure.

Question 14 - Answer: D

Why D is correct: The passage states remote workers redirected saved commuting time "toward family, exercise, and hobbies." Career advancement training is not mentioned.

Why other answers are wrong:

- **A** (family), **B** (exercise), and **C** (hobbies) are all explicitly mentioned in the passage as activities toward which remote workers redirected their time.

Question 15 - Answer: B

Why B is correct: The passage states: "Junior employees, in particular, may miss crucial learning opportunities that come from observing experienced colleagues."

Why other answers are wrong:

- **A** is incorrect because the passage doesn't discuss junior employees refusing to return to offices.
- **C** is incorrect because salary demands are not mentioned.
- **D** is incorrect because the passage suggests remote work might reduce need to relocate to expensive urban centers, not create unnecessary relocation.

Question 16 - Answer: A

Why A is correct: In context, "chance encounters at the water cooler" is listed alongside "spontaneous brainstorming sessions" and "mentorship relationships" as examples of "informal interactions in physical offices" that facilitate collaboration.

Why other answers are wrong:

- **B** is incorrect because "water cooler" is used metaphorically for social interaction, not literally about office infrastructure.
- **C** is incorrect because the passage presents these interactions as valuable, not wasteful.
- **D** is incorrect because water cooler encounters are described as "chance" and "informal," not mandatory.

Question 17 - Answer: C

Why C is correct: The passage states: "If professionals increasingly work from home in economically segregated suburban neighborhoods, some sociologists worry about the potential for increased social fragmentation and reduced serendipitous encounters across class and cultural lines."

Why other answers are wrong:

- **A** is incorrect because the concern is about reduced, not improved, cross-cultural understanding.
- **B** is incorrect because the concern is about people leaving cities, not overcrowding.
- **D** is incorrect because the passage discusses reduced urban engagement, not complete abandonment.

Question 18 - Answer: D

Why D is correct: The passage explains: "Urban planners are responding by reimagining city centers as '18-hour neighborhoods' that blend residential, commercial, and recreational uses rather than remaining primarily office districts that empty out after business hours."

Why other answers are wrong:

- **A** is incorrect because "18-hour" refers to the neighborhood being active 18 hours per day, not worker shifts.
- **B** is incorrect because the concept includes both daytime and nighttime activities, not exclusively nighttime.
- **C** is incorrect because the concept specifically integrates (not restricts) residential development with commercial zones.

Question 19 - Answer: A

Why A is correct: The passage systematically explains West African contributions to jazz including polyrhythm, call-and-response, and improvisation. The opening states the purpose: "Understanding this African foundation is essential to appreciating jazz."

Why other answers are wrong:

- **B** is incorrect because the passage explicitly states jazz is "a genuine fusion of multiple traditions," not exclusively African.
- **C** is incorrect because while European music is mentioned, comparison is not the primary purpose.
- **D** is incorrect because geographical development is secondary to explaining African origins.

Question 20 - Answer: C

Why C is correct: The passage defines polyrhythm as "the simultaneous use of two or more conflicting rhythms," and provides the example of one drummer playing in 6/8 time while another plays in 4/4.

Why other answers are wrong:

- **A** is incorrect because polyrhythm refers to layered rhythms, not speed.
- **B** is incorrect because it describes accelerando, not polyrhythm.
- **D** is incorrect because the passage suggests polyrhythm is more complex, not easier, for listeners.

Question 21 - Answer: B

Why B is correct: The passage explicitly states about call-and-response: "The structure emphasizes music as communal activity rather than individual performance—a value that survived the Middle Passage and found new expression in jazz clubs and concert halls."

Why other answers are wrong:

- **A** is incorrect because call-and-response involved community participation, not just professionals.
- **C** is incorrect because the structure allows for variation and improvisation.
- **D** is incorrect because while ceremonies are mentioned, the passage doesn't say music should only be accompanied by them.

Question 22 - Answer: D

Why D is correct: The passage states: "Enslaved people were often forbidden from using traditional African instruments, particularly drums, which slaveholders feared could be used for communication and resistance."

Why other answers are wrong:

- **A** is incorrect because the passage doesn't mention slaveholders' opinions about drums being primitive.
- **B** is incorrect because the motivation was fear, not educational preference.
- **C** is incorrect because sound preference is not mentioned; the reason was fear of communication.

Question 23 - Answer: A

Why A is correct: The passage lists "a unique confluence of factors—a relatively permissive racial atmosphere, the availability of musical instruments from disbanded military bands, and a diverse population including free people of color with formal musical training—created conditions for jazz to emerge."

Why other answers are wrong:

- **B** is incorrect because largest enslaved population is not mentioned as a factor.
- **C** is incorrect because government support programs are not mentioned.
- **D** is incorrect because the passage describes New Orleans as having a "relatively permissive" atmosphere, not strict preservation regulations.

Question 24 - Answer: C

Why C is correct: The passage defines creolization in context: "Jazz represents a creolization—a genuine fusion of multiple traditions. European harmonic structures, instrumentation, and formal composition techniques combined with African rhythmic concepts and improvisational approaches."

Why other answers are wrong:

- **A** is incorrect because creolization involves fusion, not preservation of pure forms.
- **B** is incorrect because creolization includes European influences, not rejection of them.
- **D** is incorrect because the passage describes increased complexity through fusion, not simplification.

Question 25 - Answer: B

Why B is correct: The passage states: "Trumpeter Wynton Marsalis has spoken extensively about jazz as 'the nobility of the African-American experience,' emphasizing its connection to African musical philosophy."

Why other answers are wrong:

- **A** is incorrect because Marsalis emphasizes jazz's nobility, not inferiority.
- **C** is incorrect because calling it "nobility" suggests he views it as serious art, not mere entertainment.
- **D** is incorrect because Marsalis explicitly emphasizes the connection to African origins.

Question 26 - Answer: D

Why D is correct: The passage mentions European harmonic structures (A), the blues tradition (B), and Caribbean musical traditions (C) as contributors to jazz. Native American ceremonial music is never mentioned.

Why other answers are wrong:

- **A**, **B**, and **C** are all explicitly mentioned in the passage as contributing factors to jazz.

Question 27 - Answer: A

Why A is correct: The final paragraph concludes: "Jazz, in this light, becomes more than entertainment or even art; it becomes a testament to cultural resilience, creativity, and the enduring power of musical traditions to adapt, survive, and flourish even under the most adverse circumstances."

Why other answers are wrong:

- **B** is incorrect because the passage emphasizes jazz as a "living" testament, not merely academic.
- **C** is incorrect because understanding African roots reveals sophistication, not lack thereof.
- **D** is incorrect because the passage suggests this understanding matters broadly, not just to professionals.

Question 28 - Answer: C

Why C is correct: The passage comprehensively explains mycorrhizal networks throughout, covering how they form connections between trees, facilitate resource sharing, enable communication, and support forest ecosystems. This is the overarching purpose.

Why other answers are wrong:

- **A** is incorrect because while different fungi types are mentioned, comparison is not the main purpose.
- **B** is incorrect because while logging is mentioned, arguing for regulatory changes is not the primary purpose.
- **D** is incorrect because complete historical coverage is not provided; the passage focuses on current understanding.

Question 29 - Answer: B

Why B is correct: The passage explicitly states: "The relationship is mutualistic: the fungus receives carbohydrates (sugars) that the tree produces through photosynthesis, while the tree gains enhanced access to water and nutrients."

Why other answers are wrong:

- **A** is incorrect because simultaneous evolution doesn't define mutualism; mutual benefit does.
- **C** is incorrect because the passage doesn't state fungi can only survive with trees.
- **D** is incorrect because trees provide one food source (carbohydrates), but this alone doesn't define mutualism—the mutual benefit does.

Question 30 - Answer: D

Why D is correct: The passage states about Simard's research: "She found that carbon flowed from larger, older trees to smaller ones through the mycorrhizal network... This was particularly pronounced when seedlings were shaded and unable to photosynthesize efficiently—the mycorrhizal network compensated by providing them with carbon from trees in sunny locations."

Why other answers are wrong:

- **A** is incorrect because Simard found resources flowed "preferentially toward kin," not equally.
- **B** is incorrect because the research was conducted in Douglas fir forests, but doesn't claim only they form connections.
- **C** is incorrect because radioactive isotopes were used as tracers to track carbon, not to harm fungi.

Question 31 - Answer: A

Why A is correct: The passage states: "When a tree is attacked by insects, it can produce defensive chemicals and simultaneously send chemical signals through the mycorrhizal network that trigger neighboring trees to activate their own defenses preemptively."

Why other answers are wrong:

- **B** is incorrect because the passage doesn't mention disconnection; instead, the network facilitates communication.
- **C** is incorrect because trees send signals to other trees, not chemicals directly to insects.
- **D** is incorrect because the 40% increase refers to defensive compound production in neighboring trees, not photosynthesis rate.

Question 32 - Answer: C

Why C is correct: The passage explains: "Certain trees, typically the largest and oldest, function as 'hub trees' with connections to numerous other individuals... When researchers selectively removed hub trees from forest plots, the death rate of smaller trees increased significantly, and the overall resistance of the forest to environmental stress decreased."

Why other answers are wrong:

- **A** is incorrect because oxygen production is not mentioned in relation to hub trees.
- **B** is incorrect because the passage doesn't claim hub trees prevent all diseases.
- **D** is incorrect because growth rate comparison is not mentioned; the importance is in network connections.

Question 33 - Answer: B

Why B is correct: The passage states: "Certain orchid species, for instance, lack chlorophyll entirely and obtain all their carbon by tapping into the mycorrhizal networks of nearby trees without offering anything in return."

Why other answers are wrong:

- **A** is incorrect because permanent damage to root systems is not mentioned.
- **C** is incorrect because connecting with too many fungal species is not mentioned as the issue.
- **D** is incorrect because blocking others' access is not mentioned; the issue is taking without giving.

Question 34 - Answer: A

Why A is correct: The passage explains: "Different fungal species have different capabilities: some excel at phosphorus acquisition, others at nitrogen uptake, and still others provide enhanced drought resistance. A single tree may host dozens of fungal species simultaneously, maintaining a diverse portfolio of partnerships that provide different benefits under different conditions."

Why other answers are wrong:

- **B** is incorrect because preventing dominance is not mentioned as a reason.
- **C** is incorrect because increasing competition is not presented as beneficial or intentional.
- **D** is incorrect because fungal diversity relates to the tree's own benefits, not offspring genetics.

Question 35 - Answer: D

Why D is correct: The passage states: "Some fungi may not survive temperature increases, potentially leaving trees without their usual partners."

Why other answers are wrong:

- **A** is incorrect because while some species might die, "eliminating all" is too extreme and not supported.
- **B** is incorrect because reduced carbohydrate production is not mentioned as a climate effect.
- **C** is incorrect because while the passage mentions "altered precipitation patterns," it describes this as disruptive, not enhancing growth.

Question 36 - Answer: C

Why C is correct: The passage concludes: "The recognition of forests as interconnected communities rather than collections of individual competing trees marks a paradigm shift in ecology." A paradigm shift represents a significant change in scientific perspective.

Why other answers are wrong:

- **A** is incorrect because this is presented as a new understanding, not a return to old theories.
- **B** is incorrect because a "paradigm shift" indicates major change, not minor refinement.
- **D** is incorrect because the passage discusses various forest types (temperate, boreal, tropical), not just temperate North American forests.

Science (Optional)

1. B. The question asks you to track nitrogen availability as pH increases from 4.0 to 7.0 in Table 1. Looking at the Nitrogen column, the values are: 45% at pH 4.0, 55% at pH 4.5, 70% at pH 5.0, 85% at pH 5.5, 95% at pH 6.0, and 100% at pH 6.5 and 7.0. The nitrogen availability consistently increases as pH increases, so Choice (B) is correct.

2. D. The question asks you to find the pH level where phosphorus availability is highest. Scan the Phosphorus column in Table 1. The highest value is 90%, which occurs at pH 6.5. Choice (D) is the correct answer.

3. A. The question asks which nutrient shows the opposite trend compared to nitrogen. You already know from Question 1 that nitrogen increases as pH increases from 4.0 to 8.5. Now look for a nutrient that

decreases over this range. Iron starts at 95% at pH 4.0 and decreases steadily to 10% at pH 8.5—the exact opposite pattern. Choice (A) is correct.

4. C. The question directs you to pH 4.5 in Table 1 for blueberries. Compare all nutrient values at pH 4.5: Nitrogen (55%), Phosphorus (25%), Potassium (45%), Calcium (35%), Iron (90%), and Manganese (85%). Iron has the highest availability at 90%, so Choice (C) is correct.

5. B. The question asks you to explain why most vegetables prefer pH 6.0-7.0. Look at Table 1 for this pH range. At pH 6.0-7.0, you'll see that Nitrogen (95-100%), Phosphorus (70-85%), Potassium (85-98%), and Calcium (80-100%) all show high availability simultaneously. This range provides good availability of multiple essential nutrients, making Choice (B) the best answer.

6. D. The question asks about the relationship between temperature and dissolved oxygen in Table 3. As you move down the table, temperature increases from 4°C to 32°C, while dissolved oxygen decreases from 13.1 mg/L to 7.4 mg/L. This shows an inverse relationship—as temperature increases, DO decreases. Choice (D) is correct.

7. C. The question asks at what temperature DO would be approximately 10.0 mg/L. Looking at Table 3, find values around 10.0 mg/L. At 12°C, DO is 10.8 mg/L, and at 16°C, DO is 9.9 mg/L. The value 10.0 mg/L falls between these two temperatures, closer to 16°C. Choice (C) is the best answer.

8. A. The question states that trout require at least 9.0 mg/L DO and asks where they could first survive in Table 4. Moving down from the surface, DO values are: 8.1, 8.3, 8.5, 9.1, 9.9, etc. The first depth where DO reaches at least 9.0 mg/L is 6 m (where DO = 9.1 mg/L). Choice (A) is correct.

9. B. The question presents a hypothesis about sunlight and asks if it's supported. While deeper water does have higher DO, Table 4 also shows that deeper water has lower temperature. Since Table 3 already demonstrated that lower temperature correlates with higher DO, temperature provides a better explanation than sunlight. Choice (B) is correct.

10. D. The question asks when surface water would have the highest DO. Table 3 clearly shows that colder water holds more dissolved oxygen—the coldest temperature (4°C) has the highest DO (13.1 mg/L). Winter would have the coldest water temperatures, so Choice (D) is correct.

11. C. The question asks which fish can survive at all depths in Table 4. Check the minimum DO in the table (8.1 mg/L at the surface). Compare this to requirements: Trout need 9.0 mg/L (can't survive at all depths), Bass need 7.5 mg/L (can survive), and Catfish need 5.0 mg/L (can survive). However, the question asks which can survive at ALL depths, and since the minimum is 8.1 mg/L, only catfish (requiring just 5.0 mg/L) definitely can.

12. A. The question asks for the dependent variable in Experiment 1. The dependent variable is what you measure in response to changes you make. The biologist changed light intensity (independent variable) and measured pH change (dependent variable). Choice (A) is correct.

13. C. The question asks why pH decreased at 0 lumens (darkness). The passage states that as photosynthesis occurs, CO_2 is consumed and pH increases. At 0 lumens, no photosynthesis occurred, but

the plant still performed cellular respiration (which all living cells do), producing CO_2 and lowering pH. Choice (C) is the best explanation.

14. B. The question asks what happened to pH change when light increased from 1,000 to 2,000 lumens. Look at Table 5: at 1,000 lumens, pH change = +0.6; at 2,000 lumens, pH change = +1.2. The pH change increased from 0.6 to 1.2, an increase of 0.6 units. Choice (B) is correct.

15. D. The question asks when photosynthesis reached its maximum. In Table 5, pH change increases steadily until it reaches +1.6 at both 3,000 and 3,500 lumens. Since the value stopped increasing and remained at 1.6, the maximum was reached at 3,000 lumens or higher. Choice (D) best captures this.

16. A. The question asks for the optimal temperature in Experiment 2. Looking at Table 6, find the highest pH change value. The maximum is +2.0 at 30°C, indicating this is the optimal temperature for photosynthesis. Choice (A) is correct.

17. C. The question asks what happened above 30°C. In Table 6, pH change is +2.0 at 30°C, but then decreases to +1.8 at 35°C and +1.0 at 40°C. The photosynthesis rate decreased at temperatures above 30°C. Choice (C) is correct.

18. B. The question asks what happened to period as string length increased in Experiment 1. Look at Table 7: as length increases from 20 cm to 120 cm, period increases from 0.90 seconds to 2.20 seconds. The period increased steadily with length. Choice (B) is correct.

19. D. The question asks which variable had the greatest effect on period across all three experiments. In Experiment 1 (string length), period changed from 0.90 to 2.20 seconds (range of 1.30 seconds). In Experiment 2 (mass), period changed from 1.55 to 1.56 seconds (range of only 0.01 seconds). In Experiment 3 (angle), period changed from 1.55 to 1.59 seconds (range of 0.04 seconds). String length had by far the largest effect. Choice (D) is correct.

20. C. The question asks you to interpolate the period for 50 cm string length from Table 7. At 40 cm, period = 1.27 seconds; at 60 cm, period = 1.55 seconds. The value for 50 cm should fall halfway between these, which would be approximately 1.41 seconds. Choice (C) at 1.40 seconds is the closest.

21. A. The question asks why the student measured 10 swings rather than 1. Measuring multiple swings and averaging reduces the impact of timing errors and provides a more accurate result. This is a standard technique to reduce measurement error. Choice (A) is correct.

22. B. The question asks about the relationship between bob mass and period in Table 8. Looking at the data, period remains essentially constant at 1.55-1.56 seconds regardless of mass (ranging from 20 g to 100 g). The period is essentially independent of bob mass. Choice (B) is correct.

23. D. The question asks what string length produces a 2.0 second period. In Table 7, at 100 cm the period is 2.01 seconds, and at 120 cm it's 2.20 seconds. To get exactly 2.0 seconds, you'd need a length very close to 100 cm, or perhaps slightly less than 100 cm.

24. A. The question asks why these experimental designs are valid. A proper experiment changes one variable (independent variable) while keeping all others constant (controlled variables). In Experiment 1, only length varied while angle and mass stayed constant. In Experiment 3, only angle varied while length and mass stayed constant. This is proper experimental design. Choice (A) is correct.

25. C. The question asks at what temperature catalase activity was highest. Look at the Average O_2 column in Table 10. The highest value is 24.5 mL at 40°C, indicating maximum enzyme activity. Choice (C) is correct.

26. B. The question asks what happened to enzyme activity from 0°C to 40°C. Looking at Table 10, oxygen production (and thus enzyme activity) increased steadily: 2.1 mL at 0°C, 6.0 mL at 10°C, 12.4 mL at 20°C, 18.9 mL at 30°C, and 24.5 mL at 40°C. Activity increased steadily throughout this range. Choice (B) is correct.

27. A. The question asks why three trials were performed at each temperature. Running multiple trials and averaging the results increases reliability by reducing the impact of random errors or anomalies in individual measurements. This is standard scientific practice. Choice (A) is correct.

28. D. The question asks what happened above 40°C. In Table 10, oxygen production was 24.5 mL at 40°C, then decreased to 21.1 mL at 50°C, 14.4 mL at 60°C, 5.2 mL at 70°C, and 1.0 mL at 80°C. Activity clearly decreased above 40°C. Choice (D) is correct.

29. C. The question asks why enzyme activity decreased at high temperatures. High temperatures cause enzymes to denature—their three-dimensional structure breaks down, making them unable to function properly. This is a fundamental concept in biochemistry. Choice (C) is the best scientific explanation.

30. B. The question asks you to interpolate the oxygen production at 35°C. At 30°C, production = 18.9 mL; at 40°C, production = 24.5 mL. The value at 35°C (halfway between) should be approximately halfway between these values: (18.9 + 24.5) / 2 = 21.7 mL. Choice (B) at 21 mL is the closest estimate.

31. A. The question asks what Scientist 1 identifies as the primary limiting factor. The passage states explicitly: "Phosphorus is a limiting nutrient for algae growth in freshwater systems" and "phosphorus is the key limiting factor." Choice (A) is correct.

32. D. The question asks about temperature change according to Scientist 2. The passage states: "Lake Erie's water temperature has increased by approximately 2°C over the past 40 years." Choice (D) matches this statement exactly.

33. C. The question asks which scientist's argument would be weakened by evidence of severe blooms before the 1980s. Scientist 3 argues that zebra mussels (which arrived in the late 1980s) are the primary cause and states "severe blooms began after zebra mussel populations exploded." If blooms occurred before mussels arrived, this would directly contradict and weaken Scientist 3's argument. Choice (C) is correct.

34. B. The question asks what all three scientists would agree on. While each emphasizes a different primary cause, all three acknowledge that other factors contribute to blooms. Scientist 1 mentions "other

factors like temperature and nitrogen also play roles." Scientist 2 acknowledges "While phosphorus contributes to the problem." Scientist 3 states "While phosphorus and temperature are contributing factors." All recognize multiple factors are involved. Choice (B) is correct.

35. A. The question asks how zebra mussels promote cyanobacteria according to Scientist 3. The passage states: "Zebra mussels filter massive amounts of water, consuming small phytoplankton but rejecting cyanobacteria, which are toxic to them. This selective feeding removes cyanobacteria competitors." Choice (A) correctly describes this selective filtering process.

36. D. The question asks what evidence would strengthen Scientist 2's viewpoint. Since Scientist 2 argues that temperature is the primary driver, evidence showing that bloom severity correlates strongly with temperature even when other factors remain constant would directly support this claim. Choice (D) is correct.

37. C. The question asks what solution Scientist 1 would support. Since Scientist 1 identifies phosphorus runoff from agriculture as the primary cause, the proposed solutions include "better agricultural practices, including reduced fertilizer application, buffer strips along waterways, and improved soil conservation." Choice (C) matches these recommendations.

38. B. The question points you to 11,460 years in Table 11 and asks for the percentage of C-14 remaining. Looking at the row for 11,460 years, the C-14 Remaining column shows 25.0%. Choice (B) is correct.

39. A. The question asks how old an artifact with 50% of original C-14 would be. Find 50.0% in the C-14 Remaining column of Table 11. This corresponds to 5,730 years, which is exactly one half-life. Choice (A) is correct.

40. D. The question asks for the maximum age that can be accurately dated using C-14. The passage states: "Archaeologists typically consider samples with less than 1% remaining C-14 too old to date accurately." Looking at Table 11, C-14 falls below 1% somewhere after 6 half-lives (34,380 years, where 1.56% remains). The maximum would be somewhere between 34,000-40,000 years (approximately 6-7 half-lives). Choice (D) is the best answer.

Writing (Optional)

SAMPLE HIGH-SCORING RESPONSE

Student Essay: The Future of Grading

The debate over traditional letter grades in high schools reflects a broader tension in education: how do we measure learning in ways that are both meaningful and practical? While I understand the appeal of eliminating letter grades to reduce stress and refocus on learning, I believe that Perspective 3 offers the

most realistic and effective path forward. Rather than abandoning grades entirely, we should reform how they are calculated and used, maintaining their benefits while addressing their legitimate drawbacks.

Perspective 1 raises valid concerns about the psychological impact of traditional grading. Research does show that grade-focused students often experience higher anxiety levels and may avoid challenging courses to protect their GPAs. I have witnessed this firsthand—students in my AP classes sometimes choose not to answer questions in class discussions for fear of being wrong, and some deliberately avoid rigorous courses that might lower their averages. This fear-driven approach to education contradicts the goal of fostering curious, engaged learners. Additionally, grades can reduce complex learning to reductive numbers; a "B" in English tells us little about whether a student struggles with thesis development, grammar, or literary analysis.

However, Perspective 1's proposed solution—eliminating grades entirely—creates more problems than it solves. Pass/fail systems offer insufficient differentiation for colleges making admissions decisions among thousands of applicants. Narrative evaluations, while potentially rich in detail, are time-intensive for teachers already managing heavy workloads and difficult to standardize across different schools. More fundamentally, removing grades does not necessarily remove competition or stress; students would simply compete over who receives the most glowing narrative evaluations or who passes advanced courses. The competitive pressure would remain, just in a different form.

Perspective 2 correctly identifies practical realities that cannot be ignored. Colleges do need standardized metrics to evaluate applicants from diverse schools and backgrounds. While grades are imperfect measures, they provide useful data points when combined with test scores, extracurriculars, and essays. Furthermore, the motivation that grades provide, while not ideal, is real and often necessary. In my own experience, the prospect of grades has pushed me to complete assignments I might otherwise have postponed and to study for exams more thoroughly than I would have without that external incentive.

Yet Perspective 2's defense of the status quo is insufficient. The argument that grades prepare students for "competitive adult life" assumes that current workplace competition is healthy and should be replicated rather than improved. Many modern workplaces actually emphasize collaboration, continuous learning, and growth mindsets—values that traditional grading can undermine. Moreover, the claim that academic standards would decline without grades reflects a pessimistic view of student motivation that ignores intrinsic interest in learning. Some of my most meaningful educational experiences have occurred in contexts without grades: independent reading, personal projects, and collaborative extracurricular activities where learning was driven by genuine interest rather than grade incentives.

This brings me to why Perspective 3 offers the most promising approach. Rather than treating grades as either essential or harmful, this perspective recognizes them as tools that can be used well or poorly. My

own position builds on this foundation: schools should maintain letter grades but implement specific reforms that preserve their benefits while addressing their problems.

First, schools should adopt standards-based grading where letter grades reflect mastery of specific skills and knowledge rather than averaging all assignments equally. Under this system, a student's grade in Biology would indicate their current understanding of biological concepts, not an average that includes early struggles they have since overcome. This approach maintains the clarity of letter grades while better representing actual learning.

Second, schools should allow test retakes and assignment revisions to emphasize growth over single performances. In my calculus class, my teacher allows us to retake tests after meeting with her to review our errors. This policy has transformed tests from anxiety-inducing judgments into learning opportunities. My grade reflects my eventual mastery, not my initial struggles, yet it remains a clear, standardized letter grade.

Third, grades should be complemented with meaningful feedback. A "B-" with comments explaining specifically where reasoning was strong and where evidence was weak provides both the clarity of a traditional grade and the detailed guidance of narrative evaluation. This combination approach addresses criticisms from Perspective 1 while maintaining the practical benefits identified in Perspective 2.

Schools like High Tech High in California have successfully implemented such reforms, maintaining grades while emphasizing portfolio assessments, project-based learning, and multiple demonstrations of mastery. Their graduates are accepted to competitive colleges, suggesting that reformed grading systems can satisfy practical requirements while creating healthier learning environments.

In conclusion, the question is not whether to keep or eliminate grades, but how to use them wisely. Perspective 3's reform approach recognizes that grades serve legitimate purposes while acknowledging that current implementations often create unnecessary stress and distort learning. By maintaining grades while reforming their calculation and supplementing them with detailed feedback and mastery-based assessment, schools can create evaluation systems that are both practical and pedagogically sound. As education evolves, our assessment methods should evolve too—not through wholesale elimination of established systems, but through thoughtful reform that preserves what works while fixing what doesn't.

Why This Essay Scores Highly:

✓ Clear, nuanced thesis - Takes position while acknowledging complexity

✓ Addresses all 3 perspectives - Analyzes strengths and weaknesses of each

✓ Personal examples - AP classes, calculus retakes show real-world application

✓ External examples - High Tech High provides concrete evidence

✓ Sophisticated reasoning - Goes beyond surface arguments to explore implications

✓ Strong organization - Clear structure with effective transitions

✓ Standard written English - Varied syntax, proper mechanics

✓ Original insight - Synthesizes perspectives into new solution

Estimated Score: 11-12 out of 12