

Photosynthesis in Higher Plants — CBSE Pattern Test 1

Class 11 Biology · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 1 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Biology · Photosynthesis in Higher Plants · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.

(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.

(3) For MCQ questions choose the single correct option; for VSA answers write a single line.

(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

1. Photosynthesis converts light energy into
 - (A) chemical energy
 - (B) heat energy
 - (C) mechanical energy
 - (D) electrical energy
2. The pigment that absorbs light in green plants is
 - (A) chlorophyll
 - (B) haemoglobin
 - (C) melanin
 - (D) carotene only
3. The light reaction occurs in the
 - (A) thylakoid membranes
 - (B) stroma
 - (C) cytoplasm
 - (D) mitochondria
4. Photosystem I absorbs light maximally at
 - (A) P700
 - (B) P680
 - (C) P660
 - (D) P760
5. The Calvin cycle occurs in the
 - (A) stroma
 - (B) thylakoid
 - (C) cytoplasm
 - (D) nucleus
6. The enzyme that fixes CO_2 in the Calvin cycle is
 - (A) RuBisCO
 - (B) ATP synthase
 - (C) hexokinase
 - (D) pepsin
7. The first stable product of the C_4 pathway is
 - (A) OAA

- (B) 3-PGA
 - (C) glucose
 - (D) pyruvate
8. Photorespiration occurs when RuBisCO binds
- (A) O₂
 - (B) CO₂
 - (C) N₂
 - (D) H₂O
9. Define photosynthesis.
10. What is the Z-scheme?

Section B — Short Answer I (4 × 2 = 8 marks)

11. Where does the light reaction occur?
12. What is the first stable product of the Calvin cycle?
13. Name one C₄ plant.
14. What is a limiting factor?

Section C — Short Answer II (4 × 3 = 12 marks)

15. State the products of the light reaction.
16. Name the three phases of the Calvin cycle.
17. State two advantages of the C₄ pathway.
18. State two drawbacks of photorespiration.

Section D — Long Answers (2 × 5 = 10 marks)

19. (a) Describe the events of the light reaction. (b) Describe the stages of the Calvin cycle.
20. (a) Describe the C₄ pathway and Kranz anatomy. (b) Explain the factors affecting the rate of photosynthesis.

Answer Key (Marking Scheme)

- Q1 — (A) chemical energy. Q2 — (A) chlorophyll. Q3 — (A) thylakoid membranes. Q4 — (A) P700. Q5 — (A) stroma. Q6 — (A) RuBisCO. Q7 — (A) OAA. Q8 — (A) O₂.
- Q9 — Photosynthesis is the process by which green plants use light energy to convert CO₂ and water into carbohydrate, releasing O₂.
- Q10 — The Z-scheme is the electron pathway from water through PSII and PSI to NADP⁺, drawn as a Z.
- Q11 — In the thylakoid membranes of the chloroplast.
- Q12 — 3-PGA (3-phosphoglyceric acid).
- Q13 — Maize (or sugarcane).
- Q14 — The factor in shortest supply that limits the rate.
- Q15 — ATP, NADPH and O₂.
- Q16 — Carboxylation, reduction and regeneration.
- Q17 — No photorespiration and higher productivity.
- Q18 — It consumes ATP without producing sugar and releases CO₂.

Q19 — (a) PSII splits water, electrons pass via the ETC to PSI reducing NADP⁺; proton gradient drives ATP synthesis. (b) Carboxylation, reduction, regeneration.

Q20 — (a) Mesophyll fixes CO₂ into OAA via PEP carboxylase, bundle-sheath cells release CO₂ for the Calvin cycle. (b) Light, CO₂, temperature and water; rate limited by the factor in shortest supply.