

ADVANCED PRACTICE

ANSWER & SCORING GUIDE

150 MCQ

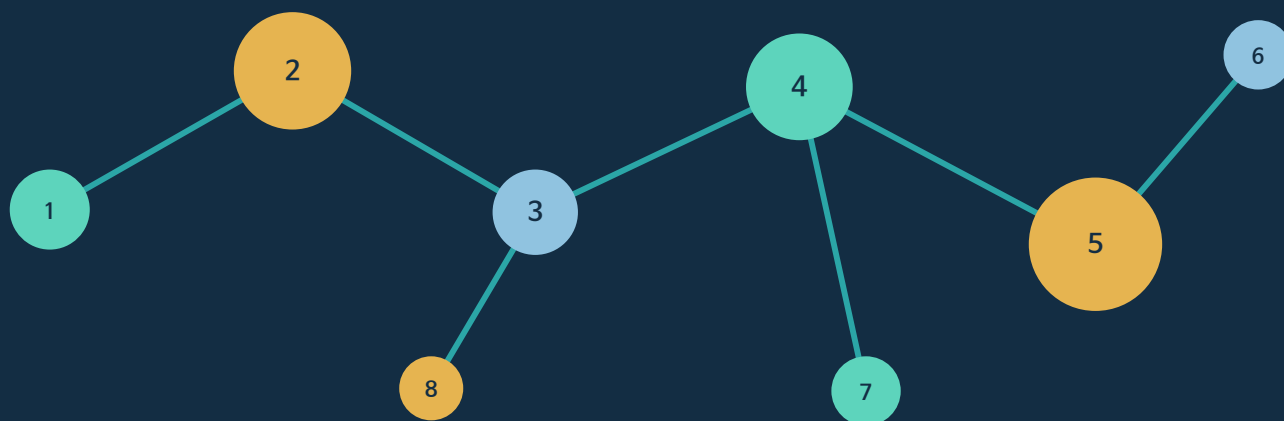
2.5x AP MCQ section

09 DATA SETS

linked evidence items

12 FRQ

4 long + 8 short



Structure / Interaction / Function / Evidence

USIS study preparation

Princeton Review Premium Prep, 29th Ed.

Student practice | Corrected edition

CORRECTED EDITION - NOT AN OFFICIAL AP OR SCHOOL EXAM

TEACHER & SELF-STUDY / ANSWER MAP

150-Question Answer Key

Check answers only after the first pass. Each explanation identifies the molecular or experimental reason the option is most defensible.

001 D	002 D	003 B	004 A	005 B	006 D	007 C	008 B	009 D	010 B
011 D	012 C	013 A	014 A	015 C	016 B	017 D	018 D	019 A	020 C
021 A	022 B	023 B	024 A	025 D	026 A	027 C	028 A	029 C	030 D
031 B	032 A	033 C	034 C	035 A	036 B	037 A	038 A	039 B	040 B
041 C	042 D	043 B	044 A	045 D	046 B	047 A	048 C	049 D	050 C
051 C	052 A	053 A	054 A	055 B	056 C	057 D	058 B	059 B	060 C
061 A	062 C	063 B	064 B	065 C	066 D	067 B	068 D	069 A	070 B
071 A	072 C	073 A	074 B	075 A	076 C	077 D	078 D	079 A	080 B
081 D	082 D	083 C	084 B	085 A	086 D	087 A	088 C	089 B	090 C
091 D	092 D	093 D	094 C	095 A	096 C	097 B	098 B	099 D	100 C
101 A	102 D	103 A	104 A	105 C	106 D	107 B	108 B	109 C	110 B
111 A	112 D	113 A	114 C	115 B	116 C	117 D	118 A	119 C	120 B
121 D	122 D	123 B	124 B	125 D	126 A	127 D	128 B	129 C	130 A
131 C	132 A	133 C	134 C	135 C	136 D	137 B	138 D	139 D	140 B
141 D	142 C	143 A	144 A	145 A	146 C	147 C	148 D	149 B	150 B

Suggested use: Wrong answer → name the exact misconception → rewrite a correct causal statement → retry 48 hours later.
MCQ: 1 point each. FRQ: 68 total practice points. These are independent scoring guidelines, not official rubrics.

Check of answer distribution

Option	A	B	C	D
Correct answers	38	38	37	37

How to classify an error

Concept: a term or property was confused. Mechanism: the cause-and-effect chain was incomplete. Evidence: a conclusion exceeded the supplied data. Quantitative: arithmetic, units, or base pairing were wrong.

PART I / RATIONALES

Concept Questions 001–105

Each item is annotated with its correct choice and the core scientific justification.

TOPIC 1.1

Water and Hydrogen Bonding

molecular polarity / cohesion / specific heat

001 / D · Water and hydrogen bonding

Unequal electron sharing creates partial charges and a polar molecule.

002 / D · Water and hydrogen bonding

Intermolecular hydrogen bonds form between the partial charges of different water molecules.

003 / B · Water and hydrogen bonding

Cohesion produces surface tension and tends to keep small drops rounded.

004 / A · Water and hydrogen bonding

Hydrogen bonding supports cohesion, while adhesion helps water interact with polar surfaces.

005 / B · Water and hydrogen bonding

High specific heat reflects energy required to disrupt intermolecular interactions.

006 / D · Water and hydrogen bonding

In ice, stable hydrogen-bond geometry spaces molecules farther apart on average.

007 / C · Water and hydrogen bonding

Evaporative cooling results from preferential loss of energetic molecules.

008 / B · Water and hydrogen bonding

Hydroxyl groups can make favorable polar and hydrogen-bond interactions with water.

009 / D · Water and hydrogen bonding

Amphipathic molecules orient hydrophobic regions away from water and toward nonpolar material.

010 / B · Water and hydrogen bonding

Thermal motion can disrupt intermolecular hydrogen bonds.

011 / D · Water and hydrogen bonding

For equal mass and heat input, a larger temperature rise indicates a lower specific heat.

012 / C · Water and hydrogen bonding

Cohesion among water molecules contributes to surface tension.

013 / A · Water and hydrogen bonding

Water surrounds and stabilizes cations and anions via ion–dipole interactions.

014 / A · Water and hydrogen bonding

Intermolecular hydrogen bonding is central to water cohesion and surface tension.

015 / C · Water and hydrogen bonding

Hydrogen bonds are individually relatively weak and dynamic in liquid water.

TOPIC 1.2**Elements and Carbon**

covalent bonding / carbon skeletons / functional groups

016 / B · Elements and carbon

Four covalent–bonding positions support chains, rings, branches, and diverse functional groups.

017 / D · Elements and carbon

Proteins commonly contain C, H, O, N, and sometimes sulfur.

018 / D · Elements and carbon

Phosphorus is present in phosphate groups of nucleotides and nucleic–acid backbones.

019 / A · Elements and carbon

Structural isomers can have distinct shapes and properties despite identical molecular formulas.

020 / C · Elements and carbon

Hydroxyl groups introduce polar bonds able to interact with water.

021 / A · Elements and carbon

The molecular environment and groups attached to carbon determine local chemical properties.

022 / B · Elements and carbon

Binding depends on shape and chemical complementarity, not merely composition.

023 / B · Elements and carbon

C–H–rich hydrocarbon regions are typically nonpolar.

024 / A · Elements and carbon

Amino groups contain nitrogen and are central to amino-acid chemistry.

025 / D · Elements and carbon

Charged groups are generally hydrophilic and can form ionic interactions.

026 / A · Elements and carbon

Covalent bonding is electron sharing; it is common in organic molecular backbones.

027 / C · Elements and carbon

Phosphate groups are polar/charged in physiological contexts and influence interactions.

028 / A · Elements and carbon

Hydrogen bonds rely on attractive partial charges, whereas covalent bonds involve electron sharing.

029 / C · Elements and carbon

Amphipathic molecules possess hydrophilic and hydrophobic regions.

030 / D · Elements and carbon

Electronegative oxygen creates polar bonds such as O-H or C=O.

TOPIC 1.3**Macromolecules**

dehydration synthesis / hydrolysis / polymer structure

031 / B · Macromolecules and reactions

Dehydration synthesis links monomers and releases water.

032 / A · Macromolecules and reactions

Hydrolysis consumes water to cleave covalent links in a polymer.

033 / C · Macromolecules and reactions

Proteins are polymers of amino acids connected by peptide bonds.

034 / C · Macromolecules and reactions

A shortening polymer with consumption of water is consistent with hydrolysis.

035 / A · Macromolecules and reactions

Composition, sequence, and folding govern molecular properties and function.

036 / B · Macromolecules and reactions

Even single sequence changes may alter shape or interactions.

037 / A · Macromolecules and reactions

Polymer extension generally involves condensation to produce an additional covalent link.

038 / A · Macromolecules and reactions

Blocked hydrolysis limits liberation of units from the polymer.

039 / B · Macromolecules and reactions

Substrate specificity and the resulting chemical transformations define enzyme function.

040 / B · Macromolecules and reactions

Major lipid classes are not typically built from long repeating monomer chains.

041 / C · Macromolecules and reactions

Hydrolysis of peptide bonds can release the constituent amino acids.

042 / D · Macromolecules and reactions

The bonded functional groups and monomers differ between proteins and carbohydrates.

043 / B · Macromolecules and reactions

Phosphodiester bonds connect the sugar–phosphate backbone of nucleic acids.

044 / A · Macromolecules and reactions

Hydrolysis cleaves covalent bonds through reaction with water.

045 / D · Macromolecules and reactions

Building a polymer requires linking constituent units covalently.

TOPIC 1.4**Carbohydrates**

storage versus structural polysaccharides

046 / B · Carbohydrates

Starch is a major plant energy–storage polysaccharide.

047 / A · Carbohydrates

Cellulose provides structural support to plant cell walls.

048 / C · Carbohydrates

Alpha and beta linkage orientations affect polymer shape, packing, and digestibility.

049 / D · Carbohydrates

Glycogen stores glucose in many animal tissues.

050 / C · Carbohydrates

Enzyme active sites recognize specific substrates and bond orientations.

051 / C · Carbohydrates

Highly branched polymers have multiple accessible ends for enzymatic processing.

052 / A · Carbohydrates

Cellulose chain length influences assembly and structural reinforcement of walls.

053 / A · Carbohydrates

Starch and cellulose are glucose polymers with distinct glycosidic geometry.

054 / A · Carbohydrates

Hydrolysis breaks glycosidic bonds to liberate glucose or smaller sugars.

055 / B · Carbohydrates

Rigid carbohydrate fibers commonly provide mechanical reinforcement.

056 / C · Carbohydrates

Starch polymerization depends on covalent glycosidic bonds.

057 / D · Carbohydrates

Cells transfer energy from glucose oxidation through coupled biochemical reactions.

058 / B · Carbohydrates

Branching creates additional termini that enzymes may process.

059 / B · Carbohydrates

Beta-1,4-linked glucose chains of cellulose can align in strong structural fibers.

060 / C · Carbohydrates

Monosaccharides are sugar monomers; polysaccharides are larger carbohydrate chains.

TOPIC 1.5

Lipids

amphipathic molecules / bilayers / tail saturation

061 / A · Lipids and membranes

The hydrophilic head and hydrophobic tails confer amphipathic behavior.

062 / C · Lipids and membranes

Amphipathic phospholipids place hydrophobic tails away from water.

063 / B · Lipids and membranes

Cis double bonds constrain geometry and bend a hydrocarbon chain.

064 / B · Lipids and membranes

Kinked tails hinder tight arrangement of neighboring hydrocarbon chains.

065 / C · Lipids and membranes

Saturated tails are straighter and generally pack more tightly.

066 / D · Lipids and membranes

Triglycerides are energy-rich storage lipids.

067 / B · Lipids and membranes

Triglycerides consist of glycerol esterified to three fatty acids.

068 / D · Lipids and membranes

Most triglycerides are nonpolar storage fats rather than amphipathic bilayer constituents.

069 / A · Lipids and membranes

Hydrophobic interactions are a major driving force for bilayer organization.

070 / B · Lipids and membranes

The hydrophobic core poses an energetic barrier to charged solutes.

071 / A · Lipids and membranes

An additional polar group may create distinct hydrophilic and hydrophobic regions.

072 / C · Lipids and membranes

Reduced hydrocarbon chains store considerable chemical energy.

073 / A · Lipids and membranes

Phospholipid heads face both outside and inside aqueous spaces.

074 / B · Lipids and membranes

The distinction is the presence or absence of carbon–carbon double bonds.

075 / A · Lipids and membranes

Kinks help limit tight packing when low temperature otherwise reduces lipid movement.

TOPIC 1.6**Nucleic Acids**

nucleotides / backbone / DNA and RNA

076 / C · Nucleic acids

Nucleotides are composed of a phosphate, pentose sugar, and nitrogenous base.

077 / D · Nucleic acids

RNA contains ribose; DNA contains deoxyribose.

078 / D · Nucleic acids

RNA generally uses uracil instead of thymine.

079 / A · Nucleic acids

Phosphodiester bonds join adjacent sugar and phosphate groups.

080 / B · Nucleic acids

Complementary DNA bases associate through hydrogen bonds.

081 / D · Nucleic acids

A pairs with T, so T is 30%; the remaining 40% consists equally of G and C.

082 / D · Nucleic acids

A pairs with T and G pairs with C; the antiparallel complement is 3'–TACG–5'.

083 / C · Nucleic acids

Nucleotide sequence encodes information and influences biological outcomes.

084 / B · Nucleic acids

RNA can be single stranded; complementary base counts cannot be inferred without pairing data.

085 / A · Nucleic acids

The five-carbon sugars differ by the 2'-OH group.

086 / D · Nucleic acids

Each guanine in canonical DNA pairs with a cytosine on the complementary strand.

087 / A · Nucleic acids

Phosphodiester bonds maintain covalent continuity along each strand.

088 / C · Nucleic acids

The sugar-carbon numbering defines the chemical 5' and 3' polarity of strands.

089 / B · Nucleic acids

A nucleoside consists of a nitrogenous base and pentose sugar.

090 / C · Nucleic acids

Biological information is encoded by the order of nucleotides.

TOPIC 1.7**Proteins**

R groups / structure / mutation / denaturation

091 / D · Proteins

Side-chain (R-group) properties distinguish amino acids.

092 / D · Proteins

Peptide bonds connect the carboxyl group of one amino acid to the amino group of another.

093 / D · Proteins

Primary structure is amino-acid sequence.

094 / C · Proteins

Secondary structures result largely from hydrogen bonding among backbone atoms.

095 / A · Proteins

Hydrophobic, ionic, hydrogen-bonding, and disulfide interactions can stabilize tertiary structure.

096 / C · Proteins

Hydrophobic effects often favor burial of nonpolar groups in aqueous environments.

097 / B · Proteins

A substitution changes the linear amino-acid sequence.

098 / B · Proteins

Denaturation often disrupts higher-order folding while leaving most peptide bonds intact.

099 / D · Proteins

Quaternary structure describes interactions among separate polypeptide chains.

100 / C · Proteins

Charge reversal can change attractions/repulsions with neighboring groups.

101 / A · Proteins

The outcome depends on chemical similarity, location, and structural context.

102 / D · Proteins

Molecular complementarity between active site and substrate governs binding and catalysis.

103 / A · Proteins

Denaturation primarily involves disruption of interactions stabilizing folding.

104 / A · Proteins

Disulfide bridges are covalent bonds between cysteine sulfur atoms.

105 / C · Proteins

Mutation effects are context dependent; location alone is insufficient to infer certainty.

PART II / DATA RATIONALES

Stimulus Sets 106–150

Distinguish observations, interpretations, predictions, and claims that are not justified.

SET 01 / Lake temperature and water properties

106 / D · Data Set 01

A relatively high specific heat slows temperature changes when heat is gained or lost.

107 / B · Data Set 01

The data show different temperature responses but do not isolate all heat-transfer variables.

108 / B · Data Set 01

Calculating heat changes requires accounting for energy input and output.

109 / C · Data Set 01

Mass and energy exchange differ; specific heat is a material property.

110 / B · Data Set 01

For the same substance, $Q/m = c \cdot \Delta T$; equal heat loss per mass gives comparable ΔT .

SET 02 / Molecular polarity and solubility

111 / A · Data Set 02

Multiple hydroxyl groups create several opportunities for hydrogen bonding.

112 / D · Data Set 02

The negatively charged region of R can be hydrated by polar water.

113 / A · Data Set 02

Interfacial orientation suggests separate hydrophobic and hydrophilic regions.

114 / C · Data Set 02

Large nonpolar surfaces make dissolution less favorable in water.

115 / B · Data Set 02

Solubility is best evaluated by how much substance dissolves under controlled conditions.

SET 03 / Dehydration synthesis and hydrolysis

116 / C · Data Set 03

Disaccharide loss with monosaccharide gain indicates glycosidic hydrolysis.

117 / D · Data Set 03

The experiment changes whether enzyme E is added.

118 / A · Data Set 03

Differences in reaction rates under matched conditions are evidence of catalytic activity.

119 / C · Data Set 03

Lower substrate availability can reduce the reaction rate.

120 / B · Data Set 03

Catalysts participate in reactions but are regenerated rather than used up in equal molar amounts.

SET 04 / Plant carbohydrate structure

121 / D · Data Set 04

Branched glucose polymers often store energy; linear fibrous polymers often support structure.

122 / D · Data Set 04

Structural specificity helps determine which glycosidic linkages an enzyme can hydrolyze.

123 / B · Data Set 04

Branching can increase available chain ends.

124 / B · Data Set 04

Cellulose forms linear, resistant structural fibers with bonds recognized by specialized enzymes.

125 / D · Data Set 04

A controlled comparison isolates branching while holding other variables constant.

SET 05 / Membrane composition and cold conditions

126 / A · Data Set 05

Cis double bonds create bends and reduce tight packing.

127 / D · Data Set 05

Unsaturated tails can counter the packing tendency at lower temperatures.

128 / B · Data Set 05

Temperature is the treatment varied between cell cultures.

129 / C · Data Set 05

The dataset does not measure activity of every transport protein.

130 / A · Data Set 05

A direct fluidity assay tests the proposed functional consequence.

SET 06 / Complementary DNA strands**131 / C · Data Set 06**

In double-stranded DNA, each adenine pairs with thymine; A=T.

132 / A · Data Set 06

There are 2,000 total nucleotides; A+T=1,200, leaving G+C=800, so G=400.

133 / C · Data Set 06

C=400 of 2,000 nucleotides, or 20%.

134 / C · Data Set 06

Sugar-phosphate backbones contain phosphodiester linkages.

135 / C · Data Set 06

A single base-pair substitution changes sequence but not overall base-pair count.

SET 07 / Protein activity across pH**136 / D · Data Set 07**

The highest observed activity is 100 units at pH 7.

137 / B · Data Set 07

The response peaks at the intermediate pH and falls on both sides.

138 / D · Data Set 07

Changing pH can modify ionic states and alter binding or folding.

139 / D · Data Set 07

Recovery after neutralization provides evidence for a reversible pH effect.

140 / B · Data Set 07

Enzyme pH optima depend on protein structure and biological environment.

SET 08 / Sequence substitution and protein function

141 / **D** · Data Set 08

The amino-acid identity differs at one position; chain length is unchanged.

142 / **C** · Data Set 08

Side-chain chemistry can affect tertiary structure or interactions with ligands.

143 / **A** · Data Set 08

Equal protein concentrations control for abundance while examining affinity.

144 / **A** · Data Set 08

The data do not identify direct contacts or all contexts.

145 / **A** · Data Set 08

Rescuing the electrostatic property while controlling other factors strengthens a causal explanation.

SET 09 / Planning a controlled enzyme experiment

146 / **C** · Data Set 09

Temperature is deliberately manipulated.

147 / **C** · Data Set 09

The purpose is to measure how temperature affects the initial reaction rate.

148 / **D** · Data Set 09

Rate = change in amount/change in time = $12/30 = 0.40$.

149 / **B** · Data Set 09

A no-enzyme or inactive-enzyme control estimates background product formation.

150 / **B** · Data Set 09

The result establishes activity difference but not the exact molecular mechanism.

PART III / FRQ SCORING

12 Free-Response Rubrics

Four 9-point long questions and eight 4-point short questions = 68 practice points. Alternative scientifically equivalent responses can earn credit.

Scoring protocol: Award points for explicit, biologically correct claims that address the requested task. Do not require exact sample wording. When a point has multiple conditions, all stated components are required for the point unless otherwise indicated.

FRQ 01 / 9 POINTS

Water as a thermal buffer

- (a) 2 points $Q = mc(\Delta T)$; $c = 4180 \text{ J} / (100 \text{ g} \times 10.0 \text{ C}) = 4.18 \text{ J g}^{-1} \text{ C}^{-1}$; correct equation and result with units.
- (b) 2 points One controlled variable: sample mass (100 g) or input energy; dependent variable: observed temperature change (or final temperature).
- (c) 3 points The O–H bonds are polar due to unequal electron sharing (1). Water molecules form hydrogen bonds (1). Energy disrupts/reorganizes those interactions, contributing to high specific heat (1).
- (d) 2 points Ethanol changes temperature more (1); for equal masses and Q , ΔT is inversely related to specific heat (1).

FRQ 02 / 9 POINTS

Cold acclimation and membrane composition

- (a) 2 points Cold-grown cells contain 64% versus 36% cis-unsaturated tails (1) and show a higher fluidity index, 0.78 versus 0.51 (1).
- (b) 2 points Cis double bonds introduce kinks (1); these reduce tight packing and help preserve lateral movement/fluidity (1).
- (c) 3 points Manipulate lipid saturation while keeping other conditions matched (1), include untreated or vehicle control (1), measure membrane fluidity at the same assay temperature with replicates (1).
- (d) 2 points Fluidity is expected to decrease (1) because straighter saturated tails can pack more tightly (1).

FRQ 03 / 9 POINTS

R-group substitution and protein activity

- (a) 2 points Highest wild-type activity is at pH 7 (1); wild-type/mutant ratio = $96/24 = 4$ (1).
- (b) 2 points The amino-acid substitution changes primary sequence (1); charge/polarity change may alter electrostatic interactions, folding, or binding (1).
- (c) 3 points Activity differences alone cannot distinguish direct substrate contact from changes in enzyme conformation or catalytic chemistry (1); propose a high-resolution structure of wild-type enzyme bound to substrate or a nonreactive substrate analog (e.g., crystallography or cryo-EM if resolution is sufficient), or an appropriately validated site-specific cross-linking approach (1); identify evidence placing that residue at the enzyme-substrate interface within plausible contact distance (1). A binding-affinity assay alone does not establish direct residue-substrate contact.
- (d) 2 points Restoring negative charge could partly restore activity (1) because electrostatic interactions can influence active-site structure or binding, but context matters (1).

FRQ 04 / 9 POINTS

Glycosidic bonds and enzyme specificity

- (a) 2 points Axes correctly labeled: time (min) horizontal and glucose equivalents (micromol) vertical (1); accurately plotted and distinguished A and B curves (1).
- (b) 2 points Rate = $(34-12)/(15-5) = 22/10 = 2.2$ micromol/min (2 points for setup and correct result).
- (c) 3 points Alpha and beta glycosidic bonds have different stereochemical orientations (1); the specified enzyme recognizes and hydrolyzes alpha-linked bonds, not beta-1,4 bonds in B (1); branching increases the number of chain ends and may accelerate release IF the enzyme can attack those termini, but the effect depends on enzyme specificity, access and whether branch-point linkages are cleavable (1). No universally faster rate is implied by branching alone.
- (d) 2 points B should release more glucose equivalents (1) because a beta-1,4-cleaving enzyme can hydrolyze bonds in B (1).

FRQ 05 / 4 POINTS

Water movement in plant tissue

- (a) 1 point Adhesion.
- (b) 1 point Cohesion links water molecules so they move together as a column.
- (c) 1 point A nonpolar coating reduces favorable polar interactions/adhesion.
- (d) 1 point Rise height generally decreases as tube diameter increases (capillary effect).

FRQ 06 / 4 POINTS

Functional groups and intermolecular interactions

- (a) 1 point Molecule X.
- (b) 1 point Hydroxyl groups can interact with polar water through hydrogen bonds.
- (c) 1 point Y is relatively nonpolar/hydrophobic.
- (d) 1 point Interaction with and likely solubility in water increase, other things equal.

FRQ 07 / 4 POINTS

Hydrolysis and polymer length

- (a) 1 point Hydrolysis.
- (b) 1 point One water molecule is consumed in cleavage of one glycosidic link.
- (c) 1 point One bond.
- (d) 1 point Monomer units are redistributed into fragments; no units are gained or lost in this cleavage.

FRQ 08 / 4 POINTS

Comparing glycogen and cellulose

- (a) 1 point Glycogen.
- (b) 1 point Cellulose.
- (c) 1 point Glycogen has alpha linkages and branches; cellulose has beta-1,4 linkages and largely straight chains.
- (d) 1 point Branching helps access stored glucose, whereas linear cellulose chains form strong structural fibers.

FRQ 09 / 4 POINTS

Phospholipid organization in water

- (a) 1 point Polar/hydrophilic head group.
- (b) 1 point Tails face inward toward one another in the bilayer core.
- (c) 1 point Hydrophobic tails minimize exposure to water while polar heads contact water.
- (d) 1 point No; the nonpolar bilayer interior energetically disfavors ions.

FRQ 10 / 4 POINTS

DNA base composition

- (a) 1 point 400 total nucleotides.
- (b) 1 point $0.30 \times 400 = 120$ G.
- (c) 1 point $C=120$, leaving 160 A+T, so $A=80$.
- (d) 1 point A pairs with T, and G pairs with C in standard double-stranded DNA.

FRQ 11 / 4 POINTS

DNA versus RNA

- (a) 1 point R is RNA and D is DNA.
- (b) 1 point Phosphodiester bond.
- (c) 1 point Ribose has a 2'-OH group, whereas deoxyribose has H at that position.
- (d) 1 point The sequence stores or conveys genetic information and can affect gene expression.

FRQ 12 / 4 POINTS

Reversible and irreversible loss of enzyme activity

- (a) 1 point Tertiary structure (or quaternary if the enzyme has subunits).
- (b) 1 point Changing protonation changes charges and electrostatic/hydrogen-bond interactions.
- (c) 1 point Measure a matched, untreated enzyme sample at pH 7 with the same substrate and temperature.
- (d) 1 point Restore treated sample to pH 7 and measure recovered activity against the control.

DIAGNOSTIC REVIEW / NEXT STEP

Targeted Correction Guide

Use question ranges to determine what the student should explain aloud or reconstruct from memory before a timed school-style mock exam.

Missed item cluster	Likely weak link	Correction task
001–015	Polarity → hydrogen bonding → water behavior	Diagram the partial charges and explain 3 water phenomena.
016–030	Carbon chemistry and functional groups	Compare hydrophilic and nonpolar groups in two molecules.
031–045	Condensation and bond hydrolysis	Draw a 3-unit polymer and show one bond broken/formed.
046–060	Carbohydrate linkage → function	Contrast starch, cellulose, and glycogen using linkage and role.
061–075	Phospholipid geometry and tails	Sketch a bilayer and predict a temperature/composition effect.
076–090	DNA/RNA and base pairing	Compute paired base amounts and trace a phosphate backbone.
091–105	R groups and protein folding	Explain a mutation effect without unjustified certainty.
106–150	Design, evidence, graphs, controlled inference	Underline IV, DV, control, mechanism, and claim limitations.

Reference sources and provenance

College Board, AP Biology Course and Exam Description (effective Fall 2025):

<https://apcentral.collegeboard.org/media/pdf/ap-biology-course-and-exam-description.pdf>

College Board, AP Biology Exam format and question types: <https://apcentral.collegeboard.org/courses/ap-biology/exam>

Princeton Review Premium Prep, 29th Edition, publication listing: <https://www.penguinrandomhouse.com/books/807024/princeton-review-ap-biology-premium-prep-29th-edition-by-the-princeton-review/9798217125043/>

Corrected edition, 2026–10–13: units in Set 09/Q148, direct-contact evidence in FRQ 03(c), and branching qualifications in FRQ 04(c) clarified. All 150 MCQs and 12 FRQs are original independent training items. Neither College Board nor USIS produced or approved these materials.