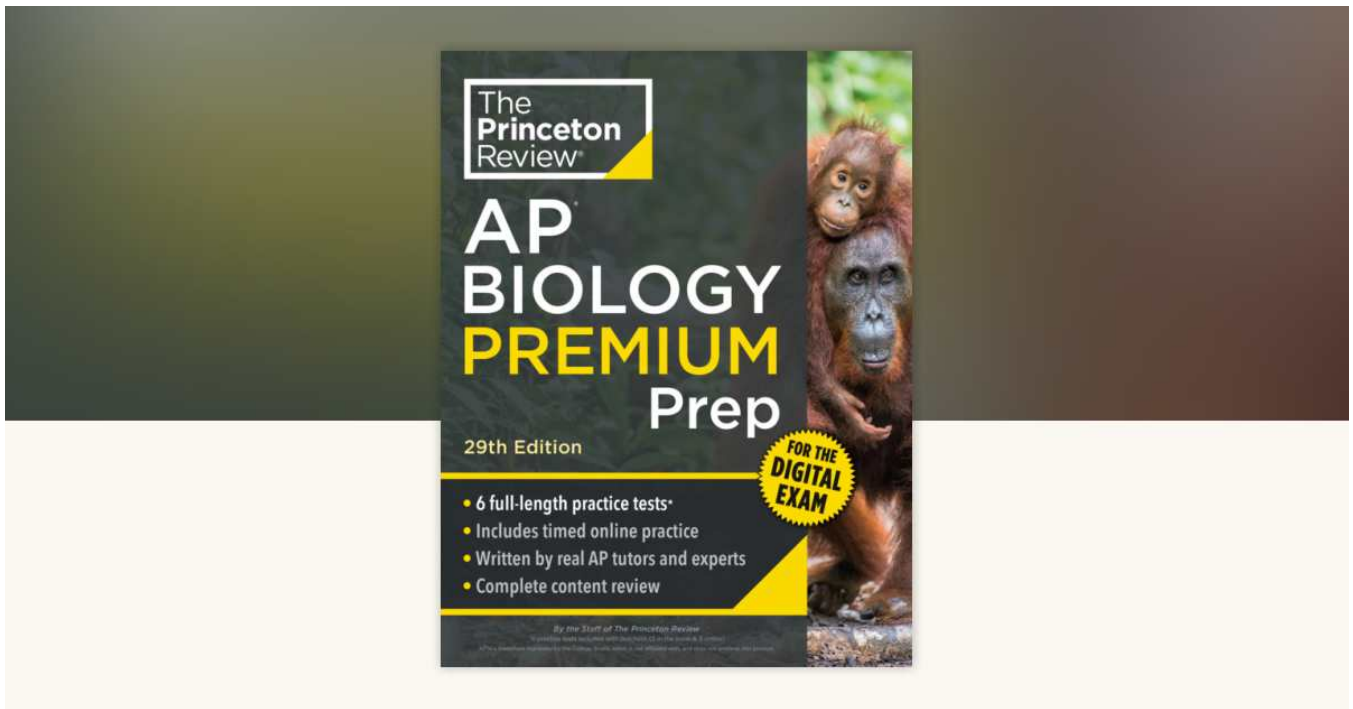


AP BIOLOGY CHEMISTRY OF LIFE

Chapter 1 | Princeton Review Premium Prep, 29th Edition



THE BIG IDEA

Chemical structures and interactions determine biological functions. Learn to explain why a property occurs, how a molecular change affects function, and what an experiment supports.

Concept map / 7 essential topics / AP-style MCQs / FRQ / answer key

학교별 중간고사 출제 방식은 미확인입니다. 이 문서는 AP 공식 범위 및 제시된 교재 범위를 참고한 학습 자료이며, USIS 기출문제가 아닙니다.

시험 이해하기

미국 College Board의 공식 AP Biology 시험과 학교 중간고사를 구분하세요. 학교 시험의 정확한 문항 수·시간·난이도는 수업 자료 또는 과거 시험지를 통해 확인해야 합니다.

공식 AP 시험	시험 구성	시험 전략
Multiple Choice	60 questions / 90 min / 50%	자료 해석과 구조-기능 연결
Free Response	6 questions / 90 min / 50%	근거를 사용한 설명·예측·정당화
Unit 1 weight	Approx. 8~11% of MCQ	Chemistry of Life 핵심 개념

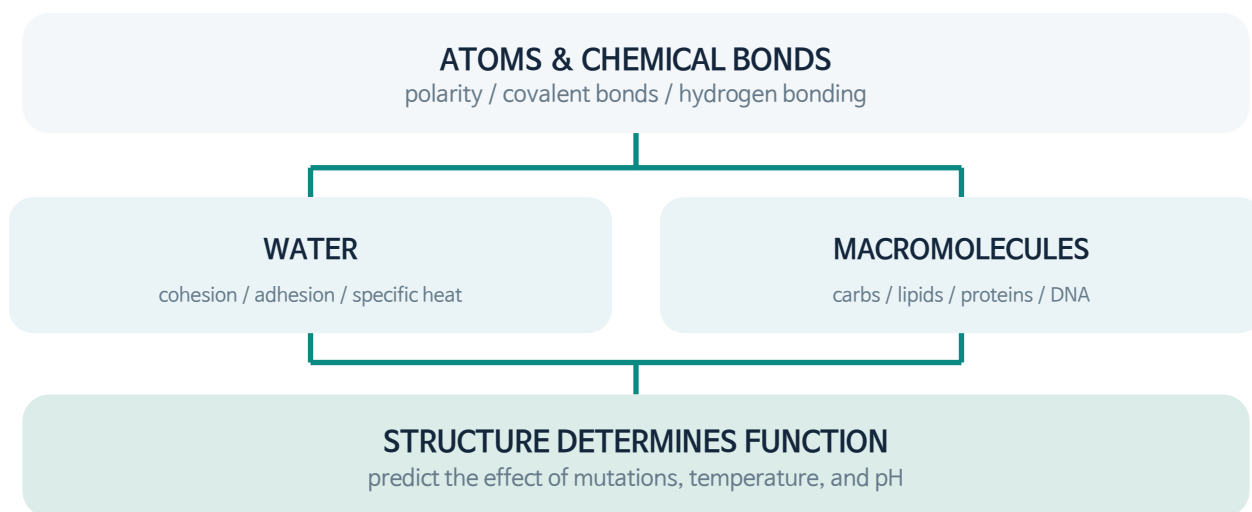
FRQ command words

Verb	What to do
Identify	State the correct term, structure, or result.
Describe	State an observable pattern or characteristic.
Explain	Connect cause, mechanism, and effect.
Predict	State a likely outcome after a condition changes.
Justify	Support your claim with relevant evidence or biological reasoning.

EXAM RULE Definition alone is rarely enough for an Explain prompt. Write a causal chain: property → interaction → structure → biological effect.

하나의 구조로 이해하는 Chapter 1

서로 떨어진 용어 7개를 암기하는 대신, 화학 결합과 분자 구조가 생명현상으로 이어지는 경로를 연결해 보세요.



Topic	Essential concepts	Likely AP task
Water	Polarity, hydrogen bonds, cohesion, adhesion, high specific heat	Explain a phenomenon
Elements / Carbon	CHNOPS, carbon bonding, molecular diversity	Analyze molecular structure
Macromolecules	Dehydration synthesis vs. hydrolysis	Predict a reaction
Carbohydrates	Monosaccharides, polymers, starch vs. cellulose	Compare structure/function
Lipids	Phospholipids, saturated vs. unsaturated fatty acids	Predict membrane effect
Nucleic acids	Nucleotides, DNA vs. RNA	Compare or infer
Proteins	Amino acids, R groups, folding, denaturation	Explain functional change

주의: Princeton Review의 Chapter 1 세부 페이지는 제공되지 않았으므로 위 항목은 College Board Unit 1과 표준 AP Biology 내용에 맞춘 학습 개요입니다.

AP-style multiple-choice practice

선지 영어로 제시합니다. 정답 확인 전에 반드시 근거가 되는 분자 수준의 기전을 한 문장으로 설명하세요.

QUESTION 01 / Water Properties

A researcher observes that water moves upward through narrow tubes in a plant, even against the force of gravity. Which property of water most directly contributes to this movement?

- A. Water molecules form ionic bonds with one another.
- B. Hydrogen bonding allows water molecules to cohere and adhere to other polar surfaces.
- C. Water molecules are nonpolar and readily dissolve lipids.
- D. Water has a lower specific heat than most liquids.

QUESTION 02 / Macromolecules

A scientist inhibits the formation of covalent bonds between monosaccharides. Which process will be most directly affected?

- A. The hydrolysis of polysaccharides
- B. The formation of hydrogen bonds between water molecules
- C. The synthesis of polysaccharides by dehydration reactions
- D. The diffusion of oxygen across a membrane.

SOLVE WITH EVIDENCE

What property or chemical bond is responsible? Which options contradict the mechanism? Eliminate exaggerated or irrelevant claims.

Structure → function reasoning

QUESTION 03 / Protein Structure

A mutation replaces a charged amino acid in the interior of a protein with a nonpolar amino acid. Which outcome is most reasonable?

- A. The primary structure must remain unchanged.
- B. The protein will necessarily be completely degraded.
- C. The mutation cannot affect the protein because all amino acids have identical properties.
- D. The substitution may alter interactions among R groups and change protein folding.

QUESTION 04 / Nucleic Acids

A researcher compares two nucleic acid molecules. Molecule X contains ribose and uracil, while molecule Y contains deoxyribose and thymine. Which conclusion is best supported?

- A. Molecule X is RNA, and molecule Y is DNA.
- B. Both molecules must be DNA.
- C. Molecule X cannot contain phosphodiester bonds.
- D. Molecule Y is composed of amino acids.

HIGH-SCORE HABIT

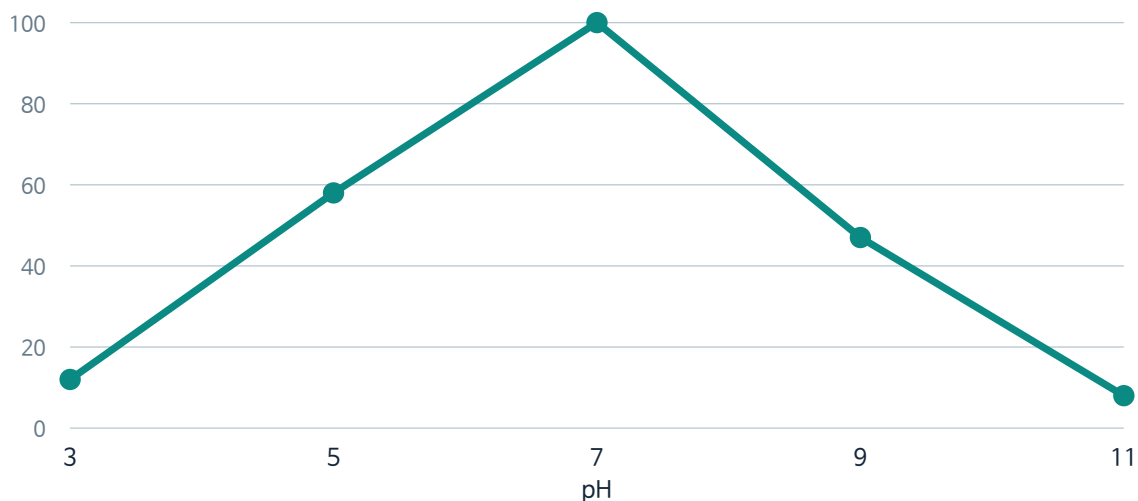
Beware of absolute words: always, never, must, necessarily. In biological systems, distinguish what is possible from what is guaranteed.

Protein structure and pH

A researcher measures the relative activity of a protein at several pH values under otherwise identical experimental conditions.

Relative activity (%)

Practice dataset – not a school exam result



Answer in complete scientific English.

- Identify the pH at which the protein exhibits maximum activity.
- Describe the relationship between pH and protein activity shown in the graph.
- Explain how changes in pH may alter interactions between amino acid R groups.
- Predict the likely effect of an extreme pH change on protein function, and justify your prediction using structure–function reasoning.

Response space

위 그래프는 문제 풀이를 위한 가상 실험 데이터입니다. 학교 시험에 실제로 출제된 자료가 아닙니다.

정답 · 판단 근거 · 함정

Q01 ANSWER B

Hydrogen bonding enables cohesion among water molecules and adhesion to appropriate surfaces. Both can contribute to capillary action.

Trap check Cohesion과 adhesion의 차이와 동시 작용을 확인.

Q02 ANSWER C

Dehydration reactions create covalent glycosidic linkages between monosaccharides and build polysaccharides.

Trap check Dehydration = 합성, hydrolysis = 분해.

Q03 ANSWER D

Different R groups can change local interactions and protein folding. A mutation may affect function, but it does not always destroy it.

Trap check “necessarily”와 같은 과도한 단정을 경계.

Q04 ANSWER A

Ribose + uracil indicates RNA; deoxyribose + thymine indicates DNA.

Trap check 염기와 당을 둘 다 대조.

FRQ model answer

(a) The protein exhibits maximum activity at pH 7.

(b) Activity increases from pH 3 to pH 7, then decreases as pH rises to 11.

(c) Changes in pH may change the protonation and charges of amino acid side chains, altering ionic interactions and hydrogen bonds that help maintain protein structure.

(d) Extreme pH may reduce activity because changes in three-dimensional structure may alter the functional region of the protein.

시험 직전 4단계

01

Proteins

R groups → folding → pH / mutation → function

02

Water

Polarity → hydrogen bonding → cohesion / specific heat

03

Macromolecules

Monomer/polymer → dehydration/hydrolysis → role

04

Nucleic Acids & Lipids

DNA/RNA differences → phospholipid structure

5-minute self-check

- ☐ Can I explain why water has high specific heat?
- ☐ Can I compare dehydration synthesis and hydrolysis?
- ☐ Can I relate phospholipid structure to behavior in water?
- ☐ Can I explain how R-group changes may affect protein folding?
- ☐ Can I describe an experimental trend without overclaiming?

FINAL METHOD

Understand → draw the structure → connect structure to function → change one condition → predict the consequence → explain it aloud in English.

SOURCE & SCOPE

College Board AP Biology Course and Exam Description / AP Biology Exam page; Princeton Review AP Biology Premium Prep, 29th Edition (cover and edition identified). Original practice questions and hypothetical experimental data were created for this study guide. USIS-specific past papers, teacher handouts, and exact textbook chapter pages were not available for verification.