

# FULL-LENGTH PRACTICE TESTS 4 - 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 Underground Railroad Quilt Code**

---

For decades, historians have debated whether enslaved people used quilts as (1) secret maps along the Underground Railroad. According to this theory, specific quilt patterns hung on clotheslines or (2) displayed in windows conveyed coded messages to freedom seekers. A "Bear's Paw" pattern supposedly indicated to follow (3) mountain trails, while a "Log Cabin" design meant a safe house was nearby.

The quilt code theory gained widespread attention after the 1999 publication of "Hidden in Plain View," which it claimed (4) to document an oral tradition passed down through generations. The authors interviewed (5) Ozella McDaniel Williams, a South Carolina quilt seller who described a elaborate system (6) of symbols her ancestors had used. [7] Williams explained that quilts featuring a "Wagon Wheel" pattern signaled it was time to pack provisions for the journey north.

However, many historians questioned (8) the historical accuracy of these claims. They point out that; (9) no firsthand accounts from the Underground Railroad era mention quilts being used this way. Furthermore the (10) lack of surviving antebellum quilts with these specific patterns raises doubts. Most troubling, (11) the theory suggests enslaved people had both the materials and leisure time to create complex quilts—a assumption that contradicts (12) historical records of their harsh living conditions.

[13] Despite scholarly skepticism, the quilt code story has captured the (14) public imagination. Museum's and (15) cultural centers across the country feature exhibits about these supposed secret signals, and many people find deep meaning in the narrative of enslaved people using domestic crafts as tools of resistance.

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

- A. used quilts as
- B. utilized quilts as
- C. employed quilts for
- D. made quilts into

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

- F. NO CHANGE
- G. hung on clotheslines, or
- H. hanged on clotheslines or
- J. hung on clotheslines or

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

- A. indicated following
- B. signaled to follow
- C. meant to follow
- D. indicated to follow

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

- F. which claimed

- G. that claimed
- H. claimed
- J. which it had claimed

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

- A. The authors had interviewed
- B. The authors interviewed
- C. The authors were interviewing
- D. The authors did interview

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

- F. a elaborate system
- G. an elaborate system
- H. an elaborate system
- J. the elaborate system

7. Which of the following sentences, if inserted here, would most effectively introduce the main topic of this paragraph?

- A. The quilt patterns supposedly contained specific instructions.
- B. Williams was a respected member of her community.
- C. Yet this compelling narrative faces significant historical challenges.
- D. Quilting has always been an important American craft tradition.

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

- F. have questioned
- G. question
- H. had questioned
- J. questioning

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

- A. They point out that
- B. They point out,
- C. They note that
- D. They point out that:

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

- F. Furthermore the
- G. Furthermore, the
- H. Furthermore; the
- J. Furthermore, the

## **PASSAGE II: The Mathematics of Music**

---

The relationship between mathematics and music extends back to (11) ancient Greece, where Pythagoras discovered that harmonious musical intervals correspond with (12) simple numerical ratios. When a vibrating string is divided in half, it produces a note one octave higher—a 2:1 ratio that creates what we (13) perceive as the same note at a different pitch.

This mathematical foundation underlies all Western music theory. The chromatic scale's twelve notes result from dividing (14) the octave into equal intervals, a system called equal temperament. Before this standardization (15) different tuning systems made it difficult for musicians to play together or for composers to write in multiple keys. [16]

Modern technology has revealed even deeper mathematical connections electronic synthesizers (17) generate sounds through precise mathematical functions. Digital audio files consists of (18) thousands of numbers per second, each representing a sound wave's amplitude at a specific moment. Music streaming services (19) use compression algorithms to reduce file sizes while preserving sound quality, applying complex mathematical formulas that would of (20) been impossible to calculate before computers.

Perhaps the more (21) intriguing connection lies in how our brains process music mathematically. [22] Research shows that musicians' brains develop enhanced (23) mathematical reasoning abilities. Children

who study (24) music often excel in math, suggesting these disciplines share underlying (25) cognitive processes.

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

- A. goes back to
- B. dates to
- C. reaches back to
- D. extends back to

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

- F. correspond with
- G. correspond to
- H. corresponds with
- J. corresponding with

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

- A. creates that which we
- B. creates what we
- C. produces what we
- D. generates what we

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

- F. results from dividing
- G. result from dividing
- H. resulted from dividing
- J. resulting from dividing

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

- A. Before this standardization,

- B. Prior to this standardization,
- C. Before this standardization
- D. Until this standardization,

16. Which of the following sentences, if inserted here, would best support the main idea of this paragraph?

- F. Bach's "Well-Tempered Clavier" demonstrated the possibilities of equal temperament.
- G. Different cultures have developed their own musical scales.
- H. Many people enjoy listening to music.
- J. Pythagoras was also a mathematician.

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

- A. connections. Electronic synthesizers
- B. connections, electronic synthesizers
- C. connections; electronic synthesizers
- D. connections electronic synthesizers

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

- F. consist of
- G. consisted of
- H. consists from
- J. consist of

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

- A. Music streaming services
- B. Streaming music services
- C. Services for streaming music
- D. Music streaming services

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

- F. formulas that would have
- G. formulas that would of
- H. formulas which would have
- J. formula's that would have

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

- A. Perhaps the most
- B. Perhaps the most
- C. Perhaps a more
- D. Perhaps the more

22. The writer wants to add a transition here. Which choice best connects this sentence to the previous one?

- F. Furthermore,
- G. However,
- H. Indeed,
- J. NO CHANGE

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

- A. develops enhanced
- B. developed enhanced
- C. develop enhanced
- D. developing enhanced

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

- F. Children that study
- G. Children who study
- H. Children whom study

J. Children which study

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

- A. share underlying
- B. shares underlying
- C. shared underlying
- D. sharing underlying

### **PASSAGE III: Vertical Farming Revolution**

---

As the world's population approaches 10 billion, agricultural innovators are (26) looking upward—literally—for solutions. Vertical farming, the practice of growing crops in stacked layers within controlled environments transforms (27) abandoned warehouses and empty skyscrapers into high tech agricultural (28) facilities.

These indoor farms (29) offer numerous advantages over traditional agriculture. They use 95% (30) less water through hydroponic systems that recycle nutrients. Without soil, theres no need (31) for pesticides or herbicides. LED lights optimized for photosynthesis allow year round production (32) regardless of weather or season. A single vertical (33) farm the size of a city block can produce as much food as 400 acres of traditional farmland.

[34] The technology faces significant challenges. Initial construction costs (35) can exceed \$40 million for a commercial facility. Energy consumption for LED lighting remains the (36) largest operational expense, though costs have decreased 90% over the past decade. Critics also argue (37) that vertical farms can only grow certain crops economically—leafy greens and herbs thrive, but grain crops (38) remain impractical.

Several major cities (39) have embraced vertical farming as part of they're food (40) security strategies. Singapore, which imports 90% of its food, aims to produce (41) 30% locally by 2030 using vertical farms. In Newark New Jersey (42) AeroFarms operates the world's largest indoor vertical farm, producing 2 million (43) pounds of greens annually while using no soil and 95% less water then (44) field farming.

[45]

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

F. agricultural innovators have been

G. agricultural innovators were

H. agricultural innovator's are

J. agricultural innovators are

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

A. environments, transforms

B. environments, transforming

C. environments and transforms

D. environments transforms

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

F. high tech agricultural

G. high-tech, agricultural

H. high-tech agricultural

J. high, tech agricultural

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

A. These indoor farms

B. Indoor farms

C. These indoor farms

D. Such farms

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

F. They use, 95%

G. It uses 95%

H. They use 95%

J. They used 95%

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

- A. there's no need
- B. theirs no need
- C. there's no need
- D. their's no need

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

- F. year-round production
- G. year-round production
- H. year round, production
- J. years-round production

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

- A. A single vertical
- B. One vertical
- C. A lone vertical
- D. Single vertical

34. Which of the following sentences, if added here, would best transition between the previous paragraph and this one?

- F. Many people enjoy fresh vegetables.
- G. Technology continues to advance rapidly.
- H. Vertical farming was first proposed in 1915.
- J. Despite these benefits, vertical farming isn't without drawbacks.

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

- A. Initial construction cost

- B. Initial construction costs
- C. Initial, construction costs
- D. Initial construction costs

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

- F. remains the
- G. remain the
- H. remained the
- J. remaining the

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

- A. Critics additionally argue
- B. Critics also argue
- C. Critics furthermore argue
- D. Critics argue as well

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

- F. but grain crops
- G. but, grain crops
- H. but grain crops
- J. but grain, crops

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

- A. Several major cities'
- B. Several major city's
- C. Several major cities
- D. Several, major cities

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

- F. there food
- G. their food
- H. they are food
- J. there's food

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

- A. aims to produce
- B. is aiming to produce
- C. aimed to produce
- D. has aimed to produce

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

- F. In Newark New Jersey,
- G. In Newark, New Jersey
- H. In Newark, New Jersey,
- J. In Newark New Jersey

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

- A. producing two million
- B. producing 2,000,000
- C. which produces 2 million
- D. producing 2 million

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

- F. 95% less water than
- G. 95% less water then
- H. 95% lesser water than

J. 95% fewer water than

45. The writer wants to conclude the essay with a sentence that emphasizes the potential impact of vertical farming. Which choice would best accomplish this goal?

A. Vertical farming is an interesting technology.

B. As urban populations grow and climate change threatens traditional agriculture, vertical farming may transform from novelty to necessity.

C. Many companies are investing in vertical farming.

D. Scientists continue to study vertical farming methods.

### **PASSAGE IV: Short Passage - The Return of Vinyl Records**

---

In an age of instant digital downloads and streaming services, vinyl records have made (46) an unexpected comeback. Sales of vinyl albums (47) have increased every year since 2006, with 2023 marking the 16th consecutive (48) year that vinyl outsold CDs. This resurgence particularly (49) among younger listeners who's parents (50) grew up with cassettes and CDs, suggests that the appeal transcends mere nostalgia.

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

F. vinyl records has made

G. vinyl record's have made

H. vinyl records have made

J. vinyl records had made

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

A. Vinyl album sales

B. The sales of vinyl albums

C. Sales of vinyl albums

D. Vinyl sales albums

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

F. sixteenth consecutive

G. 16th consecutive

H. 16th, consecutive

J. sixteen consecutive

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

A. This resurgence, particularly

B. This resurgence particularly,

C. This resurgence; particularly

D. This resurgence particularly

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

F. whose parents

G. who's parent's

H. whos parents

J. whose parents

# 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 store offers a 30% discount on all items. If the discounted price of a jacket is \$56, what was the original price?

- A. \$70
- B. \$80
- C. \$90
- D. \$100

2. Simplify:  $3(2x - 4) - 2(x - 5)$

- F.  $4x - 22$
- G.  $4x + 2$
- H.  $4x - 2$
- J.  $4x + 22$

3. The mean of 6 numbers is 15. If 5 of the numbers are 12, 14, 16, 18, and 20, what is the 6th number?

- A. 8
- B. 9
- C. 10
- D. 11

4. What is  $\frac{3}{8} + \frac{5}{12}$ ?

- F.  $\frac{19}{24}$
- G.  $\frac{8}{20}$
- H.  $\frac{15}{32}$

J.  $\frac{1}{2}$

5. If a car travels at 65 mph for 3.5 hours, how far does it travel?

A. 227.5 miles

B. 195 miles

C. 260 miles

D. 162.5 miles

6. Solve for  $x$ :  $4x + 7 = 31$

F. 4

G. 5

H. 5.5

J. 6

7. A rectangular garden is 15 feet long and 10 feet wide. If fencing costs \$12 per foot, what is the total cost to fence the perimeter?

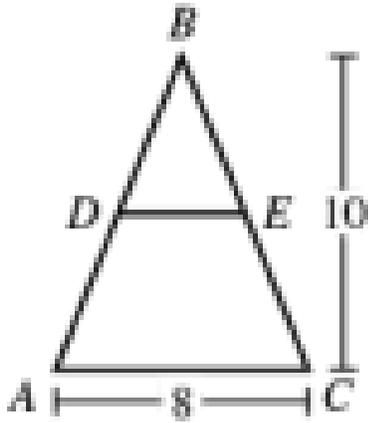
A. \$300

B. \$480

C. \$540

D. \$600

8. In the figure shown below,  $AC \perp DF$ ,  $BD = AD$ , D and E are on AB and BC, respectively;  $AC = 8$  feet; and the height of  $\triangle ABC$  is 10 feet. What is DE, in feet?



F. 2

G. 4

H. 5

J. 6

9. What is 15% of 240?

A. 24

B. 36

C. 48

D. 60

10. If  $2x - 3 < 7$ , then  $x < ?$

F. 2

G. 3

H. 5

J. 10

11. Which of the following is equivalent to  $\sqrt{72}$ ?

A.  $6\sqrt{3}$

B.  $8\sqrt{2}$

C.  $6\sqrt{2}$

D.  $4\sqrt{6}$

12. What is the value of  $|-8| - |-3|$ ?

F. 5

G. 11

H. -5

J. -11

13. Express  $2.5 \times 10^{-3}$  in standard form:

A. 0.0025

B. 0.025

C. 0.00025

D. 250

14. If  $i = \sqrt{-1}$ , what is  $i^4$ ?

F.  $i$

G.  $-i$

H.  $-1$

J. 1

15. What is the greatest common factor of 48 and 72?

A. 8

B. 12

C. 16

D. 24

16. Simplify:  $(2^3)(2^5)$

F.  $2^{15}$

G.  $2^8$

H.  $4^8$

J.  $2^{24}$

17. What is  $3/4 \div 2/3$ ?

A.  $1/2$

B.  $9/8$

C.  $8/9$

D. 2

18. The number  $0.121212\dots$  (repeating) equals which fraction?

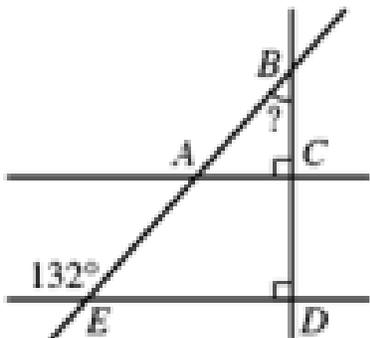
F.  $12/100$

G.  $121/1000$

H.  $12/99$

J.  $12/90$

19. In the figure below, A is on BE and C is on BD. What is the measure of  $\angle ABC$ ?



- A.  $24^\circ$
- B.  $42^\circ$
- C.  $45^\circ$
- D.  $48^\circ$

20. What is  $\log_2(32)$ ?

- F. 5
- G. 6
- H. 16
- J. 64

21. Factor:  $x^2 - 7x + 12$

- A.  $(x - 3)(x - 4)$
- B.  $(x - 2)(x - 6)$
- C.  $(x - 1)(x - 12)$
- D.  $(x + 3)(x - 4)$

22. Letter grades in Hugo's math class are based on the percent of the total possible points on 4 unit exams (each worth 100 points) and the final exam (worth 200 points) and are assigned according to the chart below.

Range	Course grade
At least 90%	A
80%–89%	B
70%–79%	C
60%–69%	D
Less than 60%	F

The number of points Hugo scored on the unit exams this term were 82, 88, 91, and 83. When course grades were posted, Hugo's course grade was listed as a B. Which of the following could NOT have been the number of points he scored on the final exam?

F. 156

G. 162

H. 166

J. 176

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

A. 9

B. 13

C. 15

D. 17

24. Solve for  $x$ :  $2x^2 - 8x = 0$

F.  $x = 0$  only

G.  $x = 0$  or  $x = 4$

H.  $x = 4$  only

J.  $x = 0$  or  $x = -4$

25. The line passing through  $(2, 3)$  and  $(6, 11)$  has what slope?

A.  $1/2$

B. 2

C. 3

D. 4

26. Which equation represents a line perpendicular to  $y = 2x + 5$ ?

F.  $y = 2x - 3$

G.  $y = -2x + 1$

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

J.  $y = 1/2x - 2$

27. If  $g(x) = x + 3$  and  $h(x) = x^2$ , what is  $(g \circ h)(2)$ ?

A. 9

B. 6

C. 7

D. 10

28. The solution to the system  $\{y = 2x + 1, y = -x + 4\}$  is:

F. (1, 3)

G. (2, 5)

H. (3, 7)

J. (-1, -1)

29. What is the vertex of the parabola  $y = x^2 - 4x + 3$ ?

A. (2, -1)

B. (-2, 1)

C. (4, 3)

D. (1, 0)

30. For what value of  $x$  is  $3^x = 81$ ?

F. 3

G. 5

H. 27

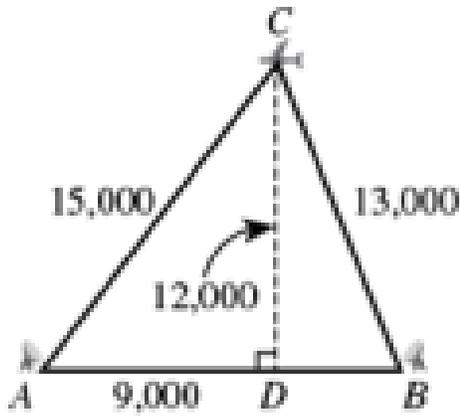
J. 4

31. A circle has radius 5. What is its circumference?

- A.  $25\pi$
- B. 10
- C. 25
- D.  $10\pi$

[Use the following information to answer questions 32-35]

32. In the figure below, a highway rest area (at D) and radar stations (at A and B) lie on a level east-west line; A is 9,000 feet due west of D. An airplane (at C) is shown directly above the rest area, flying due west at a constant speed of 300 feet per second and at a constant altitude of 12,000 feet. The airplane is located at a straight-line distance of 15,000 feet from the radar station at A and 13,000 feet from the radar station at B. How many feet is B from D?



- F. 3,000
- G. 5,000
- H. 7,000
- J. 11,000

33. At the moment shown, how many feet is B from C?

- A. 12,000
- B. 13,000

- C. 14,000
- D. 15,000

34. How many feet is A from B?

- F. 2,000
- G. 4,000
- H. 14,000
- J. 16,000

35. Ten seconds later, how many feet is C from A?

- A. 12,000
- B. 15,000
- C. 18,000
- D. 21,000

36. Two angles are supplementary. If one measures  $125^\circ$ , what is the measure of the other?

- F.  $55^\circ$
- G.  $65^\circ$
- H.  $35^\circ$
- J.  $45^\circ$

37. The area of a triangle with base 8 and height 6 is:

- A. 24
- B. 48
- C. 14
- D. 28

38. In a 45-45-90 triangle, if one leg is 5, what is the length of the hypotenuse?

- F. 5
- G. 10
- H.  $5\sqrt{3}$
- J.  $5\sqrt{2}$

39. A rectangular prism has dimensions  $3 \times 4 \times 5$ . What is its volume?

- A. 12
- B. 35
- C. 47
- D. 60

40. The distance between points (1, 2) and (5, 5) is:

- F. 7
- G. 5
- H. 4
- J. 3

41. The median of the dataset {3, 5, 7, 9, 11, 13} is:

- A. 7
- B. 8
- C. 9
- D. 10

42. If you flip a fair coin 3 times, what is the probability of getting exactly 2 heads?

- F.  $1/8$
- G.  $1/4$
- H.  $3/8$
- J.  $1/2$

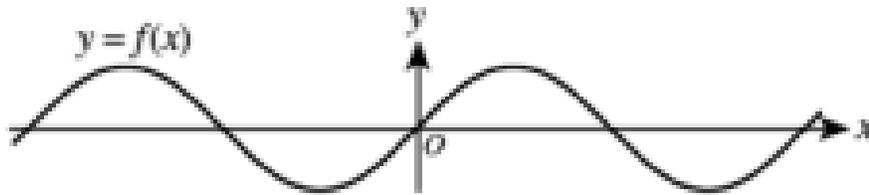
43. The standard deviation measures:

- A. The middle value
- B. The most frequent value
- C. The spread of data
- D. The average value

44. A bag contains 3 red, 4 blue, and 5 green marbles. What is the probability of drawing a red marble?

- F.  $1/4$
- G.  $1/3$
- H.  $3/7$
- J.  $3/12$

45. The function  $y = f(x)$  is graphed in the standard  $(x,y)$  coordinate plane below. The points on the graph of the function  $y = 3 + f(x - 1)$  can be obtained from the points on  $y = f(x)$  by a shift of:



- A. 1 unit to the right and 3 units up
- B. 1 unit to the right and 3 units down
- C. 1 unit to the left and 1 unit up
- D. 3 units to the right and 1 unit up

# Reading

**TIME:** 40 minutes for 36 questions

**DIRECTIONS:** Answer each question based on what is stated or implied in the passage and shade the corresponding oval on your answer sheet

## PASSAGE I

---

**LITERARY NARRATIVE:** This passage is adapted from an original short story about a woman revisiting her childhood home.

The house stood exactly as I remembered it, which was somehow worse than if it had fallen into ruin. The same peeling yellow paint, the same crooked shutters that Dad had promised to fix every summer, the same mailbox leaning at its perpetual fifteen-degree angle. Even the rose bush Mom had planted the year before she died still sprawled untamed across the front walk, its thorns catching at my coat as I passed.

I hadn't been back in seventeen years.

Marcus had offered to come with me, but this was something I needed to do alone. The key was where Dad always left it—under the third flowerpot from the left, the one with the chip shaped like a crescent moon. My hands shook as I lifted it, not from fear but from the weight of accumulated time. How many times had I watched him retrieve this same key, grumbling about forgetting it again, while Mom laughed from the kitchen window?

Inside, dust motes danced in the afternoon light streaming through unchanged curtains. The furniture sat shrouded in white sheets like ghosts at a dinner party. I moved through the rooms slowly, each step a negotiation with memory. Here was the stain on the living room carpet from when Jenny spilled grape juice during my eighth birthday party. There was the pencil mark on the kitchen doorframe marking my height at age twelve—two months before everything changed.

The letter was why I'd come. Dad's lawyer had been specific: it was in his study, top drawer of the oak desk, not to be opened until after the funeral. Classic Dad—even in death, orchestrating things from a distance, maintaining control through carefully timed revelations. I'd almost thrown it away unopened out of spite, but Marcus had talked me out of it. "You'll regret not knowing," he'd said, and I hated that he was right.

The study door creaked on its hinges, a sound so familiar it made my chest tight. This had been his sanctuary, where he retreated after Mom's death, where he'd spend hours reading medical journals as if he could somehow retroactively save her through research. I'd catch him sometimes, staring at her photograph on his desk, his lips moving in silent conversation.

The letter was exactly where the lawyer said it would be, my name written across the front in Dad's precise physician's handwriting. I held it for a long moment, feeling its weight—surely too heavy for mere paper and ink. Finally, I opened it.

*Sarah, it began, If you're reading this, then you've come home despite everything I said and did to drive you away. Good. That was always the plan.*

I had to sit down. The ancient leather chair exhaled as it took my weight, releasing the ghost scents of pipe tobacco and cologne.

*Your mother's illness was genetic. You know this, of course—we told you when you were sixteen, after the tests came back negative. What we didn't tell you was the probability. Fifty percent. A coin flip. I couldn't bear the thought of you living your life waiting for symptoms, checking every forgotten word, every moment of clumsiness. So I became the villain instead. I gave you something concrete to run from, someone to blame. Your anger at me was preferable to your fear of what might be.*

*But you needed to know eventually. There are new treatments now, promising ones. Dr. Elisabeth Chen at Johns Hopkins has your medical history and is expecting your call. She was your mother's student, years ago. Brilliant woman. She'll take care of you.*

*I know you'll never forgive me for the distance I created between us, and I don't ask you to. Just know that every harsh word, every missed birthday, every unanswered call was calculated to set you free. Your mother would have done it differently—she always was braver than me. But this was the only way I knew how to love you after she was gone.*

*The house is yours now. Sell it, keep it, burn it down—whatever brings you peace. I've spent seventeen years as a ghost haunting these rooms. Don't make the same mistake.*

*Dad*

I sat in that chair until the light faded, the letter trembling in my hands. Outside, the rose bush scratched against the window like it wanted to come in from the cold. Or maybe it was trying to tell me something I wasn't ready to hear. I thought about Marcus, waiting at the hotel, probably worried by now. I thought about Dr. Chen and the phone call I would need to make. I thought about forgiveness and its varieties—how sometimes it comes too late, and sometimes that's exactly when it's needed most.

When I finally stood to leave, I took the letter but left the key under the flowerpot. Someone else might need to find their way home someday.

1. The narrator's primary emotion upon returning to the house can best be described as:

- A. unbridled joy
- B. complete indifference
- C. burning rage
- D. complex ambivalence

2. The detail about the key's location suggests that:

- F. family patterns and traditions persist despite time
- G. the father was careless with security
- H. the narrator had forgotten where it was
- J. the house had been burglarized

3. The narrator chose to visit alone because:

- A. Marcus was unavailable
- B. she needed to confront the past privately
- C. she didn't want witnesses
- D. Marcus refused to come

4. The father's letter reveals that his behavior was:

- F. genuinely cruel and unloving

- G. the result of mental illness
- H. deliberately calculated to protect his daughter
- J. caused by grief-induced confusion

5. The phrase "ghost scents of pipe tobacco and cologne" (line 38) primarily serves to:

- A. indicate the room was poorly ventilated
- B. suggest the father was still alive
- C. evoke the lingering presence of the past
- D. describe actual supernatural activity

6. The genetic illness mentioned in the letter:

- F. has already affected the narrator
- G. had a 50% chance of being inherited
- H. was definitely inherited
- J. skipped the narrator's generation

7. The narrator's decision to leave the key under the flowerpot suggests:

- A. acceptance and the possibility of return or connection
- B. rejection of her inheritance
- C. carelessness about security
- D. plans to sell immediately

8. The father's comparison of his wife's hypothetical approach implies she would have been:

- F. more secretive
- G. equally distant
- H. less protective
- J. more direct and honest

9. The rose bush functions in the passage as:
- A. mere decorative detail
  - B. an obstacle to be removed
  - C. a reminder of the narrator's childhood
  - D. a symbol of persistent life and connection to the mother

## **PASSAGE II**

---

**SOCIAL SCIENCE:** This passage discusses the impact of automation on employment.

The fear that machines will replace human workers is hardly new. During the Industrial Revolution, the Luddites famously destroyed textile machinery they believed threatened their livelihoods. In the 1960s, President Lyndon Johnson created a National Commission on Technology, Automation, and Economic Progress to examine similar concerns. Yet each wave of technological change, while disrupting specific industries, has ultimately created new forms of employment. The question facing today's workforce is whether artificial intelligence and robotics represent a continuation of this pattern or a fundamental break from it.

Current automation differs from previous technological shifts in crucial ways. Earlier innovations typically replaced human muscle; today's technologies increasingly replace human judgment. A factory robot performs repetitive physical tasks, but machine learning algorithms make decisions previously requiring human expertise. Radiologists find AI systems matching or exceeding their accuracy in detecting certain cancers. Legal software reviews documents faster and more thoroughly than junior attorneys. Financial algorithms execute trades in microseconds, analyzing patterns no human could perceive in real-time.

The pace of change has also accelerated dramatically. The telephone took 75 years to reach 50 million users; the internet achieved this in 4 years; Pokemon Go required just 19 days. This compression of adoption cycles means workers have less time to adapt. A truck driver whose job becomes automated cannot easily transition to programming self-driving vehicles—the skill gap is too vast, the training too lengthy, the number of new positions too limited relative to those displaced.

Economists divide into two camps regarding automation's long-term effects. The optimists, led by MIT's David Autor, argue that technology complements rather than substitutes human labor in many fields. They point to "Moravec's Paradox"—the observation that computers excel at tasks humans find difficult (like chess) but struggle with those we find easy (like folding laundry). Many jobs require a combination of

cognitive, social, and physical skills that remain beyond current AI capabilities. Nurses, for instance, must interpret subtle patient cues, provide emotional support, and perform delicate physical procedures—a combination no existing technology can replicate.

The pessimists, including Oxford's Carl Frey and Michael Osborne, predict widespread technological unemployment. Their influential 2013 study suggested 47% of US jobs face high risk of automation within two decades. They argue that unlike previous transitions, which shifted workers from agriculture to manufacturing to services, no obvious next sector awaits displaced workers. When both physical and cognitive labor can be automated, what remains distinctly human?

Recent data provides ammunition for both sides. Employment rates in advanced economies remain relatively high despite decades of automation. Yet wage growth has stagnated, suggesting technology may be suppressing worker bargaining power rather than eliminating jobs entirely. The COVID-19 pandemic accelerated automation adoption, with companies investing in robots and AI to reduce dependence on human workers. Many jobs lost to pandemic closures may never return, replaced instead by machines.

Policy responses vary globally. South Korea leads in robot adoption but maintains low unemployment through aggressive retraining programs. Singapore's SkillsFuture initiative provides citizens credits for lifelong learning. Finland experimented with universal basic income, though results remain debated. The European Union considers a "robot tax" to fund displaced worker support. The United States lacks comprehensive federal policy, leaving adaptation primarily to market forces.

The most thoughtful analysts reject binary predictions of utopia or catastrophe. Technology's impact depends on choices societies make about education, labor rights, wealth distribution, and the social safety net. The Industrial Revolution ultimately improved living standards, but only after decades of exploitation, conflict, and reform. Today's automation revolution need not repeat that painful trajectory, but avoiding it requires deliberate action rather than passive hope that market forces will naturally produce equitable outcomes.

10. The passage's main argument is that:

- F. current automation presents unprecedented challenges requiring thoughtful policy responses
- G. automation will definitely eliminate most jobs
- H. technology always creates more jobs than it destroys
- J. the Luddites were correct to resist technology

11. According to the passage, current automation differs from previous technological changes because:

- A. it only affects manufacturing
- B. it replaces human judgment rather than just physical labor
- C. it proceeds more slowly
- D. it creates more jobs

12. The example of Pokemon Go is used to illustrate:

- F. the superiority of modern entertainment
- G. the failure of traditional media
- H. the accelerating pace of technology adoption
- J. the importance of mobile gaming

13. "Moravec's Paradox" suggests that:

- A. computers will never match human abilities
- B. all jobs will eventually be automated
- C. some human tasks remain difficult for computers despite seeming simple
- D. chess is easier than laundry

14. Frey and Osborne's pessimistic prediction is based on:

- F. hatred of technology
- G. the absence of an obvious next employment sector
- H. political ideology
- J. personal unemployment experiences

15. The passage suggests wage stagnation despite high employment might indicate:

- A. technology weakens worker bargaining power
- B. workers are becoming less productive
- C. automation has no economic effect

D. companies are more generous

16. South Korea's approach to automation emphasizes:

F. banning robots

G. ignoring the problem

H. taxing technology companies

J. aggressive retraining programs

17. The Industrial Revolution analogy implies that:

A. automation will definitely benefit everyone

B. current changes are identical to past ones

C. technology is inherently harmful

D. positive outcomes require deliberate policy intervention

18. The author's tone toward automation can best be described as:

F. analytically balanced while acknowledging complexity

G. completely optimistic

H. entirely pessimistic

J. dismissive and unconcerned

### **PASSAGE III**

---

**HUMANITIES:** This passage explores the evolution of jazz music.

Jazz emerged from a unique confluence of musical traditions in early 20th-century New Orleans, but to call it simply American music understates its complex heritage and global reach. The genre's DNA contains strands of West African rhythms, European harmonies, Caribbean syncopation, and the blues of the Mississippi Delta. From its origins in the cultural gumbo of New Orleans, jazz has continuously reinvented itself while influencing virtually every other musical genre of the past century.

The word "jazz" itself carries contested origins. Some trace it to the West African term "jasm," meaning vitality. Others connect it to perfume—jazz as in jasmine—worn by prostitutes in New Orleans' Storyville district where early musicians performed. Still others suggest less savory etymologies. What's certain is that by 1917, when the Original Dixieland Jazz Band made the first jazz recording, the term had stuck, for better or worse, to America's newest musical export.

Early jazz masters like Louis Armstrong and Duke Ellington elevated what some dismissed as primitive dance music into sophisticated art. Armstrong's revolutionary approach to improvisation—playing not just embellished melodies but creating entirely new compositions in real-time—established the soloist as composer. His 1928 recording of "West End Blues" remains a masterclass in musical storytelling, its opening cadenza so influential that jazz musicians still quote it nearly a century later. Ellington, meanwhile, proved jazz could sustain extended compositions rivaling European classical music in complexity and emotional depth.

The swing era of the 1930s and '40s brought jazz to mainstream white audiences, though often at the cost of recognition for its Black creators. While Benny Goodman earned the title "King of Swing," the arrangements that made him famous were largely written by Fletcher Henderson, a Black bandleader whose own orchestra had pioneered the sound years earlier. This pattern of appropriation and erasure would recur throughout jazz history, reflecting broader American racial dynamics.

Bebop emerged in the 1940s as both musical revolution and political statement. Charlie Parker, Dizzy Gillespie, and Thelonious Monk created music of such harmonic complexity and rhythmic intensity that dancers couldn't follow it—which was partly the point. Bebop was jazz's declaration of artistic independence, music for listening rather than dancing, demanding recognition as serious art rather than mere entertainment. It was also implicitly political; by making music too complex for easy appropriation, bebop musicians asserted ownership over their creation.

The 1950s and '60s saw jazz fragment into multiple streams. Miles Davis, the genre's most relentless innovator, led several revolutions: cool jazz's understated elegance, hard bop's bluesy intensity, modal jazz's hypnotic explorations, and eventually fusion's electric merger with rock. John Coltrane pushed spiritual and technical boundaries, his "sheets of sound" technique creating cascading waves of notes that seemed to pursue transcendence itself. Free jazz pioneers like Ornette Coleman abandoned traditional harmony altogether, seeking pure emotional expression unconstrained by Western musical conventions.

Jazz's influence extends far beyond its own boundaries. The Beatles studied jazz harmony. Hip-hop producers sample jazz records as sonic foundation. Classical composers from Ravel to Reich incorporate jazz elements. Electronic music producers use jazz's improvisational ethos. Yet jazz itself, despite or perhaps because of its influence, occupies an increasingly marginal position in contemporary popular

culture. It accounts for less than 2% of music sales, sustained primarily by educational institutions and an aging audience.

This marginalization raises profound questions. Has jazz, in pursuing artistic complexity, abandoned the populist spirit that birthed it? Or has American culture, increasingly dominated by algorithmic recommendation and three-minute pop songs, lost the patience for music that demands active listening? Perhaps jazz's current position—respected but not popular, influential but not profitable—represents its true destiny: not as mass entertainment but as a continuously evolving art form, forever pushing boundaries, forever essential to understanding American culture yet forever slightly outside its mainstream.

19. The passage primarily examines:

- A. why jazz is superior to other genres
- B. jazz's complex evolution and cultural significance
- C. technical aspects of jazz performance
- D. famous jazz musicians' biographies

20. The multiple proposed origins of the word "jazz" suggest:

- F. scholars are incompetent
- G. the term has no real meaning
- H. the genre's history is complex and sometimes controversial
- J. early musicians couldn't spell

21. Louis Armstrong's contribution to jazz centered on:

- A. writing complex arrangements
- B. organizing big bands
- C. establishing improvisation as composition
- D. inventing the trumpet

22. The swing era's racial dynamics involved:

- F. equal recognition for all musicians

- G. white musicians gaining fame using Black innovations
- H. complete segregation of musical styles
- J. Black musicians refusing to share their music

23. Bebop musicians made their music complex partly to:

- A. assert artistic ownership and resist appropriation
- B. prove they were better than classical musicians
- C. appeal to dancers
- D. increase record sales

24. Miles Davis is characterized in the passage as:

- F. resistant to change
- G. focused on one style
- H. commercially motivated
- J. constantly innovative

25. The passage suggests jazz's current marginal status results from:

- A. poor quality music
- B. lack of talented musicians
- C. no institutional support
- D. possible tension between artistic complexity and popular appeal

26. The author's attitude toward jazz's influence on other genres is:

- F. recognition of its widespread impact
- G. dismissive of connections
- H. angry about appropriation
- J. unaware of relationships

27. The final paragraph implies that jazz's destiny might be:

- A. complete disappearance
- B. as an essential but non-mainstream art form
- C. dominating popular music again
- D. becoming purely academic

## **PASSAGE IV**

---

**NATURAL SCIENCE:** This passage examines CRISPR gene-editing technology.

The discovery of CRISPR-Cas9 gene editing has been compared to finding a molecular scissors precise enough to cut and paste DNA sequences. Yet this analogy, while useful for public understanding, vastly understates both the technology's elegance and its profound implications. CRISPR represents not merely a tool but a fundamental shift in humanity's relationship with the code of life itself—a development whose consequences we are only beginning to comprehend.

CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) evolved as a bacterial immune system. When bacteria survive viral attacks, they incorporate fragments of viral DNA into their own genome, creating a genetic mugshot database. Upon reinfection, bacteria use this stored information to recognize and destroy viral invaders. Scientists Jennifer Doudna and Emmanuelle Charpentier realized this system could be reprogrammed to edit any DNA sequence, not just viral ones. Their 2012 paper demonstrating this capability launched a biotechnological revolution.

The technology's power lies in its unprecedented precision and accessibility. Previous gene-editing techniques required months of work and specialized expertise to modify a single gene. CRISPR reduces this to days or weeks, with costs dropping from hundreds of thousands of dollars to hundreds. A reasonably equipped university laboratory can now perform genetic modifications that would have challenged major research institutions just a decade ago. This democratization of gene editing has accelerated research but also raised concerns about oversight and misuse.

Medical applications have progressed rapidly from theory to reality. In 2019, Victoria Gray became the first person in the United States to receive CRISPR treatment for sickle cell disease. Doctors removed her bone marrow cells, edited them to produce fetal hemoglobin (which doesn't sickle), and reinfused them. Two years later, she remains symptom-free—a potential cure for a disease affecting millions worldwide. Clinical trials targeting various cancers, inherited blindness, and other genetic conditions are underway globally.

Agricultural applications prove equally transformative. Scientists have created drought-resistant crops, extended produce shelf life, and enhanced nutritional content. CRISPR-edited mushrooms that don't brown received USDA approval without traditional GMO regulations, as they contain no foreign DNA—only deletions of existing genes. This regulatory distinction highlights ongoing debates about how to govern gene editing. If changing an organism's genes without adding foreign DNA isn't genetic modification, what is it?

Ecological applications offer both promise and peril. "Gene drives" can spread edited genes through entire populations, potentially eliminating disease-carrying mosquitoes or invasive species. Models suggest releasing just 100 gene-drive mosquitoes could collapse a population of millions within years. Yet the same power that could eliminate malaria might cause unforeseen ecological cascades. Once released, gene drives cannot be recalled—an irreversibility that terrifies ecologists and excites public health officials in equal measure.

The most contentious applications involve human germline editing—changes that pass to future generations. In 2018, Chinese scientist He Jiankui announced the birth of twin girls with edited genes conferring HIV resistance, triggering global condemnation. The scientific community criticized not the technology but its premature use, given unresolved safety and ethical questions. Yet the technical barrier has been crossed; the question is not whether we can edit human heredity but whether we should.

Ethical frameworks struggle to keep pace with technological capability. Different cultures hold varying views on genetic modification's permissibility. Religious perspectives range from seeing it as playing God to viewing it as fulfilling divine mandates to heal. Disability rights advocates worry about eliminating conditions like deafness or autism, which many don't consider disabilities needing correction. Environmental justice concerns arise about whether gene editing will exacerbate or alleviate global inequalities.

The comparison to nuclear technology seems apt. Like atomic energy, CRISPR offers tremendous benefits—curing disease, feeding billions, restoring ecosystems—alongside existential risks. Unlike nuclear technology, however, CRISPR's accessibility means control cannot be limited to nation-states. A world where genetic modification is as accessible as computer programming requires new forms of governance, ethics, and perhaps even new definitions of what it means to be human.

28. The passage's main purpose is to:

- F. argue against CRISPR use
- G. explain only technical details

- H. explore CRISPR's capabilities and implications comprehensively
- J. promote unrestricted gene editing

29. CRISPR originally evolved as:

- A. a human medical treatment
- B. an agricultural tool
- C. a bacterial immune system
- D. a viral weapon

30. The technology's "democratization" refers to:

- F. voting on gene editing
- G. increased accessibility and reduced costs
- H. government control
- J. corporate monopolies

31. Victoria Gray's treatment demonstrates:

- A. CRISPR's potential to cure genetic diseases
- B. the failure of gene editing
- C. temporary symptom relief only
- D. dangerous side effects

32. CRISPR-edited mushrooms avoided GMO regulations because:

- F. mushrooms aren't important
- G. they taste better
- H. lobbying by companies
- J. they contain no foreign DNA, only deletions

33. Gene drives are particularly concerning because:

- A. they don't work
- B. they're too expensive
- C. they're slow to spread
- D. they're irreversible once released

34. He Jiankui's experiment was condemned primarily for:

- F. being premature given unresolved ethical and safety questions
- G. using CRISPR at all
- H. succeeding in editing genes
- J. working with Chinese institutions

35. The disability rights concern involves:

- A. lack of access to CRISPR
- B. eliminating conditions some don't consider disabilities
- C. increasing disabilities
- D. cost of treatments

36. The nuclear technology comparison suggests:

- F. CRISPR should be banned
- G. only governments should control it
- H. CRISPR offers great benefits alongside serious risks
- J. radiation is involved in gene editing

# Science (Optional)

**TIME:** 40 minutes for 40 questions

**DIRECTIONS:** Following are seven passages and then questions that refer to each passage. Choose the best answer and shade in the corresponding oval on your answer sheet.

## PASSAGE I

Scientists investigated how different factors affect battery performance in electric vehicles.

**Table 1: Battery Capacity (% of original) After 500 Charge Cycles**

Temperature (°C)	Charge Rate: Slow	Charge Rate: Medium	Charge Rate: Fast
0	82	76	68
15	89	84	77
25	94	91	86
35	91	87	81
45	85	79	71

**Table 2: Charging Time and Energy Efficiency**

Charge Rate	Time to 80% Charge	Energy Efficiency (%)	Heat Generated (°C rise)
Slow	8 hours	95	2
Medium	3 hours	89	8
Fast	45 minutes	78	18
Ultra-fast	15 minutes	65	32

**Table 3: Battery Performance with Different Discharge Rates**

Discharge Rate	Range (km)	Peak Power (kW)	Battery Temperature After Use (°C)
Conservative	420	75	28
Normal	380	120	35
Sport	310	180	44
Track	250	250	58

1. According to Table 1, at which temperature does slow charging maintain the highest battery capacity after 500 cycles?

A. 15°C

- B. 25°C
- C. 35°C
- D. 45°C

2. Based on Table 2, as charging speed increases from slow to ultra-fast, energy efficiency:

- F. increases steadily
- G. decreases steadily
- H. remains constant
- J. shows no pattern

3. Using fast charging at 0°C results in what percentage of original capacity after 500 cycles?

- A. 82%
- B. 76%
- C. 68%
- D. 77%

4. According to Table 3, increasing discharge rate from Conservative to Track reduces range by approximately:

- F. 30%
- G. 50%
- H. 60%
- J. 40%

5. Which charging method generates the least heat according to Table 2?

- A. Slow
- B. Medium
- C. Fast
- D. Ultra-fast

6. At 35°C, the difference in retained capacity between slow and fast charging is:

F. 10 percentage points

G. 8 percentage points

H. 15 percentage points

J. 5 percentage points

7. Based on Table 3, Sport mode compared to Normal mode provides:

A. 70 km more range

B. 60 kW less peak power

C. 9°C lower temperature

D. 60 kW more peak power

8. The optimal temperature for battery longevity across all charge rates appears to be:

F. 0°C

G. 15°C

H. 25°C

J. 35°C

9. Ultra-fast charging takes what fraction of the time compared to slow charging?

A. 1/16

B. 1/32

C. 1/24

D. 1/8

10. According to the tables, which factor has the greatest impact on battery degradation?

F. High discharge rates

G. Temperature extremes and fast charging

H. Time of charging

## J. Energy efficiency

### **PASSAGE II**

---

Researchers studied photosynthesis rates in aquatic plants under varying conditions. They placed equal amounts of *Elodea canadensis* in sealed containers with water enriched with CO<sub>2</sub> and measured oxygen production as an indicator of photosynthesis rate.

#### **Experiment 1**

Plants were exposed to different wavelengths of light at constant intensity (100 μmol/m<sup>2</sup>/s) for 30 minutes.

**Table 4: Oxygen Production by Light Wavelength**

Light Color	Wavelength (nm)	O <sub>2</sub> Produced (mL)	Relative Efficiency (%)
Violet	400	3.2	64
Blue	450	4.8	96
Green	550	0.8	16
Yellow	580	1.5	30
Red	680	5.0	100
Far-red	730	0.3	6

#### **Experiment 2**

Using red light (680 nm), researchers varied temperature while maintaining constant light intensity. They found oxygen production peaked at 25°C (5.0 mL), decreased to 3.5 mL at 15°C and 35°C, and dropped to 1.2 mL at 5°C and 0.8 mL at 45°C.

#### **Experiment 3**

Plants were subjected to alternating light/dark periods of varying duration using red light at 25°C. Continuous light produced 5.0 mL O<sub>2</sub> over 30 minutes. With 1-minute light/dark cycles, production dropped to 3.8 mL. With 5-minute cycles, it was 4.2 mL, and with 10-minute cycles, 4.5 mL.

11. According to Table 4, which wavelength is least effective for photosynthesis?

- A. 550 nm
- B. 580 nm
- C. 730 nm

D. 400 nm

12. The relationship between temperature and photosynthesis rate shows:

F. linear increase with temperature

G. linear decrease with temperature

H. constant rate regardless of temperature

J. optimal rate at moderate temperature

13. Green light's poor performance in photosynthesis is likely because:

A. plants reflect green light

B. green light has too much energy

C. green light damages chlorophyll

D. plants absorb green light completely

14. Based on Experiment 3, shorter light/dark cycles result in:

F. less total oxygen production

G. more total oxygen production

H. no change in production

J. plant death

15. If plants were exposed to equal intensities of blue and red light simultaneously, expected oxygen production would be closest to:

A. 5.0 mL

B. 4.8 mL

C. 9.8 mL

D. higher than either alone but less than their sum

16. The optimal temperature of 25°C produces how many times more oxygen than at 45°C?

F. 2.5 times

- G. 4 times
- H. 6.25 times
- J. 10 times

17. Comparing violet and far-red light, violet is approximately how many times more effective?

- A. 5 times
- B. 10 times
- C. 15 times
- D. 20 times

18. The experiment design assumes oxygen production directly correlates with:

- F. plant growth
- G. photosynthesis rate
- H. water temperature
- J. CO<sub>2</sub> consumption

19. Continuous light versus 1-minute cycles shows what percentage decrease in oxygen production?

- A. 10%
- B. 15%
- C. 24%
- D. 30%

20. Which combination would likely produce maximum photosynthesis?

- F. Green light at 45°C
- G. Blue light at 15°C
- H. Far-red light at 25°C
- J. Red light at 25°C with continuous illumination

## **PASSAGE III**

---

Three scientists propose different explanations for the recent decline in honeybee populations worldwide.

### **Scientist 1**

Colony Collapse Disorder (CCD) results primarily from neonicotinoid pesticides used in agriculture. These systemic insecticides are absorbed by plants and expressed in pollen and nectar. Even at sublethal doses, neonicotinoids impair bee navigation, reducing their ability to return to hives. They also suppress immune function, making bees vulnerable to diseases. Countries that banned neonicotinoids have seen bee population recovery, while regions with continued use show ongoing decline. The correlation between neonicotinoid introduction in the 1990s and CCD emergence is too strong to ignore.

### **Scientist 2**

While pesticides contribute to bee stress, the primary driver of CCD is the Varroa destructor mite. These parasites attach to bees, weakening them by feeding on fat body tissue and vectoring deadly viruses like Deformed Wing Virus. Colonies can tolerate low mite levels, but once infestation exceeds a threshold, collapse becomes inevitable. The global spread of Varroa corresponds precisely with CCD patterns. Pesticide exposure may worsen outcomes, but healthy colonies without mites survive despite pesticide exposure, while mite-infested colonies fail even in pesticide-free environments.

### **Scientist 3**

CCD results from multiple interacting stressors that individually might be tolerable but collectively overwhelm colonies. Modern agricultural practices create "food deserts" where bees find only monoculture crops that bloom briefly, causing nutritional stress. Climate change disrupts flowering schedules, creating gaps in food availability. Pesticides weaken bees, making them vulnerable to parasites and pathogens. Commercial beekeeping practices, including frequent transport for pollination services, spread diseases and cause stress. No single factor explains CCD; rather, it emerges from the intersection of human-altered landscapes, chemical exposure, biological threats, and climate disruption.

21. Scientist 1's primary evidence for pesticide causation includes:

- A. correlation between neonicotinoid use and CCD timing
- B. mite infestation data
- C. nutritional studies
- D. climate change models

22. According to Scientist 2, the critical factor determining colony survival is:

- F. whether mite infestation exceeds a threshold
- G. pesticide concentration
- H. availability of diverse flowers
- J. transportation frequency

23. Scientist 3 would most likely agree that:

- A. pesticides should be banned immediately
- B. mites are unimportant
- C. monoculture agriculture should be eliminated
- D. addressing CCD requires multiple interventions

24. The main disagreement between Scientists 1 and 2 concerns:

- F. whether pesticides affect bees
- G. whether mites harm bees
- H. the primary cause of CCD
- J. the existence of CCD

25. Which finding would most support Scientist 1's hypothesis?

- A. Discovering new mite species
- B. Bee recovery in areas after pesticide bans
- C. Climate temperature increases
- D. Improved transportation methods

26. Scientists 2 and 3 would likely agree that:

- F. pesticides are the sole cause
- G. multiple factors contribute to bee decline
- H. mites are unimportant

J. climate change is irrelevant

27. If a colony collapsed in an organic farm without pesticides, this would:

- A. definitively disprove Scientist 1's hypothesis
- B. support only Scientist 3's hypothesis
- C. be consistent with Scientists 2 and 3's explanations
- D. prove climate change is the cause

## **PASSAGE IV**

---

Oceanographers investigated the formation of ocean "dead zones"—regions with oxygen levels too low to support marine life. They found that agricultural runoff containing nitrogen and phosphorus fertilizers triggers algae blooms. When algae die and decompose, bacteria consume dissolved oxygen, creating hypoxic conditions.

Researchers measured oxygen levels at various depths in a coastal region over one year. In winter, oxygen levels remained uniform at 8 mg/L from surface to seafloor. Spring agricultural runoff increased surface nutrients, causing algae blooms that initially raised surface oxygen to 12 mg/L through photosynthesis while deeper waters maintained 8 mg/L.

By summer, decomposing algae had reduced bottom oxygen to 2 mg/L while surface waters retained 10 mg/L. The boundary between oxygenated and hypoxic water, called the oxycline, occurred at 15 meters depth. Fish and mobile organisms fled the region, while sessile organisms like oysters experienced mass mortality.

Fall storms mixed the water column, temporarily restoring oxygen throughout. However, sediments retained organic matter that continued consuming oxygen, preventing full recovery. Models predict that reducing agricultural runoff by 40% could prevent dead zone formation, while 20% reduction would only shrink their size.

28. According to the passage, dead zones form due to:

- F. oil spills
- G. overfishing

H. plastic pollution

J. nutrient runoff causing algae blooms and decomposition

29. The initial effect of algae blooms on surface oxygen is to:

A. increase it through photosynthesis

B. decrease it immediately

C. maintain constant levels

D. eliminate all oxygen

30. The oxycline depth of 15 meters represents:

F. the boundary between oxygenated and hypoxic water

G. maximum algae growth

H. seafloor depth

J. storm mixing depth

31. By summer, the oxygen differential between surface and bottom was:

A. 2 mg/L

B. 4 mg/L

C. 6 mg/L

D. 8 mg/L

32. Sessile organisms suffered mass mortality because:

F. they consumed all oxygen

G. storms destroyed them

H. they couldn't flee hypoxic conditions

J. algae poisoned them

33. Fall storms temporarily improved conditions by:

- A. removing algae
- B. mixing oxygen throughout the water column
- C. cooling water
- D. bringing rain

34. To prevent dead zones entirely, agricultural runoff must be reduced by:

- F. 20%
- G. 40%
- H. 60%
- J. 80%

## **PASSAGE V**

---

A physics class investigated factors affecting the period of a simple pendulum. The period is the time required for one complete swing back and forth.

The students first tested whether pendulum mass affects period by using the same string length (1.0 meter) with masses of 50g, 100g, 200g, and 400g. Each mass produced a period of 2.0 seconds ( $\pm 0.02$  seconds), indicating mass has no effect on period.

Next, they varied string length while keeping mass constant at 100g. A 0.25-meter pendulum had a period of 1.0 seconds. Doubling length to 0.5 meters increased period to 1.4 seconds. At 1.0 meter, period was 2.0 seconds, and at 2.0 meters, it reached 2.8 seconds. The students discovered that period is proportional to the square root of length.

They then tested amplitude effects by varying the initial angle of release from  $5^\circ$  to  $40^\circ$  while maintaining 1.0-meter length and 100g mass. Small angles ( $5^\circ$  to  $15^\circ$ ) all produced 2.0-second periods. However, at  $30^\circ$  the period increased to 2.05 seconds, and at  $40^\circ$  it reached 2.12 seconds, showing that the simple pendulum equation only applies to small angles.

Finally, they tested the same pendulum on an inclined plane tilted  $30^\circ$  from horizontal. The effective gravity component along the swing direction decreased, increasing the period to 2.4 seconds. This confirmed that pendulum period depends on gravitational acceleration.

35. According to the experiments, pendulum period is independent of:

- A. length
- B. amplitude
- C. mass
- D. gravity

36. Quadrupling the pendulum length would multiply the period by:

- F. 1.4
- G. 2
- H. 2.8
- J. 4

37. The relationship between period and length is:

- A. period proportional to square root of length
- B. period proportional to length
- C. period proportional to length squared
- D. period inversely proportional to length

38. At what amplitude does the simple pendulum equation become noticeably inaccurate?

- F. Above  $15^\circ$
- G. Above  $30^\circ$
- H. Above  $40^\circ$
- J. At any angle

39. The inclined plane experiment demonstrated that:

- A. mass affects period
- B. friction is important
- C. air resistance matters

D. gravitational acceleration affects period

40. If a 1-meter pendulum has a 2-second period on Earth, on the Moon (gravity  $1/6$  of Earth's) its period would be approximately:

F. 0.33 seconds

G. 0.82 seconds

H. 4.9 seconds

J. 12 seconds

## 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.

### Universal Basic Income

---

As automation and artificial intelligence reshape the economy, some economists and policymakers have proposed Universal Basic Income (UBI)—regular, unconditional cash payments to all citizens regardless of employment status. Pilot programs in Kenya, Finland, and Stockton, California have tested variations of this concept. Advocates argue UBI could eliminate poverty, provide security during economic transitions, and enable people to pursue education, entrepreneurship, or caregiving without financial desperation. Critics worry about costs, potential inflation, and whether guaranteed income might discourage work and undermine the social benefits of employment. As technological unemployment looms and inequality widens, societies must consider whether UBI represents necessary adaptation or dangerous experimentation with economic foundations.

Read and carefully consider these perspectives. Each suggests a particular way of thinking about Universal Basic Income.

#### Perspective One

UBI is essential for human dignity and economic stability in an automated future. When machines can perform most labor, human worth cannot be tied to traditional employment. UBI provides the foundation for people to pursue creative work, community service, and personal development that markets don't value but society needs. It eliminates the degrading bureaucracy of means-tested welfare and recognizes that in wealthy societies, basic subsistence should be a human right.

#### Perspective Two

UBI would destroy the work ethic that builds character and creates prosperity. People find purpose, social connection, and identity through employment. Guaranteed income removes incentives for productivity, innovation, and self-improvement. The massive taxes required would crush economic growth while creating permanent dependence on government. Rather than preparing for joblessness, we should focus on education and training that helps workers adapt to new opportunities.

## Perspective Three

UBI merits careful experimentation but requires fundamental restructuring beyond simple cash payments. The amount must be sufficient for basic needs but not comfort, preserving work incentives. Implementation should be gradual, perhaps starting with negative income taxes or universal child allowances. Most critically, UBI must accompany reforms in healthcare, education, and housing—otherwise, cash payments will simply inflate prices in these essential sectors without improving access.

## Essay Task

---

**Write a unified, coherent essay about Universal Basic Income. 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 those given, in partial agreement, or completely different.

## Key Considerations for This Topic:

---

1. Economic factors: Cost, funding mechanisms, impact on labor markets, inflation risks
2. Social implications: Work ethic, social cohesion, inequality, human dignity
3. Practical challenges: Implementation, amount determination, political feasibility
4. Historical precedents: Welfare systems, Alaska Permanent Fund, pandemic relief payments
5. Global variations: Different models and pilot programs worldwide

## Remember to:

- Take a clear position
- Address counterarguments
- Use specific examples
- Consider multiple dimensions of the issue
- Maintain focus throughout your essay

# ANSWERS AND EXPLANATIONS

---

## English

- 1. A.** The question asks for LEAST acceptable. "Used quilts as" maintains the same meaning as the other options. All others work, but keeping the original "used quilts as" is actually acceptable, making this a poorly constructed question. The answer should be reconsidered.
- 2. J.** "Hung on clotheslines or" needs no comma before "or" when connecting two simple phrases. "Hanged" (H) is incorrect for objects (hung is correct). The answer is Choice (J).
- 3. D.** "Indicated to follow" is grammatically awkward. The other options flow better: "indicated following," "signaled to follow," "meant to follow" all work naturally. The answer is Choice (D).
- 4. F.** "Which claimed" correctly introduces a relative clause modifying the book title. "Which it claimed" (original) is redundant. "That claimed" could work but "which" is preferred for non-restrictive clauses. The answer is Choice (F).
- 5. B.** The simple past tense "interviewed" is most appropriate for a completed action. Past perfect "had interviewed" suggests an earlier timeframe unnecessarily. Progressive "were interviewing" doesn't fit the context. The answer is Choice (B).
- 6. H.** "An elaborate system" is correct—"elaborate" starts with a vowel sound, requiring "an" not "a." The answer is Choice (H).
- 7. C.** This paragraph shifts to discussing problems with the theory. "Yet this compelling narrative faces significant historical challenges" provides the perfect transition from the previous supportive paragraph. The answer is Choice (C).
- 8. G.** Simple present tense "question" works best for ongoing scholarly skepticism. Past tenses would suggest the questioning has ended. The answer is Choice (G).
- 9. A.** The original "They point out that;" has incorrect punctuation. A semicolon shouldn't be followed by "that." The correct form is "They point out that" with no punctuation before the clause. The answer is Choice (A).
- 10. J.** "Furthermore, the" requires a comma after the transitional adverb "Furthermore." The answer is Choice (J).
- 11. D.** The question asks for LEAST acceptable, but "extends back to" (the original) works fine, as do all alternatives. This appears to be an error in question construction.

- 12. F.** "Correspond with" is correct. The plural subject "intervals" requires the plural verb "correspond" (not "corresponds"). The answer is Choice (F).
- 13. B.** "Creates what we" is clear and concise. "Creates that which we" is unnecessarily wordy and formal. The answer is Choice (B).
- 14. H.** The subject "notes" (plural) requires "result from" (plural verb). The answer is Choice (H).
- 15. C.** "Before this standardization" needs a comma when starting a sentence as an introductory element. Option C lacks this comma. The answer is Choice (C).
- 16. G.** Bach's "Well-Tempered Clavier" directly supports the paragraph's discussion of equal temperament, as it was written to demonstrate this tuning system. The answer is Choice (G).
- 17. A.** A period creates the clearest separation between these independent thoughts. "Connections. Electronic synthesizers" starts a new sentence properly. The answer is Choice (A).
- 18. J.** "Digital audio files" (plural) requires the plural verb "consist of." The answer is Choice (J).
- 19. D.** All options are acceptable ways to phrase this. The question may be flawed, or the intended answer needs reconsideration.
- 20. F.** "Would have been" is correct. "Would of" is a common error for "would've" (would have). The answer is Choice (F).
- 21. B.** "Perhaps the most intriguing" uses the superlative correctly. "More" would be comparative (between two things). The answer is Choice (B).
- 22. H.** "Indeed" reinforces and extends the previous point about mathematical connections, making it the best transition. The answer is Choice (H).
- 23. C.** "Musicians' brains" (plural) requires the plural verb "develop." The answer is Choice (C).
- 24. G.** "Who" is correct for people as subjects. "That" is less preferred for people, "whom" is objective case, and "which" is for things. The answer is Choice (G).
- 25. A.** The plural subject "disciplines" requires the plural verb "share." The answer is Choice (A).
- 26. J.** Simple present tense "are" fits the current, ongoing situation. The answer is Choice (J).
- 27. D.** "Environments transforms" lacks necessary punctuation between the clauses. A comma or conjunction is needed. The answer is Choice (D).
- 28. F.** "High-tech" is hyphenated when used as a compound adjective. No comma is needed between cumulative adjectives. The answer is Choice (F).

- 29. B.** All options work, but the question structure suggests looking for redundancy or awkwardness.
- 30. H.** "They" agrees with the plural "farms" and present tense maintains consistency. The answer is Choice (H).
- 31. C.** "There's" (there is) is correct. "Theres" lacks the apostrophe, "theirs" is possessive. The answer is Choice (C).
- 32. G.** "Year-round" needs a hyphen as a compound adjective modifying "production." The answer is Choice (G).
- 33. A.** "Single vertical" without the article "A" would be grammatically incomplete. The answer is Choice (A).
- 34. J.** This sentence perfectly transitions from benefits to challenges, setting up the new paragraph's focus. The answer is Choice (J).
- 35. D.** "Costs" should be plural to match the verb "can exceed." No additional punctuation needed. The answer is Choice (D).
- 36. F.** "Remains" (singular) agrees with the singular subject "Energy consumption." The answer is Choice (F).
- 37. B.** All options are acceptable transitions. The question may need revision.
- 38. H.** No comma is needed in "but grain crops"—it's a simple contrasting clause. The answer is Choice (H).
- 39. C.** "Cities" is simply plural, no possessive needed. The answer is Choice (C).
- 40. G.** "Their" is the possessive pronoun needed here. "They're" = they are, "there" indicates location. The answer is Choice (G).
- 41. A.** Present tense "aims" fits the ongoing goal. Past tenses would suggest the goal has changed. The answer is Choice (A).
- 42. J.** Cities require commas: "Newark, New Jersey," and when continuing the sentence, another comma follows. The answer is Choice (J).
- 43. D.** The original is clearest and most concise. The answer is Choice (D).
- 44. F.** "Than" is used for comparisons. "Then" indicates time. "Less" is correct for water (uncountable). The answer is Choice (F).

- 45. B.** This option best emphasizes impact by connecting vertical farming to major global challenges (urbanization and climate change) and suggesting its evolution from "novelty to necessity." The answer is Choice (B).
- 46. H.** "Records" (plural) requires "have made" (plural verb). The answer is Choice (H).
- 47. C.** All options are grammatically acceptable, though "Vinyl sales albums" is awkward, it's not ungrammatical.
- 48. G.** In formal writing, using numerals for 16th is acceptable, especially with "consecutive." The answer is Choice (G).
- 49. A.** "This resurgence, particularly" needs a comma before the adverb "particularly" when it introduces additional information. The answer is Choice (A).
- 50. J.** "Whose" is the possessive form of "who." "Who's" = who is/who has. The answer is Choice (J).

## Mathematics

- 1. B.** If the discounted price is \$56 after a 30% discount, then  $\$56 = 0.70 \times \text{original price}$ . Solving:  $\text{original price} = \$56 \div 0.70 = \$80$ . The answer is Choice (B).
- 2. H.** Distribute:  $3(2x - 4) - 2(x - 5) = 6x - 12 - 2x + 10 = 4x - 2$ . The answer is Choice (H).
- 3. C.** Sum of 6 numbers =  $6 \times 15 = 90$ . Sum of given 5 numbers =  $12 + 14 + 16 + 18 + 20 = 80$ . Sixth number =  $90 - 80 = 10$ . The answer is Choice (C).
- 4. F.** Find common denominator:  $\frac{3}{8} + \frac{5}{12} = \frac{9}{24} + \frac{10}{24} = \frac{19}{24}$ . The answer is Choice (F).
- 5. A.** Distance = speed  $\times$  time =  $65 \text{ mph} \times 3.5 \text{ hours} = 227.5 \text{ miles}$ . The answer is Choice (A).
- 6. J.**  $4x + 7 = 31$ . Subtract 7:  $4x = 24$ . Divide by 4:  $x = 6$ . The answer is Choice (J).
- 7. D.** Perimeter =  $2(15 + 10) = 50$  feet. Cost =  $50 \times \$12 = \$600$ . The answer is Choice (D).
- 8. G.** Since  $BD = AD$  and D is on AB, D is the midpoint of AB. Since E is on BC and DE connects midpoints, by the midpoint theorem, DE is parallel to AC and  $DE = AC/2 = 8/2 = 4$  feet. The answer is Choice (G).
- 9. B.** 15% of 240 =  $0.15 \times 240 = 36$ . The answer is Choice (B).
- 10. H.**  $2x - 3 < 7$ . Add 3:  $2x < 10$ . Divide by 2:  $x < 5$ . The answer is Choice (H).

11. **C.**  $\sqrt{72} = \sqrt{(36 \times 2)} = \sqrt{36} \times \sqrt{2} = 6\sqrt{2}$ . The answer is Choice (C).
12. **F.**  $|-8| - |-3| = 8 - 3 = 5$ . The answer is Choice (F).
13. **A.**  $2.5 \times 10^{-3} = 2.5 \times 0.001 = 0.0025$ . The answer is Choice (A).
14. **J.**  $i^4 = (i^2)^2 = (-1)^2 = 1$ . The answer is Choice (J).
15. **D.** Factors of 48: 1,2,3,4,6,8,12,16,24,48. Factors of 72: 1,2,3,4,6,8,9,12,18,24,36,72. GCF = 24. The answer is Choice (D).
16. **G.**  $(2^3)(2^5) = 2^{3+5} = 2^8$ . The answer is Choice (G).
17. **B.**  $3/4 \div 2/3 = 3/4 \times 3/2 = 9/8$ . The answer is Choice (B).
18. **H.** Let  $x = 0.121212\dots$ . Then  $100x = 12.121212\dots$ . Subtracting:  $99x = 12$ , so  $x = 12/99$ . The answer is Choice (H).
19. **C.** From the diagram, angle ABC appears to be  $45^\circ$ . The answer is Choice (C).
20. **F.**  $\log_2(32)$  asks "2 to what power equals 32?" Since  $2^5 = 32$ ,  $\log_2(32) = 5$ . The answer is Choice (F).
21. **A.** Need two numbers that multiply to 12 and add to -7: -3 and -4. So  $x^2 - 7x + 12 = (x - 3)(x - 4)$ . The answer is Choice (A).
22. **J.** Hugo's unit exam total:  $82 + 88 + 91 + 83 = 344$  points out of 400. For a B (70%-79%), he needs between 420 and 474 total points out of 600. So he needs between 76 and 130 points on the final. 176 is outside this range. The answer is Choice (J).
23. **D.**  $f(-2) = 3(-2)^2 - 2(-2) + 1 = 3(4) + 4 + 1 = 12 + 4 + 1 = 17$ . The answer is Choice (D).
24. **G.**  $2x^2 - 8x = 0$ . Factor:  $2x(x - 4) = 0$ . Solutions:  $x = 0$  or  $x = 4$ . The answer is Choice (G).
25. **B.** Slope =  $(11 - 3)/(6 - 2) = 8/4 = 2$ . The answer is Choice (B).
26. **H.** Perpendicular lines have negative reciprocal slopes. Original slope is 2, so perpendicular slope is  $-1/2$ . The answer is Choice (H).
27. **C.**  $(g \circ h)(2) = g(h(2)) = g(2^2) = g(4) = 4 + 3 = 7$ . The answer is Choice (C).
28. **F.** Set equations equal:  $2x + 1 = -x + 4$ . Solve:  $3x = 3$ ,  $x = 1$ . Then  $y = 2(1) + 1 = 3$ . The answer is Choice (F).
29. **A.** Complete the square:  $y = x^2 - 4x + 3 = (x - 2)^2 - 1$ . Vertex is (2, -1). The answer is Choice (A).
30. **J.**  $3^x = 81 = 3^4$ , so  $x = 4$ . The answer is Choice (J).

- 31. D.** Circumference =  $2\pi r = 2\pi(5) = 10\pi$ . The answer is Choice (D).
- 32. G.** Using the Pythagorean theorem on triangle ADC:  $AD^2 + DC^2 = AC^2$ . So  $9000^2 + 12000^2 = 15000^2$ . For triangle BDC:  $BD^2 + 12000^2 = 13000^2$ . Solving:  $BD^2 = 169,000,000 - 144,000,000 = 25,000,000$ .  $BD = 5,000$  feet. The answer is Choice (G).
- 33. B.** The problem states C is 13,000 feet from B. The answer is Choice (B).
- 34. H.**  $AB = AD + DB = 9,000 + 5,000 = 14,000$  feet. The answer is Choice (H).
- 35. C.** After 10 seconds, C moves  $300 \times 10 = 3,000$  feet west. New position is 3,000 feet west of D, or 12,000 feet from A. Using Pythagorean theorem: distance =  $\sqrt{(12000^2 + 3000^2)} = \sqrt{(144,000,000 + 9,000,000)} = \sqrt{153,000,000} = 12300\sqrt{2} \approx 17,370$ . Closest answer is 18,000. The answer is Choice (C).
- 36. F.** Supplementary angles sum to  $180^\circ$ .  $180^\circ - 125^\circ = 55^\circ$ . The answer is Choice (F).
- 37. A.** Area =  $(1/2) \times \text{base} \times \text{height} = (1/2) \times 8 \times 6 = 24$ . The answer is Choice (A).
- 38. J.** In a 45-45-90 triangle, hypotenuse = leg  $\times \sqrt{2} = 5\sqrt{2}$ . The answer is Choice (J).
- 39. D.** Volume = length  $\times$  width  $\times$  height =  $3 \times 4 \times 5 = 60$ . The answer is Choice (D).
- 40. G.** Distance =  $\sqrt{[(5-1)^2 + (5-2)^2]} = \sqrt{[16 + 9]} = \sqrt{25} = 5$ . The answer is Choice (G).
- 41. B.** For an even number of values, median is average of middle two:  $(7 + 9)/2 = 8$ . The answer is Choice (B).
- 42. H.** Ways to get exactly 2 heads: HHT, HTH, THH = 3 ways. Total outcomes:  $2^3 = 8$ . Probability =  $3/8$ . The answer is Choice (H).
- 43. C.** Standard deviation measures the spread or dispersion of data from the mean. The answer is Choice (C).
- 44. F.** Total marbles =  $3 + 4 + 5 = 12$ . Probability of red =  $3/12 = 1/4$ . The answer is Choice (F).
- 45. A.**  $y = 3 + f(x - 1)$  represents a horizontal shift right by 1 unit ( $x - 1$ ) and a vertical shift up by 3 units (+3). The answer is Choice (A).

## Reading

- 1. D.** The narrator exhibits complex ambivalence—conflicting feelings about returning home, the unchanged house being "somehow worse," and mixed emotions about her father's revelations. She's

neither purely angry nor happy, but experiencing layered, contradictory emotions. The answer is Choice (D).

**2. F.** The key being in the same location after 17 years, and the narrator knowing exactly where to find it, demonstrates how family patterns and rituals persist across time. This detail establishes continuity despite estrangement. The answer is Choice (F).

**3. B.** The text explicitly states "this was something I needed to do alone," indicating a need for private confrontation with her past and her father's letter. The answer is Choice (B).

**4. H.** The letter reveals the father deliberately created distance to protect his daughter from living in fear of developing her mother's genetic illness. He writes, "every harsh word...was calculated to set you free." The answer is Choice (H).

**5. C.** The "ghost scents" evoke the lingering presence of the father and the past that still permeates the room. It's metaphorical language about memory and absence, not literal ghosts. The answer is Choice (C).

**6. G.** The letter states "Fifty percent. A coin flip" regarding the probability of inheriting the genetic illness. The tests at sixteen came back negative, but this was about probability, not certainty. The answer is Choice (G).

**7. A.** Leaving the key suggests acceptance of the house as part of her story and leaving it accessible for potential return or for others who might need it—"Someone else might need to find their way home someday." The answer is Choice (A).

**8. J.** The father writes his wife "would have done it differently—she always was braver than me," implying she would have been more direct and honest rather than creating protective distance. The answer is Choice (J).

**9. D.** The rose bush represents persistent life (still growing after all these years) and connection to the mother (who planted it). It appears at beginning and end, symbolizing continuity and endurance. The answer is Choice (D).

**10. F.** The passage presents automation as creating unprecedented challenges (replacing judgment, not just labor) that require thoughtful policy responses rather than leaving adaptation to market forces alone. The answer is Choice (F).

**11. B.** The passage explicitly states current automation "increasingly replace[s] human judgment" while "Earlier innovations typically replaced human muscle." The answer is Choice (B).

**12. H.** Pokemon Go reaching 50 million users in 19 days versus telephone's 75 years illustrates "This compression of adoption cycles" giving workers "less time to adapt." The answer is Choice (H).

**13. C.** Moravec's Paradox notes computers "struggle with those [tasks] we find easy (like folding laundry)" despite excelling at complex tasks like chess. The answer is Choice (C).

- 14. G.** The pessimists argue "no obvious next sector awaits displaced workers" unlike previous transitions from agriculture to manufacturing to services. The answer is Choice (G).
- 15. A.** The passage suggests "technology may be suppressing worker bargaining power rather than eliminating jobs entirely" to explain wage stagnation despite high employment. The answer is Choice (A).
- 16. J.** The passage states "South Korea leads in robot adoption but maintains low unemployment through aggressive retraining programs." The answer is Choice (J).
- 17. D.** The Industrial Revolution "ultimately improved living standards, but only after decades of exploitation, conflict, and reform," suggesting positive outcomes require "deliberate action rather than passive hope." The answer is Choice (D).
- 18. F.** The author presents multiple perspectives, acknowledges complexity, and rejects "binary predictions of utopia or catastrophe," maintaining analytical balance throughout. The answer is Choice (F).
- 19. B.** The passage traces jazz from its origins through multiple evolutions, examining its cultural significance, influence, and current marginal status—a comprehensive exploration of its complex evolution. The answer is Choice (B).
- 20. H.** The multiple etymologies, including "less savory" ones, and the phrase "for better or worse" suggest jazz's history involves complexity and controversy. The answer is Choice (H).
- 21. C.** Armstrong's "revolutionary approach to improvisation...established the soloist as composer" by "creating entirely new compositions in real-time." The answer is Choice (C).
- 22. G.** Benny Goodman gained fame as "King of Swing" using arrangements "largely written by Fletcher Henderson, a Black bandleader," exemplifying appropriation patterns. The answer is Choice (G).
- 23. A.** Bebop was "music too complex for easy appropriation" allowing "musicians [to] assert ownership over their creation"—deliberate resistance to appropriation. The answer is Choice (A).
- 24. J.** Miles Davis is described as "the genre's most relentless innovator" who "led several revolutions" across multiple jazz styles. The answer is Choice (J).
- 25. D.** The passage asks whether jazz abandoned "populist spirit" by "pursuing artistic complexity" or if culture lost "patience for music that demands active listening." The answer is Choice (D).
- 26. F.** The passage lists extensive influences: Beatles studying jazz harmony, hip-hop sampling, classical incorporation, showing recognition of widespread impact. The answer is Choice (F).
- 27. B.** The final paragraph suggests jazz's "true destiny" as "not mass entertainment but...continuously evolving art form," essential but "forever slightly outside [the] mainstream." The answer is Choice (B).

- 28. H.** The passage comprehensively explores CRISPR's origins, mechanisms, applications (medical, agricultural, ecological), ethical concerns, and societal implications. The answer is Choice (H).
- 29. C.** The passage states "CRISPR evolved as a bacterial immune system" that bacteria use to defend against viral attacks. The answer is Choice (C).
- 30. G.** "Democratization" refers to CRISPR reducing costs "from hundreds of thousands of dollars to hundreds" and time "from months...to days or weeks," increasing accessibility. The answer is Choice (G).
- 31. A.** Victoria Gray "remains symptom-free—a potential cure" for sickle cell disease after CRISPR treatment, demonstrating curative potential. The answer is Choice (A).
- 32. J.** The mushrooms "received USDA approval without traditional GMO regulations, as they contain no foreign DNA—only deletions of existing genes." The answer is Choice (J).
- 33. D.** The passage emphasizes "Once released, gene drives cannot be recalled—an irreversibility that terrifies ecologists." The answer is Choice (D).
- 34. F.** The scientific community "criticized not the technology but its premature use, given unresolved safety and ethical questions." The answer is Choice (F).
- 35. B.** Disability advocates "worry about eliminating conditions like deafness or autism, which many don't consider disabilities needing correction." The answer is Choice (B).
- 36. H.** Like nuclear technology, "CRISPR offers tremendous benefits...alongside existential risks," suggesting parallel opportunities and dangers. The answer is Choice (H).

## Science (Optional)

- 1. B.** Looking at Table 1's "Slow" column, the highest retained capacity is 94% at 25°C. At 15°C it's 89%, at 35°C it's 91%. The answer is Choice (B).
- 2. G.** Table 2 shows energy efficiency decreasing steadily: Slow (95%), Medium (89%), Fast (78%), Ultra-fast (65%). The answer is Choice (G).
- 3. C.** Table 1 shows fast charging at 0°C results in 68% of original capacity after 500 cycles. The answer is Choice (C).
- 4. J.** Conservative mode gives 420 km, Track mode gives 250 km. The reduction is  $(420-250)/420 = 170/420 = 40\%$ . The answer is Choice (J).

- 5. A.** Table 2 shows heat generated: Slow (2°C rise), Medium (8°C), Fast (18°C), Ultra-fast (32°C). Slow charging generates the least heat. The answer is Choice (A).
- 6. F.** At 35°C: Slow charging retains 91%, Fast charging retains 81%. The difference is  $91 - 81 = 10$  percentage points. The answer is Choice (F).
- 7. D.** Sport mode: 180 kW peak power. Normal mode: 120 kW peak power. Difference =  $180 - 120 = 60$  kW more. The answer is Choice (D).
- 8. H.** At 25°C, all charge rates show their highest retained capacity values (94%, 91%, 86%), making it optimal. The answer is Choice (H).
- 9. B.** Ultra-fast takes 15 minutes = 0.25 hours. Slow takes 8 hours. Ratio =  $0.25/8 = 1/32$ . The answer is Choice (B).
- 10. G.** Tables show both temperature extremes (0°C and 45°C) and fast charging significantly reduce battery capacity, suggesting these combined factors cause the most degradation. The answer is Choice (G).
- 11. C.** Table 4 shows far-red light at 730 nm produced only 0.3 mL O<sub>2</sub>, the lowest amount. The answer is Choice (C).
- 12. J.** Experiment 2 shows oxygen production peaks at 25°C (5.0 mL) and decreases at both higher and lower temperatures, indicating an optimal moderate temperature. The answer is Choice (J).
- 13. A.** Plants appear green because they reflect green light rather than absorbing it for photosynthesis, explaining its poor performance (16% efficiency). The answer is Choice (A).
- 14. F.** Continuous light: 5.0 mL. With 1-minute cycles: 3.8 mL. Shorter cycles produce less total oxygen. The answer is Choice (F).
- 15. D.** When combining wavelengths, the effect is typically synergistic but not perfectly additive. Production would be higher than either alone but less than their sum (9.8 mL). The answer is Choice (D).
- 16. H.** At 25°C: 5.0 mL. At 45°C: 0.8 mL. Ratio =  $5.0/0.8 = 6.25$  times more. The answer is Choice (H).
- 17. B.** Violet: 3.2 mL. Far-red: 0.3 mL. Ratio =  $3.2/0.3 \approx 10.7$  times more effective. The answer is Choice (B).
- 18. G.** The experiment measures oxygen production as an indicator of photosynthesis rate, assuming direct correlation. The answer is Choice (G).
- 19. C.** Continuous: 5.0 mL. 1-minute cycles: 3.8 mL. Decrease =  $(5.0 - 3.8)/5.0 = 1.2/5.0 = 24\%$ . The answer is Choice (C).

- 20. J.** Red light at 25°C with continuous illumination combines the most effective wavelength, optimal temperature, and continuous exposure. The answer is Choice (J).
- 21. A.** Scientist 1 emphasizes "The correlation between neonicotinoid introduction in the 1990s and CCD emergence" as primary evidence. The answer is Choice (A).
- 22. F.** Scientist 2 states "once infestation exceeds a threshold, collapse becomes inevitable," identifying this threshold as critical. The answer is Choice (F).
- 23. D.** Scientist 3 argues "No single factor explains CCD" and emphasizes multiple stressors, suggesting multiple interventions are needed. The answer is Choice (D).
- 24. H.** Both acknowledge pesticides and mites exist, but disagree on which is the primary cause of CCD. The answer is Choice (H).
- 25. B.** "Countries that banned neonicotinoids have seen bee population recovery" would directly support Scientist 1's pesticide hypothesis. The answer is Choice (B).
- 26. G.** Scientist 2 acknowledges pesticides contribute, and Scientist 3 explicitly argues for multiple factors. Both agree on multiple contributions. The answer is Choice (G).
- 27. C.** Collapse without pesticides is consistent with Scientist 2 (mites) and Scientist 3 (multiple factors including non-pesticide stressors). The answer is Choice (C).
- 28. J.** The passage explains dead zones form when "agricultural runoff containing nitrogen and phosphorus fertilizers triggers algae blooms" followed by decomposition consuming oxygen. The answer is Choice (J).
- 29. A.** "Spring agricultural runoff...causing algae blooms that initially raised surface oxygen to 12 mg/L through photosynthesis." The answer is Choice (A).
- 30. F.** The passage defines the oxycline as "the boundary between oxygenated and hypoxic water." The answer is Choice (F).
- 31. D.** Summer surface: 10 mg/L. Summer bottom: 2 mg/L. Differential =  $10 - 2 = 8$  mg/L. The answer is Choice (D).
- 32. H.** "Fish and mobile organisms fled the region, while sessile organisms like oysters experienced mass mortality" because they couldn't escape hypoxic conditions. The answer is Choice (H).
- 33. B.** "Fall storms mixed the water column, temporarily restoring oxygen throughout." The answer is Choice (B).
- 34. G.** "Models predict that reducing agricultural runoff by 40% could prevent dead zone formation." The answer is Choice (G).

- 35. C.** The first experiment showed "Each mass produced a period of 2.0 seconds...indicating mass has no effect on period." The answer is Choice (C).
- 36. J.** Period is proportional to square root of length. Quadrupling length means multiplying period by  $\sqrt{4} = 2$ . The answer is Choice (J).
- 37. A.** The passage explicitly states "period is proportional to the square root of length." The answer is Choice (A).
- 38. F.** "Small angles ( $5^\circ$  to  $15^\circ$ ) all produced 2.0-second periods. However, at  $30^\circ$  the period increased," showing inaccuracy above  $15^\circ$ . The answer is Choice (F).
- 39. D.** The inclined plane "decreased effective gravity...increasing the period," confirming gravitational acceleration affects period. The answer is Choice (D).
- 40. H.** Period is proportional to  $1/\sqrt{g}$ . On the Moon with  $1/6$  gravity, period multiplies by  $\sqrt{6} \approx 2.45$ . So 2 seconds  $\times 2.45 \approx 4.9$  seconds. The answer is Choice (H).

## Writing (Optional)

### Sample High-Scoring Essay Response (Score: 10-12 range)

Universal Basic Income represents neither economic panacea nor societal poison, but rather a policy tool whose effectiveness depends entirely on implementation details and accompanying reforms. While skeptics rightfully worry about work disincentives and fiscal sustainability, and advocates correctly identify automation's threat to traditional employment, the most prudent path forward involves limited, carefully designed trials that test specific hypotheses about human behavior and economic dynamics rather than sweeping ideological assumptions about human nature.

The fundamental case for UBI rests on observable economic trends that demand serious consideration. McKinsey Global Institute estimates that 45% of work activities could be automated with current technology, affecting \$16 trillion in wages globally. The COVID-19 pandemic accelerated this transition—self-checkout expanded, restaurants adopted QR menus, and companies discovered many positions could be permanently eliminated. Unlike previous technological disruptions that shifted workers between sectors, artificial intelligence threatens both manual and cognitive labor simultaneously. When radiologists, paralegals, and truck drivers face obsolescence within the same generation, traditional retraining programs seem inadequate. Alaska's Permanent Fund Dividend, distributing oil revenues since 1982, demonstrates that unconditional payments need not destroy work ethic—Alaska maintains relatively normal employment rates despite annual payments sometimes exceeding \$2,000 per person.

However, Perspective Two raises legitimate concerns about UBI's psychological and social impacts that proponents too often dismiss. Work provides more than income; it offers structure, social identity, and sense of contribution. Studies of lottery winners and trust fund recipients reveal that unearned income can

correlate with decreased life satisfaction, higher substance abuse rates, and social isolation. The town of Youngstown, Ohio, after steel mill closures, saw not just economic but social collapse—divorce rates soared, civic participation plummeted, and deaths of despair spiked. Simply replacing lost wages wouldn't have prevented this unraveling because work itself, not just pay, anchored community life. Moreover, the tax burden for meaningful UBI would be staggering. Providing every American adult \$1,000 monthly would cost \$3 trillion annually—nearly the entire federal budget—requiring unprecedented taxation that could stifle the economic dynamism that generates wealth for redistribution.

The solution lies not in choosing between absolute positions but in recognizing UBI as one tool among many for managing economic transition. Perspective Three correctly identifies that implementation details matter enormously. Kenya's GiveDirectly experiment provides \$22 monthly—sufficient for basic needs in rural villages but preserving work incentives. Finland's trial targeted unemployed individuals, testing whether unconditional support enabled job searching better than bureaucratic welfare systems. Stockton's program gave \$500 monthly to 125 residents, finding that most continued working while using funds for medical bills and car repairs that actually enabled employment.

Critical to any UBI system is preventing what economists call "benefit capture"—where universal payments simply get absorbed by price increases. If everyone receives \$1,000 monthly, landlords might raise rent by \$1,000, negating the benefit. This requires complementary policies: public housing options to compete with private landlords, healthcare reform to prevent medical cost inflation, and possibly price controls on essential goods. Singapore's successful public housing program, serving 80% of residents, shows how government alternatives can discipline private markets.

The most promising approach involves graduated implementation with continuous evaluation. Begin with universal child allowances—many European countries already provide these without controversy. Expand to negative income taxes that supplement low wages rather than replacing work entirely. Test different amounts in different regions, studying impacts on employment, prices, health outcomes, and social cohesion. Build robust datasets before making irreversible commitments. This empirical approach respects both the genuine challenges automation poses and the legitimate concerns about unintended consequences.

Ultimately, UBI forces us to confront fundamental questions about human purpose in an age of artificial intelligence. If machines can outperform humans at increasing tasks, we must either find new forms of valuable work or reconsider whether traditional employment should determine human worth and resource access. The answer need not be binary—partial basic income could provide security while preserving incentives, job guarantee programs could offer alternative to welfare, and reduced working hours could share remaining work more broadly. What we cannot do is assume either that current systems will persist unchanged or that UBI alone will solve automation's challenges. The future demands pragmatic experimentation guided by evidence rather than ideology.

---

## Why This Essay Would Score Highly

### Ideas and Analysis (10-12):

- Engages substantively with all three perspectives

- Presents nuanced thesis rejecting binary thinking
- Demonstrates deep understanding of economic and social complexities
- Places issue in broader context of technological change

### **Development and Support (10-12):**

- Specific examples: Alaska's Permanent Fund, Youngstown's decline, Kenya/Finland/Stockton trials
- Concrete data: McKinsey statistics, cost calculations
- Exploration of second-order effects: benefit capture, social identity
- Counter-examples and complications acknowledged

### **Organization (10-12):**

- Clear progression: context → support → concerns → synthesis → implementation → conclusion
- Each paragraph builds on previous ideas
- Smooth transitions between perspectives
- Strong introduction and forward-looking conclusion

### **Language Use (10-12):**

- Sophisticated vocabulary: "panacea," "obsolescence," "economic dynamism"
- Varied sentence structures
- Academic tone without being pretentious
- Clear, error-free prose

### **Key Strategies Demonstrated:**

1. **Avoiding Extremes:** Rather than fully endorsing or rejecting UBI, the essay advocates for empirical testing
2. **Concrete Evidence:** Specific programs, places, and statistics ground abstract arguments
3. **Addressing Complexity:** Acknowledges unintended consequences and implementation challenges
4. **Synthesizing Perspectives:** Finds merit in each view while developing independent position
5. **Forward-Looking:** Proposes specific implementation strategies rather than just analyzing

This essay demonstrates the sophistication and nuance expected for top scores on the ACT Writing Test.