

AQA (GCSE Notes)

Chapter 4: Bioenergetics

- Q1. What is the word equation for photosynthesis?
- Q2. What is the balanced chemical equation for photosynthesis?
- Q3. What does it mean when we say photosynthesis is an endothermic reaction?
- Q4. What are the main raw materials needed for photosynthesis to take place?
- Q5. Where in a plant cell does photosynthesis happen?
- Q6. What is the role of chlorophyll in photosynthesis?
- Q7. How does light energy affect the process of photosynthesis?
- Q8. Why is carbon dioxide necessary for photosynthesis?
- Q9. How does temperature affect the rate of photosynthesis?
- Q10. What is a limiting factor in photosynthesis?
- Q11. Explain why the rate of photosynthesis increases with light intensity up to a certain point.
- Q12. What happens to the rate of photosynthesis if a plant has low levels of chlorophyll?
- Q13. Describe how the concentration of carbon dioxide can affect photosynthesis.
- Q14. What are the products of photosynthesis and how are they used by the plant?
- Q15. How would you design an experiment to test the effect of light intensity on the rate of photosynthesis?
- Q16. What is the role of water in the photosynthesis reaction?
- Q17. What is meant by the term "rate of photosynthesis"?
- Q18. Why does photosynthesis slow down at very high temperatures?
- Q19. How can you measure the rate of photosynthesis in a lab experiment?
- Q20. How would you identify the limiting factor in a given photosynthesis graph?

- Q21.** Describe how a plant uses the glucose produced in photosynthesis.
- Q22.** Why is it important for farmers to understand limiting factors of photosynthesis?
- Q23.** What is the inverse square law and how does it apply to photosynthesis?
- Q24.** How can graphs be used to interpret the effect of light intensity on photosynthesis?
- Q25.** Why might a greenhouse be heated artificially during cold weather?
- Q26.** What is the economic benefit of controlling light, temperature, and carbon dioxide in a greenhouse?
- Q27.** Why might the rate of photosynthesis not increase even if light intensity is increased further?
- Q28.** How do you know when a factor is limiting the rate of photosynthesis?
- Q29.** Why is oxygen released during photosynthesis?
- Q30.** What is the role of chloroplasts in the process of photosynthesis?
- Q31.** Why is photosynthesis important for life on Earth?
- Q32.** How can a plant compensate for low light conditions?
- Q33.** What type of energy transformation takes place during photosynthesis?
- Q34.** How does the structure of a leaf help it carry out photosynthesis?
- Q35.** Explain how stomata are involved in photosynthesis.
- Q36.** What happens to the rate of photosynthesis when carbon dioxide levels are high but light is low?
- Q37.** Why does photosynthesis require enzymes?
- Q38.** How could a scientist test the effect of carbon dioxide on photosynthesis?
- Q39.** Why might a plant grown in the shade have larger leaves?
- Q40.** Describe a method to calculate the rate of photosynthesis using pondweed.
- Q41.** How can artificial lighting be used to increase crop yield in greenhouses?
- Q42.** What safety precautions should be taken when using lamps to investigate photosynthesis?
- Q43.** How does increasing chlorophyll concentration affect photosynthesis?

- Q44.** How can temperature be controlled in an experimental setup for photosynthesis?
- Q45.** Why is it necessary to control variables when testing photosynthesis rates?
- Q46.** What conclusions can be drawn from a photosynthesis graph with a plateau?
- Q47.** How do scientists use mathematical models to describe photosynthesis rates?
- Q48.** Why do plants need to photosynthesise during the daytime?
- Q49.** What is meant by the term “optimum temperature” in relation to photosynthesis?
- Q50.** How can photosynthesis graphs help in deciding how to increase plant growth in different seasons?
- Q51.** How can you investigate the effect of light intensity on the rate of photosynthesis using pondweed?
- Q52.** What is the role of a lamp in the pondweed experiment on photosynthesis?
- Q53.** How can you make sure the temperature stays constant during the photosynthesis practical?
- Q54.** Why is it important to count the number of oxygen bubbles released in the pondweed experiment?
- Q55.** What is one way to make the measurement of oxygen more accurate in the light intensity experiment?
- Q56.** What does AT 1 refer to in the context of the photosynthesis practical?
- Q57.** What variable should be changed to investigate light intensity in the required practical?
- Q58.** What are the controlled variables in the light intensity experiment using pondweed?
- Q59.** What would be the effect of increasing the distance between the lamp and the pondweed?
- Q60.** Why is it important to repeat the pondweed experiment and take an average?
- Q61.** How can the rate of photosynthesis be calculated from the experiment with pondweed?
- Q62.** What is meant by a qualitative reagent?
- Q63.** How can you test a leaf for the presence of starch?
- Q64.** Why is the leaf boiled in ethanol during the starch test?
- Q65.** What reagent is used to test for glucose in plants?
- Q66.** What colour change would you expect when testing for protein using biuret reagent?

- Q67. What is the chemical formula for glucose?
- Q68. How is glucose used for respiration in plants?
- Q69. Why do plants convert glucose into starch?
- Q70. Why is starch stored in an insoluble form in plants?
- Q71. How is glucose used to produce fat or oil in plants?
- Q72. What is the importance of cellulose made from glucose?
- Q73. What extra nutrient do plants need to make amino acids?
- Q74. How do plants get nitrate ions from the soil?
- Q75. What is the word equation for aerobic respiration?
- Q76. Write the balanced chemical equation for aerobic respiration.
- Q77. Why is aerobic respiration described as an exothermic reaction?
- Q78. In what part of the cell does aerobic respiration mostly take place?
- Q79. How is the energy from respiration used in movement?
- Q80. Why is respiration important for keeping animals warm?
- Q81. What is the word equation for anaerobic respiration in human muscles?
- Q82. Why is less energy released in anaerobic respiration compared to aerobic respiration?
- Q83. What is the main product of anaerobic respiration in muscles?
- Q84. Why does lactic acid cause fatigue in muscles?
- Q85. What process breaks down lactic acid after exercise?
- Q86. What is the word equation for anaerobic respiration in yeast?
- Q87. What are the products of anaerobic respiration in yeast?
- Q88. What is fermentation?
- Q89. How is fermentation used in bread making?

- Q90.** How is fermentation used in the production of alcoholic drinks?
- Q91.** What gas is produced during fermentation that helps dough rise?
- Q92.** Why do yeast cells switch to anaerobic respiration when oxygen is not available?
- Q93.** Compare the products of aerobic respiration and anaerobic respiration in humans.
- Q94.** Compare the amount of energy released in aerobic and anaerobic respiration.
- Q95.** How does the body respond to increased energy demands during vigorous exercise?
- Q96.** Why does heart rate increase during aerobic respiration?
- Q97.** How does anaerobic respiration differ between muscle cells and yeast cells?
- Q98.** What are the similarities between aerobic and anaerobic respiration?
- Q99.** What happens to the oxygen supply to muscles during very intense exercise?
- Q100.** Why is respiration considered a continuous process in all living cells?
- Q101.** What changes happen in the body during exercise to meet increased energy demands?
- Q102.** Why does the heart rate increase during physical activity?
- Q103.** How does an increase in breathing rate help the body during exercise?
- Q104.** What is meant by an increase in breath volume during exercise?
- Q105.** Why do muscles need more oxygen during exercise?
- Q106.** What happens when the body cannot supply enough oxygen to the muscles during exercise?
- Q107.** What causes a build-up of lactic acid in the muscles?
- Q108.** What is meant by the term "oxygen debt"?
- Q109.** How is oxygen debt paid back after exercise ends?
- Q110.** What effect does lactic acid have on muscle function?
- Q111.** What does it mean when muscles become fatigued?
- Q112.** How does the liver help the body recover after anaerobic respiration?

- Q113.** How is lactic acid removed from muscle cells after exercise?
- Q114.** Why do athletes need to warm up before vigorous exercise?
- Q115.** What is the importance of cooling down after exercise?
- Q116.** What types of data could be collected during an investigation on the effects of exercise?
- Q117.** How can heart rate be measured accurately before and after exercise?
- Q118.** What is one method to investigate the effect of exercise on breathing rate?
- Q119.** Why should results be repeated when measuring the effects of exercise?
- Q120.** What is metabolism?
- Q121.** What are the main components involved in the synthesis of carbohydrates, proteins, and lipids?
- Q122.** What is formed when glucose is converted to starch?
- Q123.** How are glycogen and cellulose related to glucose?
- Q124.** What are lipids made from?
- Q125.** Describe the basic structure of a lipid molecule.
- Q126.** What molecules are needed to make amino acids in plants?
- Q127.** How are proteins built from amino acids?
- Q128.** Why is respiration included in the definition of metabolism?
- Q129.** What type of reaction is the breakdown of excess proteins into urea?
- Q130.** What is the role of the liver in protein breakdown?
- Q131.** How is urea removed from the body?
- Q132.** What role do enzymes play in metabolic reactions?
- Q133.** Why is energy needed for metabolic processes?
- Q134.** How does metabolism support growth in organisms?
- Q135.** What is the relationship between respiration and metabolism?



MEGA
LECTURE

- Q136.** What is the difference between anabolic and catabolic reactions?
- Q137.** How are glucose molecules used in metabolism?
- Q138.** What is the importance of metabolic reactions in everyday life?
- Q139.** How does the body store glucose when it is not immediately needed?
- Q140.** What happens to glucose during cellular respiration?
- Q141.** How is excess glucose stored in the liver and muscles?
- Q142.** How are fatty acids important in metabolism?
- Q143.** How do metabolic processes affect body temperature?
- Q144.** What are examples of molecules broken down during metabolism?
- Q145.** How can a poor diet affect metabolic processes in the body?
- Q146.** How does exercise influence the rate of metabolism?
- Q147.** How can hormones affect metabolism?
- Q148.** Why is the balance of metabolic reactions important for health?
- Q149.** Why must the body remove excess amino acids?
- Q150.** What is one way to investigate the effect of physical activity on metabolism in a classroom setting?