

Brett Robbins Academic Consulting

Biology 20 Practice Test

Unit 3: Photosynthesis and Cellular Respiration

25 Questions

Original practice questions written to the Alberta curriculum, in the style of past diploma examinations. Work through each question, then check your answers with the key at the end.

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, contact Brett for clarification.

Question 1

The overall process of photosynthesis is best represented by the equation

- A) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{energy}$
- B) $6CO_2 + 6H_2O + \text{light energy} \rightarrow C_6H_{12}O_6 + 6O_2$
- C) $6CO_2 + 6O_2 + \text{light energy} \rightarrow C_6H_{12}O_6 + 6H_2O$
- D) $C_6H_{12}O_6 + 6H_2O \rightarrow 6CO_2 + 6O_2$

Question 2

In a plant cell, photosynthesis takes place in the

- A) chloroplast
- B) mitochondrion
- C) nucleus
- D) vacuole

Question 3

The main purpose of cellular respiration is to

- A) produce glucose for storage
- B) release oxygen into the air
- C) transfer energy from glucose to ATP
- D) remove carbon dioxide from cells

Question 4

The oxygen released during photosynthesis comes directly from

- A) carbon dioxide
- B) chlorophyll
- C) glucose
- D) water

Question 5

During glycolysis, each glucose molecule that is broken down produces a net gain of 2 ATP.

The net gain of ATP when 4 glucose molecules are broken down by glycolysis is ____

Question 6

The light-dependent reactions of photosynthesis occur in the

- A) stroma of the chloroplast
- B) thylakoid membranes of the chloroplast
- C) cytoplasm of the cell
- D) matrix of the mitochondrion

Question 7

In the light-independent reactions (the Calvin cycle), ATP and NADPH are used to

- A) build sugars from carbon dioxide
- B) split water molecules
- C) release oxygen gas
- D) break down glucose

Question 8

Glycolysis, the first stage of cellular respiration, takes place in the

- A) matrix of the mitochondrion
- B) inner membrane of the mitochondrion
- C) cytoplasm of the cell
- D) stroma of the chloroplast

Question 9

A student gradually increases the light intensity on an aquatic plant. The rate of photosynthesis rises at first and then levels off, even though the light keeps getting brighter.

The best explanation for this levelling off is that

- A) the plant has stopped carrying out cellular respiration
- B) bright light has destroyed all of the chlorophyll
- C) oxygen has built up and shut down the chloroplasts
- D) another factor, such as carbon dioxide concentration, has become limiting

Question 10

In alcoholic fermentation, each glucose molecule produces 2 molecules of carbon dioxide.

The number of carbon dioxide molecules produced when yeast ferment 7 glucose molecules is ____

Question 11

In an experiment, a respirometer shows that germinating seeds take up oxygen, while boiled seeds in an identical setup take up no oxygen. This result shows that

- A) oxygen uptake is caused by heat released from the seeds
- B) oxygen uptake depends on living cells carrying out cellular respiration
- C) boiled seeds carry out more photosynthesis than living seeds
- D) germinating seeds produce oxygen as they grow

Question 12

A plant grown under green light only grows poorly, mainly because chlorophyll

- A) absorbs green light better than any other colour
- B) reflects green light instead of absorbing it
- C) is destroyed by green light
- D) needs green light to make ATP

Question 13

During the light-dependent reactions, water molecules are split. Besides oxygen, this splitting of water provides the chloroplast with

- A) carbon dioxide for the Calvin cycle
- B) glucose for cellular respiration
- C) electrons and hydrogen ions used to form NADPH
- D) ADP for the stroma

Question 14

The Krebs cycle turns once for each pyruvate molecule. Because each glucose molecule produces 2 pyruvate molecules, the cycle turns twice for every glucose molecule.

The total number of turns of the Krebs cycle when 6 glucose molecules are respired is ____

Question 15

Most of the ATP produced during aerobic cellular respiration is made during

- A) glycolysis in the cytoplasm
- B) the Krebs cycle in the matrix
- C) the electron transport chain in the inner mitochondrial membrane
- D) fermentation in the cytoplasm

Question 16

A plant is at its compensation point when

- A) photosynthesis stops completely
- B) cellular respiration stops completely
- C) the plant releases oxygen all day
- D) the rate of photosynthesis equals the rate of respiration, so there is no net gas exchange

Question 17

When the temperature rises well above the optimum for photosynthesis, the rate of photosynthesis decreases, mainly because

- A) the enzymes that catalyze the reactions begin to denature
- B) less carbon dioxide enters the air
- C) the plant runs out of glucose
- D) the plant produces less chlorophyll in hot weather

Question 18

An aquatic plant releases 36 mL of oxygen during 12 minutes of photosynthesis.

The average rate of oxygen release, in mL per minute, is ____

Question 19

Which statement best describes how photosynthesis and cellular respiration are connected?

- A) Respiration stores light energy in glucose, and photosynthesis releases it
- B) The products of photosynthesis, glucose and oxygen, are the reactants of cellular respiration
- C) Both processes occur only in the chloroplast
- D) Both processes produce oxygen gas

Question 20

Aerobic respiration releases far more ATP from each glucose molecule than fermentation does, because aerobic r

- A) breaks glucose down completely to carbon dioxide and water
- B) takes place only in mitochondria
- C) does not require any enzymes
- D) produces glucose as an end product

Question 21

In chemiosmosis, ATP is produced when hydrogen ions

- A) are pumped into the matrix of the mitochondrion
- B) combine with oxygen to form water
- C) flow through ATP synthase from an area of high concentration to an area of low concentration
- D) split a glucose molecule in the cytoplasm

Question 22

Complete aerobic respiration of one glucose molecule produces a total of 36 ATP.

Glycolysis contributes a net of 2 ATP and the Krebs cycle contributes 2 ATP.

The number of ATP produced by the electron transport chain is ____

Question 23

Muscle cells contain far more mitochondria than skin cells. The best explanation is that muscle cells

- A) carry out photosynthesis to store energy
- B) store large amounts of glucose in mitochondria
- C) use mitochondria to remove lactic acid from the blood
- D) require large amounts of ATP for contraction

Question 24

A healthy green plant is kept in complete darkness overnight. During the night, the plant

- A) carries out cellular respiration, taking in oxygen and releasing carbon dioxide
- B) carries out photosynthesis, taking in carbon dioxide
- C) stops both photosynthesis and cellular respiration
- D) releases oxygen produced by the Calvin cycle

Question 25

The complete aerobic respiration of one glucose molecule requires 6 molecules of oxygen.

The number of oxygen molecules required to completely respire 9 glucose molecules is ____

Answer Key

- | | | |
|------|--------|--------|
| 1. B | 10. 14 | 19. B |
| 2. A | 11. B | 20. A |
| 3. C | 12. B | 21. C |
| 4. D | 13. C | 22. 32 |
| 5. 8 | 14. 12 | 23. D |
| 6. B | 15. C | 24. A |
| 7. A | 16. D | 25. 54 |
| 8. C | 17. A | |
| 9. D | 18. 3 | |

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