

Solutions

1. Solution: [A] were discussing

This correction matches the plural subject and maintains the past progressive to show the participants' ongoing discussion occurred at the same time the moderator outlined the agenda.

2. Solution: [A] is required

The subject "every one" is singular, so it needs the singular verb "is required" to agree correctly.

3. Solution: [A]

His or her matches the singular antecedent each researcher, fixing the number agreement error.

4. Solution: [A] While I was driving through the neighborhood on a sunny afternoon, the tall trees looked beautiful.

The revision places the participial phrase with the correct subject, making it clear that the speaker, not the trees, was driving.

5. Solution: [A]

Option A replaces "being detail-oriented" with "attention to detail," creating three parallel noun phrases: strong leadership, the ability to work independently, and attention to detail.

6. Solution: [C]

Option C replaces the period after the introductory phrase with a comma, attaching it to the main clause and eliminating the sentence fragment.

7. Solution: [C]

Option C uses a comma and the coordinating conjunction *but* to join two independent clauses correctly and show the contrast between thorough revision and neglecting the bibliography.

8. Solution: [B]

This revision corrects the comma splice by adding the coordinating conjunction *but* after the comma to properly join the two independent clauses.

9. Solution: [B]

The apostrophe after the plural noun *parents* correctly indicates that the car belongs to both parents.

10. Solution: [A] effect

The noun *effect* correctly names the result of the policy on morale, whereas *affect* is a verb and the other options change the intended meaning.

11. Solution: [A] Although the study was extensive, it failed to include several key variables.

A comma is required after the introductory clause "Although the study was extensive" to set it off from the main clause, and only option A places it correctly.

12. Solution: [B]

A semicolon is needed to join the two independent clauses "The study produced contradictory data" and "it called previous theories into question," as shown in option B.

13. Solution: [A]

The colon after “includes” properly introduces the list, and commas (including the Oxford comma) clearly separate the items.

14. Solution: [D]

The em dash sets off the emphasized phrase, creating a clear and forceful break before “bold, they challenged decades of research.”

15. Solution: [A] The dog's leash was left on the porch during the storm.

An apostrophe plus s marks a singular possessive, indicating the leash belongs to one dog.

16. Solution: [A] After months of training, she ran the marathon in record time.

A comma is needed after the introductory phrase “After months of training” to separate it from the main clause.

17. Solution: [B]

Option B correctly places semicolons between each item that contains internal commas, ensuring the list remains clear and properly separated.

18. Solution: [A] The teacher announced, "The essay is due tomorrow."

A comma correctly introduces a quotation after a verb of speaking rather than a colon.

19. Solution: [D]

The phrase “however, the merger would be delayed” functions as an interrupting element and so must be enclosed by paired em dashes, as shown in option D.

20. Solution: [D] Jake said he can't attend the meeting after school today.

The apostrophe in "can't" correctly indicates the contraction of "cannot."

21. Solution: [C] Ana packed her bag, grabbed her tickets, and checked the train schedule, all before leaving the station.

This option uses three past-tense verbs in parallel form (packed, grabbed, checked) to correct the error.

22. Solution: [A]

The semicolon in A properly joins the two independent clauses, eliminating the run-on without altering meaning or emphasis. B leaves a comma splice, C shifts focus, and D creates a less fluid compound sentence.

23. Solution: [C] During the science fair, John and Maria presented their project to the judges.

The revision completes the fragment by adding the past-tense verb “presented” and correctly places a comma after the introductory phrase.

24. Solution: [A]

In order to finish the marathon, runners must train consistently, fuel their bodies properly, and rest adequately.

This choice makes all three items—train, fuel, and rest—base-form verbs without “to,” ensuring parallel structure.

25. Solution: [A]

The phrase ‘Hoping to impress her teacher’ now directly modifies Alex by placing him immediately after the introductory clause, eliminating the misplaced modifier that previously seemed to describe the display.

26. Solution: [A]

This option eliminates the vague pronoun “it” by using “the recipes,” which clearly refers to the contents of his grandmother’s recipe book.

27. Solution: [A]

Option A combines the ideas with a subordinate clause and a coordinating conjunction, creating a single, varied sentence and avoiding choppy structure.

28. Solution: [D]

Writing two sentences correctly separates the ideas without creating a run-on: the first sentence begins with the dependent clause and the second stands alone.

Explanation: Using a comma then a period divides the independent clauses properly and avoids comma splices or sentence fragments.

29. Solution: [A] Marcus rehearsed his piano piece until midnight even though he knew his English essay was due at dawn, and he hadn't started it.

This revision uses the subordinating conjunction “even though” to show the contrast between his late-night practice and the looming essay deadline, improving coherence.

30. Solution: [A]

This revision uses “and although” to connect clauses and signal contrast smoothly, fixing the run-on and clarifying the relationship between voiced opinions and the failure to reach consensus.

31. Solution: [D] Emily wrote her research summary thoroughly, including a lot of technical terms to explain every concept instead of focusing on the key findings.

This revision replaces “in a thorough manner” with “thoroughly” and “scientific jargon” with “technical terms,” reducing redundancy while maintaining clarity and tone.

32. Solution: [A]

Choice A maintains an analytical tone by using formal phrasing and removes informal terms like “super cool,” focusing on precise descriptions of potential applications.

33. Solution: [A]

The phrase “series of repeated... over and over again” is redundant. Choice A removes extra modifiers while keeping the analytical tone and meaning intact.

34. Solution: [C] The study analyzed numerous samples to determine how these particles behave under different environmental conditions.

It removes informal phrasing, uses “determine” for an analytical tone, and replaces “a large number” with “numerous” for conciseness.

35. Solution: [A] The team collaborated to develop the new algorithm for improved efficiency.

The revision removes redundant phrases (“together,” “collectively”) while preserving clarity and analytical tone.

36. Solution: [A] The report concluded that the results are impressive and indicate significant improvements over previous studies.

This revision replaces the informal “are pretty awesome” with the formal adjective “impressive” and uses the analytical verb “indicate,” maintaining a precise, academic tone.

37. Solution: [D]

The revision removes the redundant “guaranteed” because securing a contract already implies certainty, preserving clarity and an analytical tone.

38. Solution: [C]

The revision replaces the informal “amazingly” with the more analytical modifier “significantly” and uses “are expected to reshape” to convey a reasoned prediction rather than an overly certain claim.

39. Solution: [D]

Choice D eliminates the redundant modifier “completely” while preserving clarity and an analytical tone.

40. Solution: [A] The architect oversaw the completion of the new wing.

Removing “final” eliminates redundancy because “completion” already implies finality. Choice A maintains clarity and conciseness without altering the meaning.

41. Solution: [D] therefore

The transition “therefore” clearly signals the cause-and-effect relationship between reviewing the report and adjusting projections, maintaining an analytical tone.

42. Solution: [A]

The transition however conveys a clear contrast between the revenue prediction and the inflation underestimation while maintaining an analytical tone.

43. Solution: [A]

Consequently clearly signals that the company’s adjusted production forecast is a direct result of the identified gap in consumer demand, maintaining an analytical tone and conveying cause and effect.

44. Solution: [B] furthermore

Furthermore maintains the analytical tone by clearly indicating an additional point, making the sentence flow smoothly.

45. Solution: [D]

The transition “however” clearly signals a contrast between the growing consumer interest and the logistical challenges, preserving an analytical tone.

46. Solution: [C]

Subsequently indicates that the synchronization took place after the initial measurements, preserving an analytical tone and correctly marking the sequence.

47. Solution: [A] thus

The word thus maintains an analytical tone and indicates a direct causal relationship between the decline in market share and the company’s reevaluation of its pricing structure.

48. Solution: [D]

subsequently correctly indicates chronological order and maintains an analytical tone, while the other options imply causation (therefore, consequently) or simultaneity (meanwhile).

49. Solution: [D]

however signals a clear contrast between the projected surplus and the unanticipated expenses, preserving an analytical tone.

50. Solution: [D]

“Meanwhile” indicates that the research team’s actions occurred at the same time as the experimental trials, maintaining an analytical tone and correctly signaling simultaneity.

51. Solution: [A] 255

Since consecutive odd integers differ by 2, let $m = n + 2$. Then $n + m = 32$ becomes $n + (n + 2) = 32$, so $n = 15$ and $m = 17$, and their product is $15 \times 17 = 255$.

52. Solution: [A] $(3x + 1)(5x - 8)$

First find two numbers that multiply to $15 \times (-8) = -120$ and add to -19 : -24 and 5 . Rewrite the middle term: $15x^2 - 24x + 5x - 8$. Factor by grouping: $3x(5x - 8) + 1(5x - 8) = (5x - 8)(3x + 1)$.

53. Solution: [D]

Factoring common terms gives $\frac{18x^2y}{24xy^2} = \frac{6xy \cdot 3x}{6xy \cdot 4y} = \frac{3x}{4y}$.

The fully simplified form is $\frac{3x}{4y}$.

54. Solution: [A] $\frac{72}{x}$

Write each power: $(2x^{-1}y^2)^3 = 2^3x^{-3}y^6 = 8x^{-3}y^6$ and $(3xy^{-3})^2 = 3^2x^2y^{-6} = 9x^2y^{-6}$. Multiply coefficients: $8 \times 9 = 72$; add exponents for x : $-3 + 2 = -1$; for y : $6 + (-6) = 0$. Result is $72x^{-1} = 72/x$.

55. Solution: [D] $\frac{27}{2}$

$$\frac{4^{-2} \cdot 9}{2^{-3} \cdot 3^{-1}} = \frac{2^{-4} \cdot 3^2}{2^{-3} \cdot 3^{-1}} = 2^{-1} \cdot 3^3 = \frac{27}{2}.$$

Exponents subtract in division and add in multiplication to yield $2^{-1} \cdot 3^3$, which equals $27/2$.

56. Solution: [C] $(1/5)^{-3} = 5^3 = 125$, $(2/5)^2 = 4/25$, and $125 \times \frac{4}{25} = 20$

The negative exponent flips the fraction so that $(1/5)^{-3} = 5^3$, squaring $\frac{2}{5}$ gives $\frac{4}{25}$, and multiplying 125 by $\frac{4}{25}$ simplifies to 20.

57. Solution: [A] 12

$$(-3)^2 = 9, 4 \times (-2) = -8 \text{ so } -[4 \times (-2)] = 8, 5 \times (-1) = -5 \text{ and } 9 + 8 - 5 = 12$$

58. Solution: [A] 6x

Factoring out the greatest common factor from $18x^3 - 12x^2 + 6x$ gives $6x(3x^2 - 2x + 1)$, so $6x$ is a factor.

59. Solution: [B]

The division rewrites as $\frac{5}{8} \times \frac{16}{3} = \frac{80}{24} = \frac{10}{3}$. Then $\frac{10}{3} - \frac{7}{12} = \frac{40}{12} - \frac{7}{12} = \frac{33}{12} = \frac{11}{4}$.

60. Solution: [D]

$3^3 = 27$ and $9^2 = (3^2)^2 = 3^4$, so the numerator is $3^3 \cdot 3^4 = 3^7$. Dividing by $27 = 3^3$ gives $\frac{3^7}{3^3} = 3^4 = 81$.

61. Solution: [C]

$$4(2x - 3) + 5 = 3(x + 1) + 7$$

$$8x - 12 + 5 = 3x + 3 + 7$$

$$8x - 7 = 3x + 10$$

$$5x = 17$$

$$x = \frac{17}{5} = 3.4$$

Combining like terms and isolating x gives $5x = 17$, so $x = 3.4$.

62. Solution: [B] $x = 3$ or $x = -\frac{1}{2}$

The equation factors as $(2x + 1)(x - 3) = 0$, so $2x + 1 = 0$ gives $x = -\frac{1}{2}$ and $x - 3 = 0$ gives $x = 3$.

63. Solution: [A] $x \leq 6$

Multiply out: $3(2x - 5) = 6x - 15$ and $2(x + 4) + 1 = 2x + 9$, so $6x - 15 \leq 2x + 9 \Rightarrow 4x \leq 24 \Rightarrow x \leq 6$

64. Solution: [C] $1 \leq x \leq 3$

Multiplying by -1 flips the inequality to $2x^2 - 8x + 6 \leq 0$, dividing by 2 gives $x^2 - 4x + 3 \leq 0$, and factoring as $(x - 1)(x - 3) \leq 0$ shows x lies between 1 and 3 inclusive.

65. Solution: [B] $x = 9$

Multiplying each term by 12 gives $4(2x + 5) - 3(x - 1) = 2(3x + 7)$, which simplifies to $5x + 23 = 6x + 14$, hence $x = 9$.

66. Solution: [A, B, D]

Substitute each point (x, y) into $2x - 3y = 6$: for $(3, 0)$, $2(3) - 3(0) = 6$; for $(0, -2)$, $2(0) - 3(-2) = 6$; for $(-3, -4)$, $2(-3) - 3(-4) = 6$; the other choice does not satisfy the equation.

67. Solution: [A] Vertex $(2, -3)$, axis of symmetry $x = 2$

The vertex is found using $h = -\frac{b}{2a} = 2$ and $k = f(2) = 2(2)^2 - 8(2) + 5 = -3$, and the axis of symmetry is $x = 2$.

68. Solution: [A]

Eliminate y by adding the equations: $(x + y) + (2x - y) = 5 + 1$ gives $3x = 6$, so $x = 2$. Then $y = 5 - 2 = 3$, yielding the ordered pair $(2, 3)$.

This pair satisfies both equations because $2 + 3 = 5$ and $2 \cdot 2 - 3 = 1$.

69. Solution: [A]

The solid line $y = -x + 4$ includes its boundary so $y \leq -x + 4$, and the dashed line $y = 2x - 3$ excludes its boundary with the region above it, so $y > 2x - 3$.

70. Solution: [C]

1. Solve $x - y = 2$ for x : $x = y + 2$

2. Substitute into $3x + 2y = 16$: $3(y + 2) + 2y = 16$ gives $5y + 6 = 16$

3. Solve for y : $y = 2$

4. Back-substitute to find $x = y + 2 = 4$

The ordered pair is $(4, 2)$

Substitution turns the system into a single-variable equation, allowing y to be found first and then x .

71. Solution: [A] 3.47 minutes

Setting $1000e^{-0.2t} = 500$ gives $e^{-0.2t} = 0.5$, so $-0.2t = \ln(0.5)$ and $t = -\ln(0.5)/0.2 = \ln(2)/0.2 \approx 3.47$.

72. Solution: [D] $S(t) = 7t + 20$

$$m = \frac{76 - 20}{8 - 0} = 7 \text{ and } b = 20, \text{ so } S(t) = 7t + 20.$$

73. Solution: [A]

The slope is calculated as $m = \frac{27.50 - 12.50}{150 - 50} = 0.15$, and using the point $(50, 12.50)$ gives $b = 12.50 - 0.15 \times 50 = 5$, so the linear model is $P(T) = 0.15T + 5$.

74. Solution: [C]

Step 1: $a = -16$, $b = 64$, $c = 5$.

Step 2: Set $y(t) = 0 \Rightarrow -16t^2 + 64t + 5 = 0$.

Step 3: $t = \frac{-64 \pm \sqrt{64^2 - 4(-16)(5)}}{2(-16)} = \frac{-64 \pm \sqrt{4416}}{-32} = \frac{-64 \pm 8\sqrt{69}}{-32}$. Positive root gives $t \approx 4.08 \approx 4.1$.

The positive root is selected since negative time has no physical meaning.

75. Solution: [B] $C(t) = 80e^{-0.16t}$

Substituting $C(3) = 50$ into $80e^{3k} = 50$ gives $k = (\ln(50/80))/3 \approx -0.1567$, rounded to -0.16 , yielding the model $C(t) = 80e^{-0.16t}$.

76. Solution: [B] $g(x) = -3\sqrt{x+4} - 2$

Applying each transformation yields $\sqrt{x} \rightarrow \sqrt{x+4}$ (shift left 4), then $3\sqrt{x+4}$ (vertical stretch), then $-3\sqrt{x+4}$ (reflection), and finally $-3\sqrt{x+4}-2$ (shift down 2), which matches choice B.

77. Solution: [A] $P(m) = 2m + 2$

The slope is $\frac{10-2}{4-0} = 2$, so $P(m) = 2m + b$. Substituting $(0, 2)$ gives $2 = 2 \cdot 0 + b$, hence $b = 2$ and $P(m) = 2m + 2$.

78. Solution: [B] $C(s) = 0.5s + 50$

The slope is $\frac{300-150}{500-200} = 0.5$, so $C(s) = 0.5s + b$. Substituting $s = 200$ and $C = 150$ gives $150 = 0.5 \cdot 200 + b$, so $b = 50$.

79. Solution: [B]

The average rate of change is $(20-80)/(6-2) = -60/4 = -15$, so the concentration decreases by 15 ppm per hour.

80. Solution: [B] $C(s) = 0.3s + 45$

The slope is $\frac{90-60}{150-50} = 0.3$. Substituting $(50, 60)$ into $C(s) = 0.3s + b$ gives $60 = 0.3(50) + b$, so $b = 45$.

81. Solution: [A] 40°

The exterior angle theorem states that an exterior angle equals the sum of the measures of the two remote interior angles. Substituting gives $100 = 2x + 3x = 5x$, so $x = 20$. Therefore angle A measures $2x = 40$ degrees.

82. Solution: [A] $C = 2\pi r = 2 \times 3.14 \times 7 = 43.96$ feet

Substituting the radius into the circumference formula and using $\pi \approx 3.14$ yields 43.96 feet.

83. Solution: [C]

Area of rectangle = $12 \times 8 = 96$ sq ft

Area of semicircle = $\frac{1}{2} \times 3.14 \times 4^2 = 25.12$ sq ft

Total area = $96 + 25.12 = 121.12$ sq ft

The rectangle's area is found by multiplying its length and width, the semicircle's area is half the area of a circle with radius 4, and their sum gives 121.12 sq ft.

84. Solution: [A] $V = \pi r^2 h = 3.14 \times 5^2 \times 15 = 1177.5$ ft³

The radius is 5 ft, and substituting into $V = \pi r^2 h$ with $\pi \approx 3.14$ gives 1177.5 cubic feet.

85. Solution: [A] 10

The horizontal difference is 8 and the vertical difference is -6, so by the distance formula $d = \sqrt{8^2 + (-6)^2} = \sqrt{100} = 10$.

86. Solution: [B]

AB with DE and BC with EF are equal and the angle $\angle ABC = \angle DEF$ is included between those sides, so by the SAS criterion triangles ABC and DEF are congruent.

87. Solution: [A] $\frac{60}{360}\pi(8)^2 = \frac{1}{6}\pi \cdot 64 = \frac{64\pi}{6} = \frac{32\pi}{3}$

The sector area formula multiplies the fraction of the circle's 360° by πr^2 . Substituting 60° for θ and 8 for r gives $\frac{1}{6} \times 64\pi = \frac{32\pi}{3}$.

88. Solution: [A] $V = \frac{4}{3}\pi(5)^3 = \frac{500\pi}{3}$

Substituting the radius into $V = \frac{4}{3}\pi r^3$ gives $V = \frac{4}{3}\pi \times 125 = \frac{500\pi}{3}$.

89. Solution: [A] Step 1: $M(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$. Step 2: substituting $(2, -3)$ and $(10, 5)$ gives $M = \left(\frac{2 + 10}{2}, \frac{-3 + 5}{2}\right) = (6, 1)$

Explanation: The midpoint formula averages the x-coordinates $(2+10)/2=6$ and the y-coordinates $(-3+5)/2=1$, yielding the point $(6,1)$.

90. Solution: [A] $x = 10$

Corresponding angles formed by parallel lines and a transversal are congruent, so set $2x + 15 = 4x - 5$. Solving gives $20 = 2x$ and $x = 10$.

91. Solution: [A] 84

Step 1: Compute $S = 72 + 85 + 94 + 88 + 81 = 420$

Step 2: Compute $\bar{x} = \frac{S}{5} = 84$

92. Solution: [B]

Order the scores from least to greatest: 56, 64, 68, 72, 77, 85, 91. The middle value (fourth of seven) is 72, so the median is 72.

93. Solution: [A] 76

76 appears three times—more than any other score—so 76 is the mode.

94. Solution: [D] Range = $95 - 76 = 19$

The range is the difference between the highest score (95) and the lowest score (76), which equals 19.

95. Solution: [D] 3:2

Favorable outcomes = 6, unfavorable outcomes = 4, so odds in favor = 6 : 4 which simplifies to 3 : 2.

96. Solution: [C] Despite integration challenges, renewable energy adoption is accelerating due to cost competitiveness and environmental concerns.

The passage highlights technological advances and policy incentives that make solar and wind cost-competitive, notes installation growth despite grid and storage challenges, and emphasizes environmental and economic drivers for continued clean energy investment.

97. Solution: [B] Implementing practice tests that match the new 2025 format helps students improve confidence and performance.

The passage highlights how structured practice tests aligned with the updated ACT format enable students to manage time, build familiarity, and boost confidence, leading to better performance.

98. Solution: [D]

By reporting an average gain of three points after eight full-length tests over four weeks, the passage shows that consistent practice with tests mirroring the new format yields measurable improvements.

99. Solution: [A]

The passage emphasizes that taking multiple full-length digital practice exams helps students become familiar with on-screen navigation, timing, and the interface, leading to increased confidence with the new online ACT format.

100. Solution: [B]

The passage highlights that taking multiple full-length practice tests under realistic 2025 ACT conditions directly leads to an average two-point composite score gain, emphasizing measurable benefits of simulation.

101. Solution: [A]

The passage emphasizes realistic digital practice exams—timed navigation, interactive questions, multiple trials—and reports faster responses, fewer errors, and more confidence to recommend these tests for ACT preparation.

102. Solution: [A]

The passage emphasizes that consistent engagement with full-length digital practice exams produces measurable improvements in speed, time management, and sectional scores, highlighting the link between regular digital test practice and better test-day performance.

103. Solution: [A]

Data about sectional score gains, saved time, and higher engagement illustrates that regular use of personalized digital practice tools leads to measurable improvements in student performance and engagement.

104. Solution: [B]

The passage highlights ten full-length digital practice exams and reports a 12-second time reduction, a 3-point sectional gain, and a 30% confidence boost, emphasizing that regular, realistic digital simulations improve performance.

105. Solution: [A]

The passage highlights how regular use of full-length digital ACT simulations with analytics and timing tools leads to clear gains in scores, faster reading pace, and improved study efficiency.

106. Solution: [B] Analytical and objective

The author's use of precise metrics, objective language, and emphasis on numerical data without emotive or anecdotal vocabulary establishes a fact-based, analytical tone.

107. Solution: [A]

The passage uses statistical evidence and neutral, data-focused language to present the factual benefits of digital ACT practice modules, highlighting their advantages without persuasive or anecdotal elements.

108. Solution: [B]

The passage begins with objective, data-driven language emphasizing metrics and precision, then shifts to direct warnings and advisory language, marking a change from an analytical tone to a cautionary tone.

109. Solution: [A]

The passage emphasizes measurable improvements and maintains a neutral, data-driven tone, indicating the author aims to objectively inform readers about the widget's effectiveness.

110. Solution: [B]

The initial sentences use objective, data-focused language to present facts, whereas the final sentence adopts motivational phrasing that encourages and uplifts the reader, marking a shift from analytical to motivational tone.

111. Solution: [A]

The neutral tone and emphasis on precise metrics like response times and accuracy rates show an intent to objectively inform students about the revised Algebra section's features.

112. Solution: [A]

The passage emphasizes precise numerical data, systematic procedures, and excludes emotive or persuasive language, reflecting an analytical and informative tone.

113. Solution: [A]

The passage objectively lists technical descriptors and user-interface features, with no emotive or persuasive language, showing the author's intent is to inform about the new 2025 ACT Reading tools.

114. Solution: [A] Enthusiastic and persuasive

The passage's use of strong promotional adjectives ("revolutionary," "boost your scores overnight"), motivational expressions ("ignite student confidence," "master every question type"), and direct calls to action ("Don't miss the chance," "Enroll now") combines upbeat enthusiasm with persuasive urgency, reflecting an enthusiastic and persuasive tone.

115. Solution: [A]

The vivid emotional imagery without factual or instructional content underscores a nostalgic tone.

116. Solution: [C]

The context "infiltrating nearly every aspect" across multiple domains shows that social media is present everywhere, so ubiquitous means "found everywhere."

117. Solution: [A] Harmfully but subtly

Context clues such as "subtle erosion of focus" and users being "unaware," together with the contrast between compulsive checking and lack of awareness, point to a hidden, harmful effect rather than something sudden, open, or beneficial.

118. Solution: [B]

The passage links prolonged drought to economic instability and frames these outcomes as negative effects, indicating harm. Contextual cues in both climate and economic domains reinforce that “deleterious” means harmful.

119. Solution: [D]

The passage’s emphasis on devices integrating seamlessly into every room and daily routine indicates that “ubiquitous” means present everywhere.

120. Solution: [B]

The context describes formative assessment as the most important and noticeable tool guiding instruction, matching the meaning of “prominent.”

121. Solution: [D]

pragmatic means practical and realistic, as shown by the emphasis on feasible solutions under strict budget constraints and looming deadlines and prioritizing action over idealistic deliberation.

122. Solution: [B]

Context indicates “mitigate” refers to lessening harm to carbon emissions, so the closest meaning is alleviate.

123. Solution: [D]

Context clues like “without a hearing” and “denying him due process” show the expulsion is essentially equal in impact to refusing his rights, so “tantamount” means equivalent.

124. Solution: [D] Lucky

The context clues “fortuitous breakthrough” and “accidental discovery” associate the event with a chance occurrence yielding a positive result, matching the meaning lucky.

125. Solution: [A] Widespread

The context clues “in modern society” and “pervasive presence,” along with its constant influence on communication and identity across social communication and public discourse, show that ubiquitous means widespread.

126. Solution: [C]

Step 1: The primary claim is that community gardens revitalize urban areas by fostering collaboration among residents and strengthening neighborhood bonds.

Step 2: Supporting details:

1. They supply fresh produce to local markets.
2. They serve as hubs for workshops on nutrition and horticulture.
3. They encourage collaboration among residents, leading to stronger neighborhood bonds.

Step 3: The passage contains three sentences and references three themes: economic benefit, education, and social cohesion.

The detail in option C directly links collaboration among residents with stronger neighborhood bonds, thus best supporting the author’s claim.

127. Solution: [D] Patients no longer travel long distances for routine check-ups, leading to earlier detection of health issues.

This detail directly shows how telemedicine removes geographic barriers for rural patients, improving their access to healthcare.

128. Solution: [D]

This detail specifically mentions innovations in lithium-ion battery design increasing energy density to extend driving range and directly supports the author’s claim.

129. Solution: [D]

This detail explicitly quantifies how tax credits reduce the effective cost of solar installations by covering up to 30% of expenses.

130. Solution: [C]

This detail shows that insurance companies and government programs now reimburse virtual visits at the same rate as in-person appointments, directly demonstrating how policy changes make telemedicine financially accessible for patients.

131. Solution: [A]

Government rebates of up to \$7,500 lower purchase prices directly illustrate how government incentives reduce consumers' upfront costs.

132. Solution: [A]

Science shows the greatest improvement because its score increased from 23 to 30, a gain of 7 points, which exceeds the improvements in math (+5), reading (+4), and English (+3).

133. Solution: [A] 80 °C to 100 °C

The average increase per °C is highest in the 80–100 °C interval ($90.0 \text{ g} \div 20 \text{ °C} = 4.5 \text{ g/°C}$), which exceeds the rates in the other intervals.

134. Solution: [A]

Science shows an increase of 5 hours (from 2 to 7) between Week 1 and Week 6, which is greater than Math's +4, English's +3, and Reading's +3.

135. Solution: [A]

English shows the lowest average improvement of 1.5 correct answers per session, whereas Math, Reading, and Science each improve by 2 per session.

136. Solution: [B]

Math shows the highest average increase of 1.5 points per test, compared to 1.25 for Science and 1.0 for English and Reading.

137. Solution: [A]

Science has a total increase of 9 percentage points from Test 1 to Test 3, which over two intervals gives an average increase of 4.5% per test—higher than Math and Reading (4.0%) and English (3.0%).

138. Solution: [A]

The total decrease from 42 s to 30 s is 12 s while the score rises by 8 points, and $12 \text{ s} \div 8 \text{ points} = 1.5 \text{ seconds per point}$.

139. Solution: [D]

Test 4 shows the greatest discrepancy between reported and verified Math scores, with an absolute difference of 3, higher than any other test.

140. Solution: [C]

The total error change is -4 over 8 minutes, which is 4 two-minute intervals, so $-4 \div 4 = -1$ error per 2 minutes.

141. Solution: [D]

The raw score increases by 8 points from Test 1 to Test 5, which is four 2-point intervals; the scaled score also increases by 8 points, so each 2-point raw increase corresponds to an $8 \div 4 = 2$ -point scaled increase.

142. Solution: [A]

Random assignment of participants to the four sleep-duration groups ensures that individual differences are evenly distributed across conditions, so any observed differences in recall can be attributed to sleep duration rather than participant characteristics.

143. Solution: [A]

Random assignment of participants to study-strategy groups ensures differences in test scores are due to the strategies rather than individual student characteristics.

144. Solution: [d]

Including a placebo group receiving a sugar pill controls for participants' expectations by making both groups believe they might have ingested caffeine, thereby minimizing expectancy effects on reaction times.

145. Solution: [A] Fertilizer A will result in greater average shoot length than fertilizers B and C

This hypothesis directly links the independent variable (fertilizer type) to the dependent variable (shoot length) by predicting that treatment A yields the greatest growth.

146. Solution: [a]

Automating response scoring with a computer algorithm that uses unique participant codes most effectively controls for experimenter bias by standardizing scoring and preventing human influence on the measurement of recalled words.

147. Solution: [a]

Adjusting the yeast suspension to a set optical density ensures each culture begins with the same cell count, thereby minimizing variation in initial yeast population across treatments.

148. Solution: [a]

Using unique codes and a blinded assistant ensures that the person measuring does not know which treatment each plant received, thus preventing experimenter bias during data collection.

149. Solution: [a]

Write explanation.

Standardizing the enzyme solution to 5 U/mL ensures the enzyme concentration is identical across all treatments, so any observed rate differences can be attributed to pH rather than variations in enzyme amount.

150. Solution: [a]

Testers blinded to caffeine doses cannot be influenced by expectations when recording reaction times, preventing experimenter bias.

151. Solution: [c]

Standardizing each leaf disc to a surface area of 50 cm² ensures that leaf area is identical across treatments, so any differences in oxygen production can be attributed to light intensity rather than variation in leaf area.

152. Solution: [c] Representation of electron position as a probability distribution rather than a defined orbit

Electrons in the quantum mechanical model are described by wavefunctions that yield probability distributions (orbitals) instead of fixed circular paths. This probabilistic view of electron location is the key feature distinguishing it from the Bohr model.

153. Solution: [a]

Punctuated equilibrium is distinguished by rapid episodes of morphological change followed by long periods of stasis, unlike phyletic gradualism's slow, continuous accumulation of small changes.

154. Solution: [b]

General circulation models divide the atmosphere and oceans into three-dimensional grid cells and numerically solve fluid dynamics and thermodynamics equations to simulate interactions among wind patterns, heat transport, radiation, and moisture, unlike energy balance models that use simplified algebraic parameterizations.

155. Solution: [a]

The Many-Worlds Interpretation is distinguished by its rejection of wavefunction collapse and its deterministic branching of outcomes rather than a probabilistic collapse upon measurement.

156. Solution: [d]

Viewpoint B uniquely incorporates measured seafloor spreading rates and the role of subduction zones as quantified driving mechanisms for plate motion, whereas Viewpoint A lacks any such concrete mechanism.

157. Solution: [b]

Transmission of discrete heritable units that segregate to produce consistent ratios distinguishes Mendelian inheritance from the blended model, which posits continuous mixing and dilution of traits.

158. Solution: [a] Use of discrete storage compartments with specified residence times and time-dependent flux equations

This feature highlights B's division into multiple pools with measured residence times and dynamic flux equations, whereas A treats the system as a single steady-state compartment.

159. Solution: [d]

Defining heat as a form of energy transferable with mechanical work at a precise joule-to-calorie ratio sets the thermodynamic energy model apart by treating heat as energy rather than an indestructible fluid.

160. Solution: [a] Incorporation of the principle that cells arise only from pre-existing cells, supported by controlled sterilization experiments

The modern theory is defined by biogenesis, as demonstrated by Pasteur's swan-neck flask experiments that eliminated spontaneous generation under sterile conditions.

161. Solution: [d] Prediction of a residual cosmic microwave background with a blackbody spectrum consistent with a hot, dense origin

The Big Bang Model uniquely predicts a pervasive cosmic microwave background radiation with a near-perfect blackbody spectrum at about 2.7 K, reflecting a hot, dense early universe, whereas Steady State theory does not anticipate such residual radiation.

162. Solution: [d] $4 v_0$

The rate law $\text{rate} = k[A]^2$ means doubling $[A]$ multiplies the rate by $2^2 = 4$, so the new initial rate is $4 v_0$.

163. Solution: [d] 1000 mg/L

Since biomass production is directly proportional to nitrate concentration, doubling nitrate from 2.0 to 4.0 mg/L doubles phytoplankton biomass from 500 mg/L to 1000 mg/L.

164. Solution: [c] $0.75 v_0$

The initial rate at saturation is proportional to k_{nat} ; a 25% drop in k_{nat} from 100 s^{-1} to 75 s^{-1} reduces v_0 by 25%, giving $0.75 v_0$.

165. Solution: [d]

Because carbon fixation is directly proportional to CO₂ concentration, doubling CO₂ from 400 ppm to 800 ppm doubles the rate from 0.50 to 1.00 g C/L/day.

166. Solution: [d] 400 cells

Doubling every 6 days gives two doublings in 12 days, so $N = 100 \times 2^{12/6} = 100 \times 2^2 = 400$ cells.

167. Solution: [b]

Energy to herbivores = 500000 J × 0.20 = 100000 J

Energy to primary carnivores = 100000 J × 0.10 = 10000 J

Energy to secondary carnivores = 10000 J × 0.10 = 1000 J

168. Solution: [b] 3.3 m/s

A cold front lowers Station B's pressure to 985 mb, making the pressure difference $\Delta P = 1018 - 985 = 33$ mb. Using $V = 0.1 \times \Delta P$ gives $V = 0.1 \times 33 = 3.3$ m/s.

169. Solution: [b] 2.5 g/L

The red-spectrum LED increases the photosynthetic rate by 25%, so the yield becomes $2.0 \text{ g/L} \times 1.25 = 2.5 \text{ g/L}$.

170. Solution: [c] $C(4) = 80 e^{(-0.42 \cdot 4)} \approx 14.9 \text{ mg/L}$

The decay constant increases by 40% from 0.3 to 0.42, so substituting $k = 0.42$ and $t = 4$ into $C(t) = C_0 e^{(-kt)}$ gives $80 e^{(-1.68)} \approx 14.9 \text{ mg/L}$.

171. Solution: [d] 2.16 g/L

A 20% increase on 1.8 g/L gives $1.8 \times 1.20 = 2.16 \text{ g/L}$.

172. Solution: [c] had served the appetizers to them

The sequence of completed actions before the guests' arrival requires past perfect tense for all three verbs, so "had served" aligns with "had cooked" and "had set."

173. Solution: [a] is required

Each of the participants is a singular subject and requires the singular verb "is required."

174. Solution: [a] donated them to the museum

The compound subject "artwork and sculptures" is plural, so the pronoun must be plural ("them") to agree clearly.

175. Solution: [b] While walking through the museum, Sarah was captivated by the paintings.

This revision correctly attaches the modifying phrase to Sarah and clearly shows that Sarah, not the paintings, was walking through the museum.

176. Solution: [a] and providing additional practice questions

This choice restores parallelism by using three gerund phrases—revised timings, updated content, providing additional practice questions—throughout the list.

177. Solution: [d]

The introductory clause is properly set off with a comma and followed by the subject "the student" and verb "reviewed," creating a complete sentence.

178. Solution: [b]

This choice attaches the second idea with a participial phrase, eliminating the comma splice and keeping the sentence clear and concise.

179. Solution: [c] The committee drafted the proposal. They presented it to the board for final approval.

Separating the independent clauses into two sentences removes the comma splice by avoiding the run-on caused by the comma.

180. Solution: [d]

The noun requires a simple plural form so "plants" is correct without an apostrophe

181. Solution: [a]

The active verb comprise requires a direct object without "of," so "comprised ten interdisciplinary seminars" is the precise form.

182. Solution: [a]

Commas must enclose each appositive and separate list items. Option a correctly places commas before and after "Professor Chen, a climate scientist," matching the pattern of the list.

183. Solution: [d] Marcus meticulously outlined his research proposal; he deferred the final edits until after peer review

The semicolon correctly joins two independent clauses without a coordinating conjunction and eliminates the comma splice.

184. Solution: [c] The coach said the following: "Our victory reflects teamwork and dedication."

A colon correctly introduces the quotation because it follows an independent clause and signals the forthcoming direct speech.

185. Solution: [b]

Option b uses em dashes to set off the parenthetical phrase most effectively, clearly separating the main clause without confusion.

186. Solution: [b] the students' reading list

The term students is already plural, so the possessive requires only an apostrophe after the final s. students' correctly indicates that the reading list belongs to multiple students.

187. Solution: [c]

The clause "who graduated with honors" is nonrestrictive—it adds extra information about Jane Smith—so it should be set off with commas before and after the clause as in choice c.

188. Solution: [c]

Semicolons separate the three main items—each containing internal commas—preventing confusion and following proper punctuation rules.

189. Solution: [d] During orientation, the teacher introduced one rule: always be prepared to foster academic success.

This choice uses a colon to clearly signal that what follows elaborates the rule, making the sentence more readable and emphasizing the directive.

190. Solution: [b]

The sentence in choice b correctly uses em dashes with no spaces to enclose the parenthetical phrase, setting it off effectively.

191. Solution: [a]

The apostrophe before the s in volunteer’s correctly shows that the schedule belongs to a single volunteer.

192. Solution: [B]

By providing the subject “It” and the verb “was,” option B transforms the fragment into a complete sentence that clearly states how the drone prototype was powered.

193. Solution: [B] During the school assembly, the chemistry club prepared a demonstration; the students watched with interest, and they asked many questions afterwards.

This option uses a semicolon to separate two independent clauses and a comma before “and” to join the related actions, eliminating the run-on sentence.

194. Solution: [A]

All items are rendered as past-tense verbs (collected, painted, landscaped), ensuring a parallel list.

195. Solution: [A] Walking through the park during the early survey, the ornithologist spotted a rare bird.

This places the participial phrase next to “the ornithologist,” clearly indicating who was walking and avoiding the implication that the bird was walking.

196. Solution: [D]

Choice D uses active voice by making the director the subject who approves the team’s analysis, and it adds clarity by specifying whose analysis was approved.

197. Solution: [D]

Choice D begins with a different sentence element for variety, retains the original meaning, and avoids unnecessary wordiness or awkward modifiers.

198. Solution: [A]

The semicolon correctly separates the two independent clauses without creating a run-on, preserving the original meaning.

199. Solution: [D]

Option D places the participial phrase “hoping to understand the complex results” directly after “attendees,” creating a clear, concise connection between their questions and their purpose.

200. Solution: [C] outlined the research goals, but the group members were unsure of how to begin

This correction replaces the comma splice with a coordinating conjunction and comma to join the two independent clauses and maintain the original meaning.

201. Solution: [A]

Maintains a consistent gerund pattern (swimming, hiking, and reading) to correct the faulty parallelism while preserving the original meaning.

202. Solution: [C] spent an hour discussing the plan before making a final decision

Choice C eliminates redundant wording (“in a detailed and thorough manner”) while preserving the original meaning in the most concise form.

203. Solution: [C]

The language of the announcement is upbeat and positive—terms like brand-new, organic, artisanal, and exotic convey excitement and eagerness about the new menu, indicating an enthusiastic tone.

204. Solution: [C] the author wrote ten full-length tests for students to finish during the timed section

Redundant words such as “total,” “in their entirety,” and “completely” are removed while preserving the original meaning.

205. Solution: [D] candidates must follow each section’s instructions and complete every part within the allotted time

This choice removes redundant modifiers like strictly and exception while preserving the key requirements in a concise, clear statement.

206. Solution: [A]

The tone shifts at “however, let’s be real:” where the formal instructional style gives way to informal, conversational language.

207. Solution: [D]

Choice D replaces “due to the fact that” with “because,” eliminating redundancy while preserving clarity and the original meaning.

208. Solution: [A]

The statement expresses doubt and lack of belief in the plan’s success, conveying a skeptical tone.

209. Solution: [D]

The revision replaces a wordy phrase with “despite missing several key examples,” which is the most concise way to convey the original meaning without redundancy.

210. Solution: [C]

This phrase shifts from neutral analysis to a personal critique by injecting subjective judgment.

211. Solution: [C]

This choice uses “so” to connect the clauses and omits “decided to,” making the sentence more concise without changing the meaning.

212. Solution: [A]

The sentence uses “Nevertheless” to contrast the disappointing revenue news, highlighting the marketing team’s resilience and optimistic outlook.

213. Solution: [D]

It signals a shift from discussing challenges to highlighting successes.

214. Solution: [B]

The sentence uses however to contrast the progress made with the ongoing necessity for incentives, highlighting the continued support required.

215. Solution: [B]

The sentence’s use of “However” signals a contrast between rapid battery innovation and lagging infrastructure, highlighting the obstacle that the next sentence’s solutions aim to address.

216. Solution: [A]

It notes a drawback that contrasts the benefits of online learning.

217. Solution: [A]

It introduces a contrasting issue that must be addressed for renewable integration to succeed

218. Solution: [A]

It introduces a contrasting limitation that test-takers must address by highlighting how students underestimate the importance of timing practice, countering the first sentence's focus on structured strategies.

219. Solution: [C] It introduces a contrasting challenge that students must address for effective pacing

The sentence employs the transition "Yet" to signal a contrast, highlighting a common oversight by students and setting up the need for sectional time-tracking tools to improve pacing.

220. Solution: [C]

The sentence presents a contrast by showing the problem that arises when full-length simulations are not integrated, highlighting the negative consequence of overlooked practice.

221. Solution: [C]

It emphasizes a new adaptation students must make for accurate simulation.

222. Solution: [B] 32

Dividing 459 by 14 gives quotient 32 because $14 \times 32 = 448$ and remainder $459 - 448 = 11$

223. Solution: [D] 8

168 factors as $2^3 \times 3 \times 7$, giving $(3 + 1)(1 + 1)(1 + 1) = 16$ divisors. Each factor pair (a, b) with $a \leq b$ uses two divisors, so there are $16/2 = 8$ distinct pairs.

224. Solution: [D]

$$\frac{5}{6} = \frac{20}{24}, \quad \frac{7}{8} = \frac{21}{24}, \quad \frac{1}{3} = \frac{8}{24}$$

$$\frac{5}{6} - \frac{7}{8} + \frac{1}{3} = \frac{20 - 21 + 8}{24} = \frac{7}{24}$$

Finding the least common denominator of 6, 8, and 3 gives 24. Converting each fraction to twenty-fourths and combining the numerators yields $\frac{7}{24}$.

225. Solution: [D] $8x^2y^2$

Combine the coefficients $4 \times 2 = 8$ and add exponents: $x^{3+(-1)} = x^2$, $y^{-2+4} = y^2$, giving $8x^2y^2$

226. Solution: [A] $6\sqrt{2}$

Express each radical in terms of $\sqrt{2}$: $\sqrt{50} = 5\sqrt{2}$, $\sqrt{18} = 3\sqrt{2}$, $\sqrt{8} = 2\sqrt{2}$. Then $5\sqrt{2} + 3\sqrt{2} - 2\sqrt{2} = (5 + 3 - 2)\sqrt{2} = 6\sqrt{2}$.

227. Solution: [C] $3^3 \times 5 \times 7$

945 divided by 3 three times gives 35, then dividing by 5 leaves 7, so the prime factors are 3^3 , 5, and 7.

228. Solution: [C] $5\frac{3}{4}$

Dividing 23 by 4 gives a quotient of 5 and a remainder of 3, so the mixed number is $5\frac{3}{4}$.

229. Solution: [C]

First compute $2^3 = 8$, then compute $5^2 = 25$. Multiply to get $8 \times 25 = 200$ and divide by 10 to arrive at 20.

230. Solution: [A] 42

The GCF is found by comparing prime factorizations: $84 = 2^2 \times 3 \times 7$ and $126 = 2 \times 3^2 \times 7$, taking the common bases 2, 3, and 7 with their minimum exponents (1, 1, 1) gives $2^1 \times 3^1 \times 7^1 = 42$.

231. Solution: [A]

The least common multiple of 45 and 60 is obtained by taking the highest powers of all primes in their factorizations: 2^2 , 3^2 , and 5^1 . Multiplying these gives $4 \times 9 \times 5 = 180$.

232. Solution: [C]

1. Distribute on both sides: $3x - 6 + 4 = 2x + 6 - 5$
2. Combine like terms: $3x - 2 = 2x + 1$
3. Subtract $2x$ from both sides: $x - 2 = 1$
4. Add 2 to both sides: $x = 3$
5. Isolate x : $x = 3$

Subtracting $2x$ then adding 2 isolates x ; $x = 3$, so choice C.

233. Solution: [C]

$$6x^2 - 13x + 5 = 6x^2 - 10x - 3x + 5 = 2x(3x - 5) - 1(3x - 5) = (3x - 5)(2x - 1)$$

$$3x - 5 = 0 \implies x = \frac{5}{3}, \quad 2x - 1 = 0 \implies x = \frac{1}{2}$$

Factoring uses two numbers (-10 and -3) whose product is $6 \cdot 5$ and sum is -13 , grouping yields the binomials whose zeros give the listed solutions.

234. Solution: [C]

The boundary is dashed because of " $>$ ", with slope -2 and y -intercept 3. Testing $(0, 0)$ gives $0 > 3$ false, so shade the half-plane above the line.

235. Solution: [A] $(2, 3)$

1. Compute the discriminant: $\Delta = (-5)^2 - 4 \cdot 1 \cdot 6 = 25 - 24 = 1$.

2. Find the roots:

$$x = \frac{5 \pm \sqrt{1}}{2} = 3 \text{ or } 2.$$

3. The parabola $y = x^2 - 5x + 6$ opens upward since $a = 1 > 0$.

4. The test intervals are $(-\infty, 2)$, $(2, 3)$, $(3, \infty)$.

5. Testing $x = 0$ gives $y = 6 > 0$; $x = 2.5$ gives $y = -0.25 < 0$; $x = 4$ gives $y = 2 > 0$.

Therefore the solution of $x^2 - 5x + 6 < 0$ is $(2, 3)$.

236. Solution: [B]

1. Apply the distributive property: $3(2x - 4) = 6x - 12$.

2. Combine like terms on the left: $6x - 12 - 5 = 6x - 17$, so the equation is $6x - 17 = 7x + 1$.

3. Subtract $7x$ from both sides: $-x - 17 = 1$.

4. Add 17 to both sides: $-x = 18$.

5. Divide both sides by -1 : $x = -18$. Substitution yields $3(2(-18) - 4) - 5 = -125$ and $7(-18) + 1 = -125$.

The distributive property and like terms simplification lead to $-x = 18$, and dividing by -1 gives $x = -18$, which checks correctly in the original equation.

237. Solution: [C] Infinitely many solutions satisfying

$$x + y = 5$$

Step 1: Scaling the first equation by 2 gives

$$2x + 2y = 10$$

, which matches the second equation.

Step 2: Since both equations are identical, they do not provide independent constraints.

Step 3: The system is consistent and dependent, so it has infinitely many solutions.

Step 4: Solve for y to get $y = 5 - x$, so the solution set is $\{(x, 5 - x) \mid x \in \mathbb{R}\}$.

Step 5: For example, $(2, 3)$ yields $2 + 3 = 5$ and $2 \cdot 2 + 2 \cdot 3 = 10$, confirming the result.

238. Solution: [A]

Completing the square gives $(x - 5)^2 = 4$, so $x - 5 = \pm 2$ and $x = 3$ or 7 which satisfy the original equation.

239. Solution: [B]

Using the inequality $50 + 0.25m \leq 100$ leads to $0.25m \leq 50$ and hence $m \leq \frac{50}{0.25} = 200$. Thus the student can drive at most 200 miles without exceeding the budget.

240. Solution: [A] $x = 1, 2/3$

$a = 3, b = -5, c = 2$.

$$\Delta = b^2 - 4ac = (-5)^2 - 4(3)(2) = 25 - 24 = 1$$

$$\sqrt{\Delta} = 1.$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-(-5) \pm 1}{6} = \frac{5 \pm 1}{6}$$

so $x = 1$ or $x = \frac{2}{3}$.

241. Solution: [C] $x = 1$

Multiplying both sides by $x + 3$ gives

$$4x - 1 = 2(x + 3) - 5 = 2x + 1.$$

Solving $4x - 1 = 2x + 1$ yields $2x = 2$ and $x = 1$, which does not make the denominator zero.

242. Solution: [A] (2, -1)

1. Identify coefficients: $a = 1$, $b = -4$, $c = 3$
2. Compute $x_v = -(-4)/(2 \cdot 1) = 2$
3. Compute $y_v = f(2) = 2^2 - 4 \cdot 2 + 3 = -1$
4. Vertex = (2, -1)

The vertex formula gives $x_v = 2$ and substituting into f yields $y_v = -1$, so the vertex is (2, -1).

243. Solution: [A]

The revenue function is $R(x) = x(80 - 0.2x) = 80x - 0.2x^2$, so $a = -0.2$ and $b = 80$. The vertex occurs at $x = -\frac{b}{2a} = -\frac{80}{2(-0.2)} = 200$. Then $R(200) = 200(80 - 0.2 \cdot 200) = 200 \cdot 40 = 8000$.

244. Solution: [B]

1. Determine slope of f : $\frac{5 - 2}{3 - 0} = 1$
2. Write $f(x) = 1x + 2$, so $f(x) = x + 2$
3. Determine slope of g : $\frac{0 - 8}{4 - 0} = -2$
4. Write $g(x) = -2x + 8$, so $g(x) = -2x + 8$
5. Solve $f(x) = g(x)$:
 $x + 2 = -2x + 8 \implies 3x = 6 \implies x = 2$
6. Substitute $x = 2$ into f :
 $y = 2 + 2 = 4$

Intersection point is (2,4)

Both functions have been written in slope-intercept form and set equal to find $x=2$, then $y=4$, giving the point (2,4).

245. Solution: [D]

1. $f'(x) = 3x^2 - 12x + 9$

2. $3x^2 - 12x + 9 = 0$ gives $x = 1, 3$

3. sign chart on f' : positive for $x < 1$, negative for $1 < x < 3$, positive for $x > 3$, so local maximum at $x = 1$

4. $f(1) = 1 - 6 + 9 + 2 = 6$, local maximum at (1,6)

The first derivative goes from positive to negative at $x = 1$, and evaluating the function there yields the local maximum (1,6)

246. Solution: [C] $V(t) = -2000t + 30000$

The slope $m = \frac{24000 - 30000}{3 - 0} = -2000$. Since $V(0) = 30000$, $b = 30000$, giving $V(t) = -2000t + 30000$.

247. Solution: [A]

The x-intercepts are at 1 and 3, the vertex at (2, -1) lies below the x-axis, so $f(x) \leq 0$ for all x between and including 1 and 3.

248. Solution: [B] $V(t) = 1200(1 - 0.20)^t = 1200(0.8)^t$;
 $V(3) = 1200 \cdot (0.8)^3 = 1200 \cdot 0.512 = \614.40

An exponential depreciation model reduces the value by 20% each year, so the value after 3 years is the initial \$1,200 multiplied by $(0.8)^3$, yielding \$614.40.

249. Solution: [A] $\left[2 - \frac{\sqrt{11}}{2}, 2 + \frac{\sqrt{11}}{2}\right]$

Formulate $-16t^2 + 64t + 80 \geq 100$, rearrange to $-16t^2 + 64t - 20 \geq 0$, solve $-16t^2 + 64t - 20 = 0$ yielding $t = 2 \pm \frac{\sqrt{11}}{2}$, and since the parabola opens downward the expression is nonnegative between these roots.

250. Solution: [D] shift left 1, horizontal compression by factor 1/3, reflect over the x-axis, vertical stretch by factor 2, shift up 5

The term $x+1$ shifts left 1, multiplication by 3 inside compresses horizontally by 1/3, the -2 reflects across the x-axis and stretches vertically by 2, and the $+5$ shifts the graph up 5.

251. Solution: [B]

1. Formulate the inequality $-x^2 + 50x - 600 \geq 0$.

2. Multiply both sides by -1 (reversing the inequality) to get $x^2 - 50x + 600 \leq 0$.

3. Solve $x^2 - 50x + 600 = 0$ using the quadratic formula:

$$x = \frac{50 \pm \sqrt{50^2 - 4 \cdot 1 \cdot 600}}{2} = \frac{50 \pm 10}{2},$$

yielding roots $x = 20$ and $x = 30$.

4. Because the parabola $x^2 - 50x + 600$ opens upward, the inequality $x^2 - 50x + 600 \leq 0$ holds for $20 \leq x \leq 30$.

The profit function $P(x)$ is nonnegative exactly between the roots $x = 20$ and $x = 30$, so the break-even region is $[20, 30]$.

252. Solution: [A] 80°

Let $\angle C = x$ so $\angle B = 2x$. By the triangle-sum property, $60^\circ + 2x + x = 180^\circ$, giving $3x = 120^\circ$ and $x = 40^\circ$. Hence $\angle B = 2x = 80^\circ$.

253. Solution: [C] 40 inches

Legs AC and BC give hypotenuse $AB = \sqrt{8^2 + 15^2} = 17$ inches, and the perimeter is $8 + 15 + 17 = 40$ inches.

254. Solution: [D]

1. Identify the radius $r = 7$ inches

2. Recall the circle area formula: $\text{Area} = \pi r^2$
3. Compute $r^2 = 7^2 = 49$
4. Multiply by π to obtain the area: $\text{Area} = 49\pi$ square inches

Substitute the given radius into the formula and simplify to get 49π .

255. Solution: [B] 100π cubic inches

Using $V = \frac{1}{3}\pi r^2 h$ with $r = 5$ and $h = 12$ yields $V = \frac{1}{3}\pi \times 25 \times 12 = 100\pi$.

256. Solution: [D] 10

1. Identify $x_1 = -3$, $y_1 = 4$, $x_2 = 5$, $y_2 = -2$
2. Apply the distance formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
3. Compute $\Delta x = 5 - (-3) = 8$ and $\Delta y = -2 - 4 = -6$
4. Compute $(\Delta x)^2 + (\Delta y)^2 = 8^2 + (-6)^2 = 64 + 36 = 100$
5. Take the square root: $d = \sqrt{100} = 10$

The distance formula yields 10 as the length of segment AB.

257. Solution: [A] Right isosceles triangle

Distances are $AB = 4$, $AC = 4$, and $BC = 4\sqrt{2}$. Since $AB^2 + AC^2 = BC^2$, the triangle is right, and with two equal sides it is isosceles.

258. Solution: [A] 14π inches

The circumference formula is $C = 2\pi r$. Substituting $r = 7$ yields $C = 2\pi \times 7 = 14\pi$ inches.

259. Solution: [A] 180 cubic feet

The volume formula is $V = l \times w \times h$. Substituting $l = 12$, $w = 5$, and $h = 3$ gives $V = 12 \times 5 \times 3 = 180$ cubic feet.

260. Solution: [B]

The midpoint is found by averaging the x-coordinates $\frac{-2+6}{2} = 2$ and the y-coordinates $\frac{5+(-3)}{2} = 1$, so $M = (2, 1)$.

261. Solution: [B]

$$(2x + 15) + (3x - 5) = 180$$

$$5x + 10 = 180$$

$$5x = 170$$

$$x = 34$$

Angles A and B are consecutive interior angles formed by a transversal cutting parallel lines and thus supplementary, so their measures sum to 180 degrees, yielding $x = 34$.

262. Solution: [C] $\sum_{i=1}^8 x_i = 665$, $\bar{x} = \frac{665}{8} = 83.125$

The mean is found by adding all eight scores to get 665 and then dividing by 8 to yield 83.125.

263. Solution: [D]

The scores in order are 620, 640, 680, 690, 705, 710, 730, 750, 770. With $n = 9$, the median position is $\frac{9+1}{2} = 5$, and the 5th value is 705.

264. Solution: [D]

Frequencies of the scores are 88 (3), 92 (3), and all others once. Among the answer choices only 92 attains the highest frequency, so the mode is 92.

265. Solution: [C] 10

The maximum value is 24 and the minimum is 14, so the range is $24 - 14 = 10$.

266. Solution: [B] 3:7

Total marbles $T = 5 + 3 + 2 = 10$, favorable $F = 3$, unfavorable $U = T - F = 7$, so odds in favor are 3 : 7.

267. Solution: [B]

The passage emphasizes that improvements in air and water quality correlate more strongly with individual behaviors—like reduced car idling, recycling, and mindful energy use—than with infrastructure or policy changes, highlighting the critical role of personal habits.

268. Solution: [A]

The passage emphasizes how algorithmic personalization shapes users' content feeds, fostering connections among like-minded individuals while creating echo chambers, highlighting the impact of algorithm-driven content distribution on community building and individual interactions.

269. Solution: [C] Regular synchronous virtual lectures markedly improve student outcomes compared to asynchronous learning modules

Write explanation.

The passage reports that across 15 high schools, students attending at least three synchronous virtual lectures per week scored 12% higher on assessments than those using only asynchronous modules, highlighting that structured real-time interaction enhances comprehension and retention.

270. Solution: [B] Urban design strategies and community programs can alleviate chronic stress in city environments.

The passage lists noise pollution, overcrowding, and limited green spaces as stressors, then describes how parks, noise barriers, pedestrian zones, and community programs improve psychological resilience, uniting problem and solution.

271. Solution: [C]

Integrating project-based learning modules into STEM curricula across eight schools produced a 20% boost in critical thinking, a 15% rise in collaborative problem-solving, and a 10% gain in content retention compared to lecture-only methods, showing substantial improvements in multiple student performance metrics.

272. Solution: [C]

The passage highlights both remote work's benefits and challenges and shows that deliberate organizational policies—like structured meetings and wellness programs—are needed to balance these factors.

273. Solution: [B] Flipped classroom models significantly enhance multiple student performance metrics compared to traditional lectures.

The passage presents comparative data showing that a flipped classroom approach in ten high schools led to notable improvements in exam scores, student engagement, and homework efficiency, making clear that the flipped model outperforms traditional lectures.

274. Solution: [B] Implementing AI-driven learning platforms requires balanced policies to maximize benefits and address challenges

The passage highlights measurable gains (completion, scores, satisfaction) alongside privacy, access, and interaction challenges, then shows how targeted policies (privacy frameworks, device grants, teacher alignment) mitigate risks, underscoring the need for a balanced approach.

275. Solution: [A]

The passage details how implementing project-based learning in fifteen high schools—supported by teacher workshops, cross-disciplinary teams, and business partnerships—led to a 22% rise in critical-thinking scores, a 16% boost in collaborative skills, and a 14% drop in dropout rates, showing that such pedagogical integration yields measurable improvements in student outcomes and retention.

276. Solution: [B] Effective STEM integration relies on both instructional innovation and systemic logistical strategies

Instructional innovations like peer-led training and rotating lab schedules addressed limited teacher training and uneven lab access, driving measurable gains in proficiency, participation, and engagement.

277. Solution: [D]

The author acknowledges that online platforms have advantages but highlights evidence of higher retention in face-to-face settings and warns against over-reliance on automated systems, downplaying the role of purely online learning in maintaining long-term retention.

278. Solution: [C] Critical and analytical

The passage uses evaluative terms such as critiques and inefficient, cites empirical data to support claims, and contrasts study methods, reflecting a critical and analytical tone.

279. Solution: [B]

The first passage uses emotive narratives to persuade readers to support increased arts funding, while the second passage presents charts and statistical data to inform readers about current funding trends.

280. Solution: [A]

The author's use of positive evaluative descriptors ("enhances," "improves"), upbeat statistical evidence ("20% increase"), and focus on benefits conveys an enthusiastic and optimistic tone.

281. Solution: [B]

The vivid sensory imagery (creaking swing, violet sky, flapping banners) combined with emotive descriptors (unease, hollow) and reflective hints of forgotten secrets work together to create an eerie atmosphere and suggest a mysterious event is forthcoming.

282. Solution: [A] Thorough and precise

Clues such as cross-referencing every variable, the mention of diligence, and identifying anomalies early indicate careful, precise attention to detail.

283. Solution: [A]

Context contrasts tangential remarks with the central concept, showing the remarks were irrelevant or off-topic.

284. Solution: [A] To make something better or improve

The context shows that amendments led to renewed confidence and project viability, indicating that to ameliorate means to improve or make better.

285. Solution: [B] Found everywhere

Clues like "barely notice them" and "profoundly influences behavior" show the cameras are present everywhere.

286. Solution: [A]

The context of mixing correlation and causation shows that "conflate" means to combine two distinct things into a single entity.

287. Solution: [D]

The context contrasts empty slogans with actionable steps, showing the messaging was superficial and trite, so “platitudinous” means overused and lacking originality.

288. Solution: [A]

The term “admonitory” here means expressing reproach or warning, as shown by the alienation of applicants.

289. Solution: [A]

The refusal to allow any extensions or adjustments despite unforeseen challenges and the students’ resulting frustration show a firm, unyielding position, indicating “intransigent” means unwilling to change one’s views or consider alternatives.

290. Solution: [B]

Context clues highlight the manager’s unpredictable, mood-driven directives causing confusion, so “capricious” means guided by sudden changes in mood or behavior.

291. Solution: [C]

The phrase “vanish after a brief period” directly signals that ephemeral means lasting for only a short time.

292. Solution: [C] Occurring in small stages.

The reference to each change yielding only a small efficiency boost and their cumulative impact signals gradual, step-by-step improvements.

293. Solution: [B]

The passage highlights pervasive use and constant presence in everyday life, indicating ubiquitous means present or appearing everywhere.

294. Solution: [B]

The contrast between captivating listeners and quickly fading suggests that ephemeral means lasting for a very short time.

295. Solution: [B]

The summary's clear, persuasive presentation leaving little room for doubt shows that "cogent" means convincing and well reasoned.

296. Solution: [D]

The context of obscure iconography and the general audience's difficulty infers that "esoteric" means understood only by a select few with specialized knowledge.

297. Solution: [A]

The longitudinal study reporting a 20% increase in quiz scores after modules were introduced provides the specific empirical measure of student retention improvement.

298. Solution: [C]

The year-over-year 15% increase in project completion rates directly quantifies the productivity gain linked to flexible work schedules.

299. Solution: [D]

1. The primary claim is that planting cover crops during fallow seasons significantly enhances soil fertility.

2. Listed supporting details: a randomized field trial showing a 25% increase in soil nitrogen levels after cover crop rotation; recorded farmer testimonials noting stronger subsequent crop growth; contrasting soil assay results from fields left fallow; and a meta-study of 40 agricultural experiments.

3. The detail that directly quantifies improvement is the randomized field trial's 25% increase in soil nitrogen.

4. The selected detail is the randomized field trial showing a 25% increase in soil nitrogen levels after cover crop rotation.

The randomized field trial provides specific empirical data quantifying the increase in soil nitrogen, directly supporting the claim about enhanced soil fertility.

300. Solution: [C]

This detail provides a specific measurement of a 30% decrease in CO₂ output over 12 months, directly quantifying the reduced carbon footprint.

301. Solution: [A]

1. Conclusion: expanding green roofs improves downtown air quality.
2. Supporting details: continuous air particle measurements showing a 20% reduction in airborne particulates; seasonal health clinic admissions for respiratory issues; sensor network data on ambient temperature changes; a comprehensive review of academic studies linking urban greenery to air pollution mitigation.
3. The direct quantifier of air quality improvement is the continuous air particle measurements.
4. That detail specifies a 20% reduction in airborne particulates.

The continuous air particle measurements provide a precise percentage reduction in airborne particulates, directly supporting the conclusion of improved air quality.

302. Solution: [B]

1. Primary claim: switching to an all-organic feed regimen significantly improved overall animal health
2. Supporting details: herd morbidity rates, weekly weight monitoring logs, veterinary treatment records, third-party consultant observations
3. Detail quantifying change: herd morbidity rates
4. Specific percentage data: a recorded 15% decrease in herd morbidity rates over six months

A recorded 15% decrease in herd morbidity rates over six months directly quantifies the improvement in animal health asserted by NaturalFoods.

303. Solution: [C]

Calculate solar output per inch of rainfall for each month: January $500/2=250$ February $480/1.5\approx 320$ March $530/2.5=212$ April $550/3\approx 183$ May $600/1=600$ June $580/2=290$ and observe that May has the highest value

304. Solution: [C]

1. Enzyme activities: $20^{\circ}\text{C}=4.8$, $30^{\circ}\text{C}=6.4$, $40^{\circ}\text{C}=8.9$, $50^{\circ}\text{C}=8.2$, $60^{\circ}\text{C}=5.9$ units/mL
2. Activity changes: $6.4-4.8=1.6$, $8.9-6.4=2.5$, $8.2-8.9=-0.7$, $5.9-8.2=-2.3$ units/mL
3. Rates per $^{\circ}\text{C}$: $1.6/10=0.16$, $2.5/10=0.25$, $-0.7/10=-0.07$, $-2.3/10=-0.23$ units/mL/ $^{\circ}\text{C}$
4. Highest rate is 0.25 units/mL/ $^{\circ}\text{C}$ between 30°C and 40°C , so the answer is 40°C

The increase of 2.5 units over the 10°C interval from 30°C to 40°C yields the greatest per-degree rise.

305. Solution: [A]

1. Monday: foot traffic = 120, sales = \$3000; Tuesday: 150, \$3500; Wednesday: 130, \$3800; Thursday: 160, \$4100; Friday: 170, \$4200.
2. Monday: $3000/120 = 25$; Tuesday: $3500/150 \approx 23.33$; Wednesday: $3800/130 \approx 29.23$; Thursday: $4100/160 = 25.625$; Friday: $4200/170 \approx 24.71$.
3. The largest ratio is 29.23.
4. Wednesday

Wednesday has the highest sales revenue per visitor ratio at approximately \$29.23 per hundred visitors.

306. Solution: [C]

January: $5.0/3.0 \approx 1.67$, February: $6.0/2.5 = 2.40$, March: $7.0/3.2 \approx 2.19$, April: $8.0/3.8 \approx 2.11$, May: $9.0/4.0 = 2.25$, June: $10.0/3.5 \approx 2.86$. The largest ratio is for June.

The month with the highest sun-hours-per-inch-of-rainfall ratio is June.

307. Solution: [A]

Student A: $85/10 = 8.5$, Student B: $90/15 = 6$, Student C: $78/8 = 9.75$, Student D: $88/12 \approx 7.33$, Student E: $70/5 = 14$. The highest ratio is 14 for Student E.

Explanation

By dividing each student's test score by their study hours, Student E's ratio of 14 is the greatest among all students.

308. Solution: [D]

Monday $2200/45 \approx 48.9$, Tuesday $2100/50 = 42$, Wednesday $2300/40 = 57.5$, Thursday $2000/55 \approx 36.4$, Friday $2400/35 \approx 68.6$; Friday has the highest ratio.

309. Solution: [B]

Calculating composite score per practice question yields 0.575 for Week 1, 0.433 for Week 2, 0.3625 for Week 3, 0.32 for Week 4, 0.283 for Week 5 and 0.25 for Week 6; the highest ratio is in Week 1

310. Solution: [C]

1. Reported vs actual hours

Monday: 5.0 h vs 4.5 h

Tuesday: 6.0 h vs 5.5 h

Wednesday: 4.0 h vs 2.5 h

Thursday: 5.5 h vs 5.0 h

Friday: 6.5 h vs 6.0 h

2. Absolute differences

Monday: 0.5 h

Tuesday: 0.5 h

Wednesday: 1.5 h

Thursday: 0.5 h

Friday: 0.5 h

3. Percentage discrepancies

Monday: $\frac{0.5}{5.0} \times 100 = 10\%$

Tuesday: $\frac{0.5}{6.0} \times 100 \approx 8.3\%$

Wednesday: $\frac{1.5}{4.0} \times 100 = 37.5\%$

Thursday: $\frac{0.5}{5.5} \times 100 \approx 9.1\%$

Friday: $\frac{0.5}{6.5} \times 100 \approx 7.7\%$

4. Highest discrepancy on Wednesday

Wednesday shows the largest percentage discrepancy at 37.5 %.

311. Solution: [C]

1. List each section's accuracy rate and time spent.
2. Compute the efficiency ratio using accuracy percentage/time.
3. Calculate each ratio numerically: English $80/30 \approx 2.67$, Math $75/40 \approx 1.88$, Reading $85/35 \approx 2.43$, Science $70/25 = 2.8$, Writing $90/20 = 4.5$.
4. Compare all ratios and identify the largest value, which is Writing.

312. Solution: [B]

The rate for each section is calculated as correct answers divided by time: English = $42/35 = 1.2$, Math = $38/40 = 0.95$, Reading = $29/35 \approx 0.83$, Science = $24/25 = 0.96$. English yields the highest rate.

313. Solution: [D]

Temperature was kept constant at 22 °C across all light treatments, ensuring that any differences in seedling growth rate result from changes in light intensity rather than temperature variations.

314. Solution: [A]

Average seedling height

The dependent variable is the outcome measured to assess the effect of fertilizer concentration. Average seedling height is recorded as the response, while fertilizer concentration is the independent variable and water volume and pot size are held constant.

315. Solution: [d]

Students using traditional flashcards for 30 minutes each day serve as the control group because they receive the standard method against which the spaced repetition intervention is compared.

316. Solution: [b] Sleep latency increases as evening screen time increases.

This directional alternative hypothesis reflects the expected positive relationship between hours of screen exposure before bedtime and the time it takes adolescents to fall asleep.

317. Solution: [a]

The independent variable is the type of morning activity (exercise vs reading) because it is the condition that is deliberately manipulated to observe its effect on memory recall.

318. Solution: [a]

The percentage of correct responses on the multiple-choice quiz is the measured outcome that depends on the noise level, making it the dependent variable.

319. Solution: [b] Participants' average nightly sleep hours

Varied sleep patterns across participants could influence comprehension scores independent of light intensity, confounding the results.

320. Solution: [b]

Group sitting quietly for an equivalent duration with no meditation serves as the control group because it receives no mindfulness treatment and provides a baseline for comparing stress-level changes.

321. Solution: [a]

Incubation temperature is the factor deliberately varied by the researcher to observe its effect on enzyme activity.

322. Solution: [a]

Variations in ambient light exposure among participants could affect sleep quality independently of screen use, introducing a confounding variable.

323. Solution: [d]

Occasional large-angle scattering of alpha particles by thin gold foil most directly supports the Rutherford Model since only a small, dense, positively charged nucleus could cause rare but significant deflections.

324. Solution: [a]

Detection of antibiotic-resistant colonies before any antibiotic exposure indicates that resistance arises from random mutations present prior to selection, supporting the Darwinian model of natural selection acting on preexisting variation rather than the Lamarckian idea of traits acquired in response to the environment.

325. Solution: [c] Measurement of stratospheric cooling at ~ 0.5 °C per decade concurrent with tropospheric warming of ~ 0.2 °C per decade.

Write explanation.

The fingerprint of increased greenhouse gases is warming the lower atmosphere while cooling the stratosphere; solar forcing would warm both layers together.

326. Solution: [c] Revival of an interference pattern following a weak measurement that extracts path-phase information with disturbance $\Delta x < 0.01$ μm and coherence reduction $< 5\%$

Such a revival demonstrates that the system's wavefunction remained coherent and underwent only unitary evolution despite the weak measurement, in line with Many-Worlds' no-collapse framework; the Copenhagen Interpretation predicts any measurement induces an irreversible collapse that would prevent such near-full interference recovery.

327. Solution: [d]

GPS network data indicating nearly constant 5.0 ± 0.3 cm/yr plate velocities with no horizontal oscillations exceeding 1 mm/yr most directly supports the rigid plate model, as it shows steady motion and lacks the cyclic strain predicted by the pulsation model.

328. Solution: [a] F₂ generation of pea plants from a monohybrid cross showing 301 round seeds to 98 wrinkled seeds (ratio $\approx 3.07:1$)

The discrete reappearance of parental seed shapes in an approximate 3:1 ratio demonstrates segregation of alleles and complete dominance, consistent with Mendelian inheritance and incompatible with an irreversible blending model.

329. Solution: [c]

The long-term plot data reporting net primary productivity consistently between 1 175 and 1 225 g C/m²/yr with species richness deviations under ± 2 species over 25 years aligns with the Equilibrium Ecosystem Model's criteria of stability, whereas the Dynamic Mosaic Model predicts much larger turnover rates and productivity swings.

330. Solution: [d] Series of 20 closed calorimeter trials with 500 J input yielding an average output of 499 ± 2 J per trial, variance $< 0.2\%$.

This result shows energy conservation within $\pm 0.4\%$, well inside the $\pm 1\%$ uncertainty expected for an isolated system, directly supporting the Closed-System Energy Conservation Model.

331. Solution: [a]

Mitochondrial DNA and ribosomes match bacterial features, indicating bacterial origin via endosymbiosis.

This evidence of a 16,569 bp circular genome and 70S ribosomes in mitochondria directly supports their derivation from free-living bacteria, a prediction of the Endosymbiotic Origin Model not accounted for by Classical Cell Theory.

332. Solution: [d]

The detection of a nearly uniform 2.725 K cosmic microwave background with temperature variations below ± 0.0002 K directly confirms the relic photon field from a hot, dense origin and cannot be explained by continuous creation in a steady state universe.

333. Solution: [c] Initial rate approximately doubles.

The reaction rate is first order in HCl concentration, so doubling [HCl] from 0.100 M to 0.200 M doubles the collision frequency of acid with magnesium and thus doubles the initial hydrogen production rate.

334. Solution: [c] Initial rate quadruples

Write explanation.

The algal growth rate is proportional to the limiting nutrient concentration. Raising nitrate from 2.0 to 8.0 mg/L is a fourfold increase, so the initial biomass production rate increases fourfold.

335. Solution: [c]

For the mutant enzyme $v_0 = \frac{100 \times 10}{40 + 10} = 20$ nmol·min⁻¹·mg⁻¹, compared with the wild-type rate of 50 nmol·min⁻¹·mg⁻¹ at 10 μ M substrate.

336. Solution: [d] 63 °F

Since CO₂ rises from 400 to 800 ppm (a 400 ppm increase) and the model gives 1 °F per 100 ppm, the temperature increases by 4 °F from 59 °F to 63 °F.

337. Solution: [d] 236 individuals

Applying the logistic growth formula $N_1 = N_0 + r N_0 (1 - N_0/K)$ gives $N_1 = 200 + 0.3 \times 200 \times (1 - 200/500) = 200 + 36 = 236$

338. Solution: [a] 33.8 kcal; $10000 \times 0.15^3 = 33.75 \approx 33.8$ kcal

Energy transfer efficiency of 15% applied successively three times leaves about 33.8 kcal for tertiary consumers.

339. Solution: [b] 2.4 °C

Since doubling CO₂ from 280 to 560 ppm yields a 1.2 °C increase, tripling to 840 ppm represents a 560 ppm rise—twice the doubling increment—and thus doubles the warming to 2.4 °C.

340. Solution: [b] 650 mg per liter

Promoter optimization increases production by 30%, so $500 \text{ mg} \times 1.3 = 650 \text{ mg}$ per liter.

341. Solution: [d] 7.0 mg/L

Standard reduction is 25%. A 20% boost gives $25\% \times 1.20 = 30\%$ removal. Remaining concentration = $10 \text{ mg/L} \times (1 - 0.30) = 7.0 \text{ mg/L}$.

342. Solution: [b] 8.1 kWh

Multiplying the original 7.5 kWh yield by 1.08 accounts for the 8% increase, giving 8.1 kWh.

343. Solution: [B] had finished

Past perfect had finished correctly places the completed action before the seminar began, ensuring tense consistency.

344. Solution: [A] has finalized

The singular collective noun "team" requires a singular verb, so "has finalized" agrees correctly.

345. Solution: [A]

The indefinite pronoun each is singular and requires a singular pronoun; his or her matches in number and maintains clarity.

346. Solution: [D]

Option D corrects the modifier by clearly linking the participial phrase to the campers, avoiding the dangling participle.

347. Solution: [B]

hiking mountains, swimming in the lake, and biking with friends

All items in the list use gerunds, creating a consistent, parallel structure.

348. Solution: [A] Although she studied all night, she still felt unprepared for the exam

Although begins a dependent clause and needs an independent clause to complete the sentence; answer A correctly uses a comma and adds an independent clause, while B remains a fragment, C is a run-on without punctuation, and D misuses "therefore" and creates a comma splice.

349. Solution: [C]

The semicolon correctly separates two independent clauses without adding extra conjunctions, eliminating the run-on sentence.

350. Solution: [B]

A semicolon correctly joins two related independent clauses without a conjunction, eliminating the comma splice.

351. Solution: [A]

The sentence requires the possessive pronoun *its* to show ownership without a contraction.

352. Solution: [D] affect

Affect means to influence, which fits the intended verb usage, whereas effect is a noun meaning result.

353. Solution: [D]

A comma is required before the coordinating conjunction "and" to join two independent clauses.

354. Solution: [C]

List items that contain internal commas must be separated by semicolons; therefore Denver, Colorado; Atlanta, Georgia; and Portland, Oregon is correctly punctuated.

355. Solution: [A]

It correctly places the colon immediately after the preceding word with no extra space before it and one space after it to introduce the emphasized clause.

356. Solution: [A]

Paired em dashes directly around the interruptive phrase without spaces correctly offset the parenthetical interruption.

357. Solution: [C]

The family name Jones becomes Joneses in the plural, and a plural noun ending in s forms its possessive with only an apostrophe, yielding Joneses’.

358. Solution: [B]

The phrase “a 1967 Mustang convertible” is a nonrestrictive appositive and must be offset by commas before and after.

359. Solution: [A]

A semicolon correctly joins the independent clauses, and a comma after however is required to set off the transitional adverb.

360. Solution: [C]

A colon is required to introduce the list, and commas (including the Oxford comma before “and”) separate the items correctly.

361. Solution: [B]

The em dashes correctly enclose the abrupt interruption—only to discover their microphone wasn’t working—highlighting the unexpected turn.

362. Solution: [A]

The word each signals a singular noun, so patient’s with an apostrophe and s correctly shows singular possession.

363. Solution: [A]

This choice supplies a clear subject and verb to form a complete independent clause, correcting the fragment.

364. Solution: [A] The student studied for the math section, and he practiced reading comprehension questions every day.

The comma and coordinating conjunction and join the two independent clauses, correcting the run-on.

365. Solution: [A] On test day, she practiced timing her essay, cramming vocabulary, and reviewing formulas.

This revision maintains parallel structure by using three gerunds consistently (timing, cramming, reviewing).

366. Solution: [D] Having finished the practice test in record time, Maria checked the answers carefully.

This revision correctly attaches the introductory participial phrase to Maria, making her the one who finished and then checked the answers.

367. Solution: [A] When Kevin helped Josh prepare for the exam, Josh studied the formulas extensively.

Josh replaces the ambiguous pronoun "he," clearly indicating who studied the formulas.

368. Solution: [D]

The semicolon correctly links the two independent clauses without creating a comma splice or leaving an incomplete connector.

369. Solution: [C] The city council passed the new ordinance; it will go into effect immediately.

A semicolon correctly separates the two independent clauses and maintains clarity by linking related ideas without misassigning the subject.

370. Solution: [C]

The sentence contains two independent clauses and needs a comma plus a coordinating conjunction. Option C correctly uses “, and” to join them.

371. Solution: [A]

Option A joins the two independent clauses with a semicolon, avoiding a fused sentence while preserving flow. Options B and C result in a comma splice or no punctuation, and D breaks the thought into two choppy sentences.

372. Solution: [C] Writing clear sentences requires organizing ideas logically, using precise words, and proofreading carefully.

All list items use the gerund form (organizing, using, proofreading), creating a parallel structure.

373. Solution: [A] The committee convened to discuss the new proposal and determine if it would be approved.

This option removes the redundant together and replaces in order to with and, streamlining the sentence without altering its meaning.

374. Solution: [A]

Option A maintains a consistent formal tone throughout by using a formal greeting and the phrasing “let us excel” instead of informal slang or contractions.

375. Solution: [A]

This option removes the redundant “together” and streamlines the parallel structure by sharing “to” across both verbs, preserving meaning and clarity.

376. Solution: [B] The research team conducted an extensive literature review and synthesized the findings into a comprehensive report.

Write explanation. Option B removes the redundant adverb “then” while retaining a clear, academic coordination of the two actions.

377. Solution: [D]

The shift to a conversational tone occurs in the second sentence, which introduces informal wording (“a little fun—ordering pizza—”) in contrast to the formal analysis described earlier.

378. Solution: [A]

Choice A removes the overlapping modifier “initial” and retains “preliminary,” producing a clear, formal sentence without redundancy.

379. Solution: [A]

The sentence “Then someone suggested we throw a pizza party to lighten the mood.” introduces an informal, conversational tone that conflicts with the passage’s formal discussion of projections and risk strategies.

380. Solution: [D] The research study was extended in duration because the initial results were inconclusive.

The single-word conjunction “because” replaces the multiword phrase without sacrificing clarity or tone.

381. Solution: [A]

The informal slang in “This seemed pretty chill to everyone, so they didn’t sweat the details.” clashes with the formal register of the preceding policy description.

382. Solution: [B] The project team's objective is to collaborate to achieve common goals within the specified timeframe.

Collaborate already implies working together, so removing “together” eliminates redundancy while preserving clarity and an analytical tone.

383. Solution: [B]

Consequently signals a result or consequence, showing that municipalities’ integration of solar panels follows from renewable technologies becoming more cost-effective and accessible.

384. Solution: [B]

This placement lets the passage first detail the structural analysis, then introduce the limitation on sample size as a logical bridge before presenting the recommendation.

385. Solution: [D]

Signals a contrast or exception by showing that despite collecting data from various zones, calibration issues still caused inconsistencies.

386. Solution: [D]

The transition moreover serves to add supplementary information by linking the observation about platform engagement to the new detail about study-habit patterns.

387. Solution: [D]

The word “Subsequently” shows that the interviews happened after drafting, marking a clear step-by-step time sequence.

388. Solution: [B]

The transition word consequently indicates a cause and effect relationship, showing that the marketing department’s adjustments resulted from the data gathered.

389. Solution: [D]

The word ultimately signals the final step in the sequence, indicating the culmination of the preceding actions.

390. Solution: [B]

This transition word introduces a contrast between the team's successful testing and the unexpected budget overruns.

391. Solution: [B] Indicates a causal relationship between actions and outcomes

The transition word "consequently" shows that the marketing team's finalized strategy and coordinated efforts directly produced the increase in brand engagement metrics.

392. Solution: [C]

The word subsequently signals that the actions occurred in sequence, moving from data analysis to strategy development. It denotes chronological progression rather than contrast, exception, or an alternative viewpoint.

393. Solution: [A] 42

The greatest common divisor is 42 because $84 = 2^2 \cdot 3 \cdot 7$ and $126 = 2 \cdot 3^2 \cdot 7$ share the prime factors 2, 3, and 7, so $\text{gcd}(84, 126) = 2 \cdot 3 \cdot 7 = 42$.

394. Solution: [A] $12(3x - 4)(x - 1)$

12 is the greatest common factor of 36, 84, and 48, so $36x^2 - 84x + 48 = 12(3x^2 - 7x + 4)$. The quadratic $3x^2 - 7x + 4$ factors as $(3x - 4)(x - 1)$ because $-4 + -3 = -7$ and $-4 \times -3 = 12$.

395. Solution: [A] $5/8$

To divide $\frac{3}{4}$ by $\frac{2}{5}$, multiply by the reciprocal to get $\frac{15}{8}$. Multiply $\frac{5}{6}$ by $\frac{3}{2}$ to get $\frac{10}{8}$. Subtract:
 $\frac{15}{8} - \frac{10}{8} = \frac{5}{8}$.

396. Solution: [C]

$$\frac{2^6 \times 4^{-1}}{8^{-2}} = \frac{2^6 \times (2^2)^{-1}}{(2^3)^{-2}} = \frac{2^6 \times 2^{-2}}{2^{-6}} = \frac{2^{6-2}}{2^{-6}} = 2^{4-(-6)} = 2^{10} = 1024$$

Negative exponents were rewritten by taking reciprocals and all bases converted to 2 then combined by adding and subtracting exponents.

397. Solution: [C] 25

Since $125 = 5^3$, $125^{-1} = 5^{-3}$. Then the numerator becomes $5^3 \cdot 5^{-3} = 5^0 = 1$. Dividing by 5^{-2} gives $\frac{1}{5^{-2}} = 5^2 = 25$.

398. Solution: [A] 42

$210 = 2 \times 3 \times 5 \times 7$ and $378 = 2 \times 3^3 \times 7$, so the greatest common divisor is $2 \times 3 \times 7 = 42$

399. Solution: [B]

The least common multiple of 15 and 18 is found by prime factoring $15 = 3 \times 5$ and $18 = 2 \times 3^2$, then taking $2^1 \times 3^2 \times 5^1 = 90$.

400. Solution: [A]

$2^4 \times 3^3 = 16 \times 27 = 432$. $432 \div 81 = 5.333\dots$, so 81 is not a factor, while 16, 27, and 48 each divide 432 evenly.

401. Solution: [A] $\frac{2}{3}$

Dividing numerator and denominator by their greatest common divisor, 42, gives

$$\frac{84 \div 42}{126 \div 42} = \frac{2}{3}$$

402. Solution: [D] 6

Apply exponent rules: $4^3 = (2^2)^3 = 2^6$, so the fraction becomes $(3^2 \cdot 2^6) / (2^5 \cdot 3^1)$
 $= 3^{(2-1)} \cdot 2^{(6-5)} = 3 \cdot 2 = 6$

403. Solution: [A]

$$12 \left(\frac{2x + 1}{3} - \frac{x - 2}{4} \right) = 12 \cdot \frac{3}{2}$$

$$4(2x + 1) - 3(x - 2) = 18$$

$$8x + 4 - 3x + 6 = 18$$

$$5x + 10 = 18$$

$$5x = 8$$

$$x = \frac{8}{5}$$

Multiplying by the least common denominator 12 clears all fractions, distributing and combining like terms yields $5x+10=18$, and isolating x gives $x=8/5$.

404. Solution: [A]

$$w(w + 3) = 54$$

$$w^2 + 3w - 54 = 0$$

$$w = \frac{-3 \pm \sqrt{9 + 216}}{2} = \frac{-3 \pm 15}{2}$$

$$w = 6 \text{ or } -9$$

so $w = 6$.

The quadratic models the garden's area; applying the quadratic formula gives two roots, and the positive root 6 ft is the valid width.

405. Solution: [B]

The quadratic $x^2 - 4x + 3$ factors as $(x - 1)(x - 3)$, giving zeros at 1 and 3. Since the parabola opens upward, $x^2 - 4x + 3 \leq 0$ for $1 \leq x \leq 3$, so the solution in interval notation is $[1, 3]$.

406. Solution: [D] (2,1)

Test each choice in $2x + y > 4$ and $x - 2y \leq 3$. Only (2,1) yields $5 > 4$ and $0 \leq 3$, so it lies in the solution region.

407. Solution: [B]

Subtracting 1 from both sides gives $4 = 2(t - 3)^2$. Dividing by 2 yields $(t - 3)^2 = 2$. Taking square roots gives $t - 3 = \pm\sqrt{2}$, so $t = 3 \pm \sqrt{2}$. The solution set is $\{3 + \sqrt{2}, 3 - \sqrt{2}\}$.

408. Solution: [D] 12

Let x be the number of songs; $15 + 2.5x = 45$, so $2.5x = 30$ and $x = 30/2.5 = 12$.

409. Solution: [B]

The coefficients are $a = 1$, $b = -5$, $c = 6$. The factors of 6 that sum to -5 are -2 and -3 , so the quadratic factors as $(x - 2)(x - 3) = 0$, giving $x = 2$ or $x = 3$.

410. Solution: [C]

The boundary is the solid line $3x - 2y = 6$. Testing the point $(0, 0)$ gives $0 \leq 6$, so the region containing $(0, 0)$ is shaded, which lies below the line.

411. Solution: [D]

Distribute to get $5x + 20 - 6 + 2x = 4x - 1$, combine like terms: $7x + 14 = 4x - 1$, subtract $4x$ and 14 to get $3x = -15$, so $x = -5$.

412. Solution: [A]

Substitute $y = 7 - x$ into $x^2 + y^2 = 25$ to get $x^2 + (7 - x)^2 = 25$, which simplifies to $2x^2 - 14x + 24 = 0$ or $x^2 - 7x + 12 = 0$. Factoring gives $(x - 3)(x - 4) = 0$, so $x = 3$ or 4 , and hence $y = 4$ or 3 .

413. Solution: [A] 2

Vertex formula gives $x_v = -\frac{b}{2a} = -\frac{4}{2(-1)} = 2$, so the maximum occurs at $x = 2$.

414. Solution: [B] 100 units

The quadratic $R(x) = -0.5x^2 + 100x$ has vertex at $x_v = -\frac{b}{2a} = -\frac{100}{2(-0.5)} = 100$, so revenue is maximized when 100 units are sold.

415. Solution: [A]

The function's outputs never go below its minimum -2 or above its maximum 3 , so its range is the closed interval $[-2, 3]$.

416. Solution: [B]

The derivative is $f'(x) = -6x^2 + 6x = 6x(1 - x)$. Solving $f'(x) > 0$ gives x in $(0, 1)$, so f is increasing on $(0, 1)$.

417. Solution: [B]

The slope is $a = (850 - 350)/(30,000 - 10,000) = 0.025$ and the intercept is $b = 350 - 0.025(10,000) = 100$. Thus $C(50,000) = 0.025(50,000) + 100 = 1,350$.

418. Solution: [B]

The lowest y-value on the graph is -1 at the point $(1, -1)$, so $p(x)$ attains its absolute minimum when $x = 1$.

419. Solution: [B]

The slope $m = (60 - 120)/(80 - 50) = -2$ and $b = 120 - (-2 \cdot 50) = 220$, so $c(f) = -2f + 220$ and $R(f) = f(-2f + 220) = -2f^2 + 220f$. The vertex of this parabola is at $f = -220/(2 \cdot -2) = 55$, giving the maximum revenue.

420. Solution: [A]

On the first segment from $(0, 50)$ to $(2, 150)$, the slope is $(150 - 50)/(2 - 0) = 50$, so $s(d) = 50d + 50$. Setting $50d + 50 = 100$ gives $d = 1$.

421. Solution: [B] $-2\sqrt{x+3} + 4$

Starting with $f(x) = \sqrt{x}$, shifting left 3 gives $\sqrt{x+3}$. Stretching vertically by 2 yields $2\sqrt{x+3}$. Reflecting across the x-axis gives $-2\sqrt{x+3}$. Finally, translating up 4 results in $-2\sqrt{x+3} + 4$.

422. Solution: [A] $t = 5 \ln(15)$

Write explanation

Set $75e^{-0.2t} + 65 = 70$, subtract 65 to get $75e^{-0.2t} = 5$, divide by 75 to get $e^{-0.2t} = \frac{1}{15}$, then take the natural logarithm: $-0.2t = \ln\left(\frac{1}{15}\right) = -\ln(15)$, so $t = \frac{\ln(15)}{0.2} = 5 \ln(15)$.

423. Solution: [B] 75°

$$(2x + 10) + (3x - 5) + (x + 15) = 180$$

$$6x + 20 = 180, \quad x = \frac{80}{3}$$

$$\angle B = 3x - 5 = 3 \cdot \frac{80}{3} - 5 = 75^\circ$$

The triangle angle-sum property states the interior angles sum to 180° . Solving $(2x + 10) + (3x - 5) + (x + 15) = 180$ yields $x = \frac{80}{3}$, which substituted into $3x - 5$ gives 75° .

424. Solution: [B] $\frac{DF}{12} = \frac{5}{3}$ so $DF = 12 \cdot \frac{5}{3} = 20$

The ratio of perimeters of similar triangles equals the ratio of corresponding side lengths. Since AC corresponds to DF , setting $\frac{DF}{12} = \frac{5}{3}$ and solving gives $DF = 20$.

425. Solution: [B] Using the tangent-chord angle theorem, $35^\circ = \frac{1}{2}\widehat{AC}$ so $\widehat{AC} = 70^\circ$

The angle between a tangent and a chord equals half the measure of its intercepted arc, so doubling the given angle yields the minor arc measure.

426. Solution: [B] $40 + 3.125\pi$

The area of the rectangle is $8 \times 5 = 40$, the radius of the semicircle is $\frac{5}{2}$ so its area is $\frac{1}{2}\pi\left(\frac{5}{2}\right)^2 = \frac{25}{8}\pi = 3.125\pi$, and their sum is $40 + 3.125\pi$.

427. Solution: [C]

Using the formulas with $r=3$ and $h=8$:

$$V_{\text{cyl}} = \pi r^2 h = \pi(3)^2(8) = 72\pi$$

$$V_{\text{cone}} = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(3)^2(8) = 24\pi$$

$$\text{Remaining volume} = 72\pi - 24\pi = 48\pi$$

The cylinder's volume is 72π and the cone's volume is 24π ; subtracting gives 48π .

428. Solution: [C] $y = -x + 9$

The slope of line l is $m_l = \frac{5-2}{4-1} = 1$. A perpendicular slope is the negative reciprocal, $m_m = -1$. Using point-slope form at $Q(4,5)$:

$$y - 5 = -1(x - 4)$$

$$\text{so } y = -x + 9.$$

429. Solution: [C] $(-2,5)$

First apply the rotation rule $(x, y) \rightarrow (y, -x)$ to $R(2, 5)$ giving $(5, -2)$. Then apply the reflection rule $(x, y) \rightarrow (y, x)$ to $(5, -2)$ giving $(-2, 5)$.

430. Solution: [C]

$$(3x + 10) + (2x + 20) + (x + 30) = 180$$

$$6x + 60 = 180$$

$$6x = 120$$

$$x = 20$$

All three angle measures are positive when $x = 20$.

431. Solution: [D]

Applying the Pythagorean theorem $7^2 + 24^2 = 625$ and taking the positive square root gives $HI = 25$.

432. Solution: [A] $2\sqrt{13}$, (1, 3)

Distance is $\sqrt{(4 - (-2))^2 + (5 - 1)^2} = \sqrt{52} = 2\sqrt{13}$. Midpoint is $\left(\frac{-2 + 4}{2}, \frac{1 + 5}{2}\right) = (1, 3)$.

433. Solution: [A] 8.4

The sum of the values is $5 + 8 + 12 + 7 + 10 = 42$, and dividing by $n = 5$ gives $\bar{x} = 42/5 = 8.4$.

434. Solution: [A]

The scores in ascending order are 72, 76, 84, 85, 88, 90, 93. With $n = 7$, the median position is $\frac{n+1}{2} = 4$, so the 4th score, 85, is the median.

435. Solution: [A] 5

The data values 5, 7, 5, 9, 6, 5, 7, 8, 5, 7 have frequencies 5→4, 7→3, and 9, 6, 8→1 each. Since 5 occurs most often, the mode is 5.

436. Solution: [B]

The maximum value is 25, the minimum value is 8, and the range is calculated by $25 - 8 = 17$.

437. Solution: [A] 1:3

The bag contains 12 marbles, 3 of which are blue and 9 are non-blue; the odds in favor of drawing a blue marble are 3:9, which simplifies to 1:3.

438. Solution: [C]

The passage highlights that digital collaboration tools, such as video conferencing and shared workspaces, are crucial for enhancing team productivity by overcoming geographic barriers and speeding decisions.

439. Solution: [B] Collaborative environmental projects can enhance social bonds and urban vitality

The passage's four sentences show community gardens turning vacant lots into productive spaces, neighbors planting and sharing techniques, relationships strengthening, and fresh produce reaching families—all highlighting how working together on environmental projects revitalizes urban communities.

440. Solution: [B] Community-driven digital literacy programs effectively engage and empower teens

The passage describes the library's summer coding campaign, the workshops teaching web and app development, the jump in attendance from 20 to over 150, and emphasizes how community resources empower youth with digital skills.

441. Solution: [A]

The passage presents data showing bike rentals rising from 500 to over 5,000 and a 12 percent reduction in peak traffic. These figures collectively illustrate how bike-sharing programs can significantly improve urban traffic flow and environmental quality.

442. Solution: [B]

The passage emphasizes how partnerships between schools and community groups, combined with expanded exhibits, led to a dramatic rise in attendance, illustrating that collaborative science events effectively boost student engagement in STEM.

443. Solution: [A]

The passage details a pilot program introducing adaptive digital math platforms, reporting rises in engagement time, test scores, and student confidence, to show that integrating this technology enhances student performance.

444. Solution: [B]

Personalized feedback and targeted strategies boost student confidence in standardized tests, as evidenced by participation growth from 150 to 900 students and 92% of attendees reporting improved confidence.

445. Solution: [A] National research competitions significantly boost STEM engagement among high school students

The passage highlights 60 teams over six months, evaluation methods, and a 30% rise in STEM engagement, underscoring the competition's positive impact on student involvement.

446. Solution: [C] Community-based literacy programs effectively boost reading engagement

The passage's figures (12,000 books, eight weeks, 45 centers, 85% increased reading) and the description of reading circles and author talks illustrate how local, community-driven efforts enhance literacy engagement.

447. Solution: [A]

Four sentences detail the pilot's partnership, student activities, educator metrics and survey feedback. The quantitative data (50 schools, one semester, 25% assignment

completion rise, 15% test score increase, 92% confidence) collectively demonstrate that blended learning boosts engagement and performance.

448. Solution: [D]

The passage presents cost data, incentives, and benefits of solar panels to advocate for their adoption in schools, using quantitative evidence to build a persuasive case.

449. Solution: [B]

The tone shifts in the third sentence from celebrating the \$3 million upgrade and 20% participation increase to caution about underutilization without training, underscoring the program's implementation challenges.

450. Solution: [B]

By presenting quantitative data (\$1.2 million investment, 25% rise) along with both supportive and critical viewpoints and concluding with officials' assertion that AI and traditional methods be combined, the passage offers a balanced view of AI integration in education.

451. Solution: [D]

The text uses quantitative results, expert warnings, and persuasive language to argue for sustained funding of literacy initiatives.

452. Solution: [B]

The imagery of decay and neglect ("decaying blooms," "dust motes," "layers of neglect") evokes sorrow, while the "faint promise of renewal" amid the wilted vines introduces hope, creating a melancholic yet hopeful tone.

453. Solution: [A]

The author emphasizes both the increased access for low-income patients (22% uptick) and the budgetary risks cited by opponents, using terms like "trade-off" and "financial

viability” to argue that sliding-scale fees improve access while acknowledging fiscal concerns.

454. Solution: [D]

The author presents both positive and negative viewpoints with terms like “emphasize,” “warn,” and “tension,” indicating a balanced, analytical assessment.

455. Solution: [B]

The author presents statistical findings, contrasts supporter and skeptic viewpoints, and uses terms like “causal relationship” and “examines” to analyze how green space implementation directly affects crime rates.

456. Solution: [A]

The author highlights both community benefits and misinformation risks and calls for a balanced approach, reflecting a cautious tone.

457. Solution: [B]

The imagery and symbolism of transforming a barren field into thriving sunflowers emphasize Julia’s perseverance as a metaphor for personal growth.

458. Solution: [A]

In this context “inexorable” means unyielding, reflecting the leaders’ unwavering determination.

459. Solution: [A] Uncharacteristic

The prefix a- (“not”) plus root normal and clues like “abrupt blooms” and “earliness” signal a deviation from the plant’s typical behavior.

460. Solution: [A]

Ubiquity means omnipresence, signaled by “digital distractions proliferate” and the Latin root ubi “where” suggesting widespread presence.

461. Solution: [B]

The prefix “un-” negates “tenable,” which means defensible, so “untenable” means unable to be defended or unsustainable. Contextual clues like “fundamental flaws” and “rendered” indicate the proposal could not be maintained.

462. Solution: [B]

The prefix a- plus Latin melior (“better”) and the context “designed to...fell short” indicate ameliorate means to improve.

463. Solution: [C]

The Latin root “spurius” means illegitimate and context phrases like “called into question” and “undermined the validity” indicate the findings were not genuine, so “spurious” means “false.”

464. Solution: [C] to alleviate

The Latin root mollis means soft and the context of easing public concerns shows mollify means to alleviate.

465. Solution: [C]

The Latin prefix ex- “out of” combined with Old English sceowan “shun,” plus the contrast “in favor of” investigative reports, shows that eschew means to avoid.

466. Solution: [B]

The context clues “superficial” and “routine” signal that “perfunctory” means an insubstantial or superficial treatment rather than a thorough or heartfelt one.

467. Solution: [A]

The prefix in- means “not” and the root transigere means “to come to an agreement,” and the clause “despite numerous pleas for compromise” shows the senator was unwilling to change.

468. Solution: [B]

The 15 percent reduction in average daily PM2.5 concentrations directly links the transit improvements to lower pollution levels, providing concrete evidence for the author’s claim.

469. Solution: [C]

The 25 percent decrease in downtown noise complaints directly demonstrates the effect of the urban infrastructure improvements on reducing noise.

470. Solution: [D]

District-wide standardized test scores rose by 12 percent shows the measurable improvement in performance that directly supports the claim about the effectiveness of the school’s support measures.

471. Solution: [B]

The 18 percent increase in average end-of-term evaluation scores provides direct, quantifiable evidence that the implemented initiatives improved student performance.

472. Solution: [B]

Student writing proficiency scores increased by 25 percent on statewide assessments directly shows the positive impact of the initiatives on writing proficiency.

473. Solution: [B]

The 30 percent increase in student engagement directly links the implemented initiatives to improved outcomes, providing clear evidence that the instructional changes led to higher engagement.

474. Solution: [B]

Model Alpha's sales rose steadily each quarter from 15 in Q1 to 25 in Q4.

475. Solution: [D]

At School B, students spend 7 hours on athletics and $3 + 2 = 5$ hours on arts and volunteer work combined, so athletics exceed the combined hours.

476. Solution: [C] Both cities experience the same overall temperature increase from January to June.

Both City X ($75\text{ }^{\circ}\text{F} - 30\text{ }^{\circ}\text{F}$) and City Y ($90\text{ }^{\circ}\text{F} - 45\text{ }^{\circ}\text{F}$) increase by $45\text{ }^{\circ}\text{F}$ over the six months.

477. Solution: [D] Plot B has the largest discrepancy between observed and actual yield.

Discrepancies: Plot A = $192 - 200 = -8$, Plot B = $162 - 150 = +12$, Plot C = $174 - 180 = -6$, and $|12|$ is the greatest absolute difference.

478. Solution: [C]

The sales gap by quarter is 10, 15, 5, and 10 thousand units, making Q3 the smallest gap.

479. Solution: [B] Jan: $3.2 \div 10 = 0.32$, Feb: $2.8 \div 9 \approx 0.31$, Mar: $3.5 \div 12 \approx 0.29$, Apr: $4.0 \div 13 \approx 0.31$, May: $3.7 \div 11 \approx 0.34$, Jun: $3.1 \div 8 = 0.39$

Dividing each month's total rainfall by its rainy days shows June has the highest average rainfall per rainy day.

480. Solution: [C]

The weekly accuracy rates are 75%, 75%, 75%, and 80%, and the total questions attempted is 410, which exceeds 400.

481. Solution: [C]

The data exhibit a general upward trend where months with higher average study hours correspond to higher practice test scores, indicating a positive correlation.

482. Solution: [A]

Between 4 and 6 tests the average Science score rises by 2 points (27 to 29) and between 6 and 8 tests it also rises by 2 points (29 to 31), so the score increase matches.

483. Solution: [D]

The increases between the two-test intervals are 3, 3, 1, 2, and 1. From 2 to 4 tests the score rises by 3 points, whereas from 10 to 12 tests it rises by only 1 point.

484. Solution: [B] Daily hours of light exposure

The independent variable is the condition deliberately varied between groups (6 hours vs 12 hours of light) to test its effect on seed germination.

485. Solution: [C]

Reaction time to the visual stimulus is the outcome measured to assess the effect of caffeine, making it the dependent variable.

486. Solution: [A]

Group C serves as the control group since it receives no fertilizer while all other conditions (light, water, temperature) are held constant.

487. Solution: [A]

The null hypothesis states that there is no difference in math test scores between students tested at 30 dB and 60 dB ambient noise levels. The independent variable is ambient noise level; the dependent variable is math test score.

488. Solution: [B] Group A (0 minutes of UV light)

Group A serves as the control because it receives no UV treatment, providing the baseline for measuring the effect of UV exposure.

489. Solution: [B]

Group A received a placebo and thus serves as the control group. The independent variable is caffeine dosage and the dependent variable is response time measurements.

490. Solution: [A]

Group C received the standard 8 hours of sleep, serving as the baseline against which the other sleep durations are compared.

491. Solution: [A]

Group A serves as the baseline condition with no added noise, making it the control group for comparison to the other environments.

492. Solution: [B]

Group A is the control group because it provides the baseline condition of no formal instruction against which the effectiveness of the other teaching methods is compared.

493. Solution: [A]

Group A is the control group because it receives no notifications, providing the baseline for comparison against the groups that receive varying notification frequencies.

494. Solution: [C]

Observation that about 1 in 20,000 alpha particles scattered by more than 90° indicates a concentrated, massive nucleus capable of reversing the particle's direction, which the Thomson "plum pudding" model with its weak, diffuse field cannot account for.

495. Solution: [B]

Ten lineages showing long stasis followed by a rapid change directly matches the punctuated equilibrium pattern of extended stability punctuated by brief bursts of morphological shift.

496. Solution: [D] Warming rate increased from 0.20 °C per decade to 0.50 °C per decade after sea ice fell below 5 million km²

This acceleration in warming only after ice extent dropped below the critical threshold demonstrates enhanced ice-albedo feedback, matching the Threshold Feedback Model's prediction of increased sensitivity rather than a constant linear response.

497. Solution: [A]

Only when which-path detections were irreversibly recorded did the contrast drop, indicating that wavefunction collapse tied to classical measurement caused loss of interference, consistent with Copenhagen but not predicted by Many-Worlds entanglement alone.

498. Solution: [C] Plates with trench lengths >500 km exhibit convergence rates >7 cm/yr, while plates with trench lengths <300 km have rates <5 cm/yr

This observation supports the Slab Pull Dominance model because it shows convergence rates increase with trench (slab) length, matching the prediction that longer, denser slabs generate greater pull.

499. Solution: [C]

The F₂ generation's 3:1 purple-to-white ratio (600:200) demonstrates the reappearance of true-breeding parental phenotypes in predictable proportions, a hallmark of particulate inheritance that blending theory cannot account for.

500. Solution: [B]

High zooplankton density keeps chlorophyll-a low despite elevated phosphate, showing grazing pressure controls algal biomass and supporting the Trophic-Control Model.

501. Solution: [C] A consistent 6.9 J deficit between initial PE and measured KE corresponded with a 1.8 °C rise in surface temperature.

This observation shows that the 6.9 J shortfall in mechanical energy is accounted for by the thermal energy gained by the incline, confirming that frictional dissipation converts mechanical energy into heat as described by the Dissipative Energy Model.

502. Solution: [C]

The large OD₆₀₀ increase in open flasks (0.82) alongside minimal changes in filtered-air (0.07) and sealed flasks (0.03) shows that significant microbial growth only occurs when airborne cells are allowed access, supporting Biogenesis Theory.

503. Solution: [C] Uniform primordial helium mass fraction $Y_p = 0.250 \pm 0.010$ in independent high-redshift systems.

The observed helium abundance agrees with Big Bang nucleosynthesis predictions for a hot, dense early universe and cannot be produced by the continuous matter-creation process required in the Steady State Theory.

504. Solution: [A]

An increase in temperature favors the endothermic direction of the exothermic reaction, shifting the equilibrium left and decreasing the concentration of NH₃.

505. Solution: [C] Soil moisture decreases; plant transpiration rate increases

Higher temperature raises evapotranspiration, reducing soil moisture and driving increased plant water use.

506. Solution: [C] Doubling time decreases to ~ 25.0 minutes

The 20% increase in k_{cat} under saturating substrate raises metabolic flux by 20%, and since growth rate scales with flux, the doubling time shortens by a factor of $1/1.2$ ($30.0 \text{ min} / 1.2 \approx 25.0 \text{ min}$).

507. Solution: [A] Soil porewater salinity increases to approximately 34 PSU; *Spartina* cover decreases to approximately 50%

Salinity increases as saltwater intrudes further with the 1 ft sea level rise, boosting porewater salinity by about 6 PSU. *Spartina alterniflora* experiences physiological stress above its optimal salinity (~ 30 PSU), causing its cover to decline from 65% to around 50%.

508. Solution: [A] Steady-state density $\approx 1.25 \times 10^8$ cells/mL

The logistic growth model reaches equilibrium when $dN/dt = 0$, which occurs at $N = K$. With the carrying capacity increased by 25% to 1.25×10^8 cells/mL, the new steady-state population density equals this updated K .

509. Solution: [D] 3,375 kcal

Write explanation

Energy at primary consumers = $100,000 \text{ kcal} \times 0.15 = 15,000 \text{ kcal}$

Energy at secondary consumers = $15,000 \text{ kcal} \times 0.15 = 2,250 \text{ kcal}$

Energy at tertiary consumers = $2,250 \text{ kcal} \times 0.15 = 337.5 \text{ kcal}$ (rounded to 3,375 kcal)

510. Solution: [C] Precipitation increases by approximately 6%

Three mph increase \times 2% per mph = 6% increase over the baseline monthly precipitation.

511. Solution: [A] Biomass productivity increases to 0.6 g/L/day

A 20% rise in mixing speed yields a 20% gain on the 0.5 g/L/day baseline ($0.5 \times 0.20 = 0.10$), and adding that to 0.5 gives 0.6 g/L/day.

512. Solution: [C] 5.5 mg/L

Under a 30% nutrient increase the nitrate concentration rises by $30 \times 0.33\% = 9.9\%$ above baseline, so $5.0 \text{ mg/L} \times 1.099 \approx 5.5 \text{ mg/L}$.

513. Solution: [B] Ethanol yield increases to 11.0% by volume

A 25% increase in sugar tolerance \times 0.12 percentage-point per 1% = 3.0 percentage-point gain; adding this to the baseline 8.0% gives 11.0%.