**Topic 4- Bioenergetics - AQA Biology GCSE**

# Exam Questions/Mock Exam Questions

**Questions For Foundation, Higher, and Triple Science (scroll down for questions for higher and triple science only):**
(It would still be recommended to answer the foundation tier questions for triple science and higher tier to ensure you have good understanding).

**Q1.** Plants use sunlight for photosynthesis.
(a) Write the word equation for photosynthesis.

(2)

(b) Name one factor that affects the rate of photosynthesis.

(1)
**[Total: 3 marks]**

**Q2.** A student investigates how light intensity affects photosynthesis.
(a) What gas is released during photosynthesis?

(1)

(b) Suggest one way the student could measure the rate of photosynthesis in their experiment.

(2)
**[Total: 3 marks]**

**Q3.** A greenhouse can help plants grow faster.
(a) Explain one way a greenhouse improves photosynthesis.

(2)

(b) Give one other condition that is controlled in a greenhouse.

_____

(1)
**[Total: 3 marks]**

**Q4.** Glucose made in photosynthesis can be used by plants in different ways.
(a) State two uses of glucose in plants.

1. _____
2. _____

(2)

(b) What is glucose stored as in plant cells?

_____

(1)
**[Total: 3 marks]**

**Q5.** The rate of photosynthesis can be limited by several factors.
(a) Name one limiting factor of photosynthesis.

_____

(1)

(b) How does temperature affect the rate of photosynthesis?

_____

_____

(2)
**[Total: 3 marks]**

**Q6.** A student sets up a pondweed in a beaker under a lamp.
(a) Why is the lamp moved further away in each repeat?

_____

(2)

(b) What would be the effect of moving the lamp further away?

(1)
**[Total: 3 marks]**

**Q7.** Organisms need energy for many processes.
(a) State one use of energy in the human body.

(1)

(b) Which process in cells releases this energy?

(1)
**[Total: 2 marks]**

**Q8.** Aerobic respiration uses oxygen.
(a) Write the word equation for aerobic respiration.

(2)

(b) In which part of the cell does respiration happen?

(1)
**[Total: 3 marks]**

**Q9.** Anaerobic respiration occurs when oxygen is not available.
(a) Write the word equation for anaerobic respiration in muscles.

(1)

(b) Why is anaerobic respiration less efficient than aerobic respiration?

(2)
**[Total: 3 marks]**

**Q10.** During exercise, the body responds in different ways.
(a) Give one change that happens in the body during exercise.

(1)

(b) Explain why this change helps during exercise.

(2)
**[Total: 3 marks]**

**Q11.** Plants and animals carry out respiration.
(a) Which gas is used in aerobic respiration?

(1)

(b) Which gas is produced?

(1)
**[Total: 2 marks]**

**Q12.** Respiration is a chemical reaction.
(a) Is respiration endothermic or exothermic?

(1)

(b) Give a reason for your answer.

(2)
**[Total: 3 marks]**

**Q13.** During vigorous exercise, lactic acid builds up.
(a) What is the effect of lactic acid on the muscles?

(1)

(b) What is oxygen debt?

(2)
**[Total: 3 marks]**

**Q14.** The body removes lactic acid after exercise.
(a) How is lactic acid removed from the body?

(2)

(b) Which organ helps to deal with lactic acid?

(1)
**[Total: 3 marks]**

**Q15.** Metabolism involves many chemical reactions.
(a) What is metabolism?

(2)

(b) Give one example of a metabolic reaction.

(1)
**[Total: 3 marks]**

**Q16.** A student compares aerobic and anaerobic respiration.
(a) State one difference between aerobic and anaerobic respiration.

(1)

(b) Which type of respiration causes oxygen debt?

(1)
**[Total: 2 marks]**

**Q17.** A runner is tested after a race.
(a) Why does the runner continue to breathe heavily after finishing the race?

(2)

(b) Name the substance that must be broken down after anaerobic respiration.

(1)
**[Total: 3 marks]**

## Higher Tier

**Q18.** Photosynthesis is an endothermic reaction. (a) Explain what is meant by an endothermic reaction.

(2)

(b) Suggest how the structure of a leaf is adapted to carry out photosynthesis.

(3)
**[Total: 5 marks]**

**Q19.** A student investigates how carbon dioxide concentration affects the rate of photosynthesis in pondweed. (a) Name one variable the student should keep constant during the investigation.

(1)

(b) Explain why increasing carbon dioxide concentration increases the rate of photosynthesis.

(2)

(c) Describe how the student could measure the rate of photosynthesis.

(3)
**[Total: 6 marks]**

**Q20.** Plants convert glucose into different substances. (a) Name two substances that plants convert glucose into for storage or structure.

1. _____
2. _____

(2)

(b) Explain why converting glucose into starch is useful for plants.

_____

_____

(2)

**[Total: 4 marks]**

**Q21.** Respiration releases energy in living organisms. (a) Write the balanced symbol equation for aerobic respiration.

_____

_____

(2)

(b) State two uses of the energy released by aerobic respiration in animals.

1. _____
2. _____

(2)

**[Total: 4 marks]**

**Q22.** A scientist compares aerobic and anaerobic respiration in yeast. (a) Give the word equation for anaerobic respiration in yeast.

_____

(1)

(b) Explain one advantage of anaerobic respiration in yeast during industrial fermentation.

(2)

(c) Suggest one reason why aerobic respiration is preferred in muscle cells.

(2)
**[Total: 5 marks]**

**Q23.** A student takes part in a fitness experiment. (a) Explain why heart rate and breathing rate increase during exercise.

(3)

(b) Describe what happens to glucose in muscle cells during anaerobic respiration.

(2)
**[Total: 5 marks]**

**Q24.** Scientists study the effect of temperature on photosynthesis. (a) Describe how a temperature that is too high could affect the rate of photosynthesis.

(2)

(b) Explain why enzymes are important in photosynthesis.

(2)
**[Total: 4 marks]**

**Q25.** Plants grown in a greenhouse have different conditions than plants grown outdoors. (a) State three environmental conditions that can be controlled in a greenhouse.

1. 
2. 
3. 

(3)

(b) Explain why controlling these conditions helps increase the yield of plants.

(3)
**[Total: 6 marks]**

**Q26.** Anaerobic respiration in muscle cells causes fatigue. (a) Name the substance produced in muscles during anaerobic respiration.

(1)

(b) Describe how the body removes this substance after exercise.

(2)
**[Total: 3 marks]**

**Q27.** Metabolism includes all the chemical reactions in a cell. (a) Give two examples of metabolic reactions in the human body.

1. _____
2. _____

(2)

(b) Explain how metabolism is related to respiration.

_____

_____

(2)
**[Total: 4 marks]**

**Q28.** A graph shows how light intensity affects the rate of photosynthesis. (a) Describe the pattern shown by the graph.

_____

_____

(2)

(b) Suggest one reason why the rate of photosynthesis stops increasing at high light intensity.

_____

_____

(2)
**[Total: 4 marks]**

**Q29.** A scientist tests two different fertilisers on plant growth. (a) State the independent variable in this experiment.

_____

(1)

(b) State one control variable in this experiment.

_____

(1)

(c) Suggest how the scientist could measure the rate of photosynthesis in the plants.

(2)
**[Total: 4 marks]**

**Q30.**

**Photosynthesis and respiration are both vital to life on Earth.**
(a) Compare photosynthesis and aerobic respiration. In your answer, include:

- where they happen
- the substances used and produced
- whether they are endothermic or exothermic

(6) **[Total: 6 marks]**

## Triple Science Tier

**Q31.** Photosynthesis occurs in chloroplasts of plant cells.
(a) Describe the role of chlorophyll in photosynthesis.

(2)

(b) Explain how the structure of chloroplasts helps them carry out photosynthesis efficiently.

(3)

**[Total: 5 marks]**

**Q32.** Light intensity, temperature, and carbon dioxide concentration affect photosynthesis.
(a) Explain how light intensity affects the rate of photosynthesis.

(2)

(b) Describe how plants adapt to low light conditions to increase photosynthesis.

(2)

(c) Suggest one reason why photosynthesis cannot happen without light.

(1)

**[Total: 5 marks]**

**Q33.** Investigating photosynthesis: A student uses pondweed to measure oxygen production at different temperatures.
(a) Explain why oxygen production can be used as a measure of the rate of photosynthesis.

(2)

(b) Predict how the rate of photosynthesis changes as temperature rises from 10°C to 30°C. Explain your answer.

(3)

**[Total: 5 marks]**

**Q34.** The glucose made by photosynthesis is used by plants in different ways.
(a) Write the chemical formula for glucose.

(1)

(b) Explain how glucose is used to produce cellulose and starch in plants.

(3)

**[Total: 4 marks]**

**Q35.** Aerobic respiration releases energy from glucose.
(a) Write the balanced symbol equation for aerobic respiration.

(2)

(b) Explain why aerobic respiration releases more energy than anaerobic respiration.

(3)

**[Total: 5 marks]**

**Q36.** Anaerobic respiration in muscles produces lactic acid.
(a) Explain why lactic acid builds up during vigorous exercise.

(2)

(b) Describe how the body removes lactic acid after exercise.

(2)

(c) Suggest why anaerobic respiration is less efficient than aerobic respiration.

(1)

**[Total: 5 marks]**

**Q37.** ATP is the energy currency of cells.
(a) Describe the role of ATP in cellular processes.

(2)

(b) Explain how ATP is produced during respiration.

(3)

**[Total: 5 marks]**

**Q38.** During photosynthesis, energy is transferred through the ecosystem.
(a) Explain the importance of photosynthesis to life on Earth.

(2)

(b) Describe what happens to the energy stored in glucose when it is eaten by animals.

(3)

**[Total: 5 marks]**

**Q39.** A student measures the rate of photosynthesis at different carbon dioxide concentrations.
(a) What is the limiting factor when increasing carbon dioxide concentration no longer increases photosynthesis?

(1)

(b) Explain why photosynthesis stops increasing beyond a certain carbon dioxide concentration.

(3)

**[Total: 4 marks]**

**Q40.** Plants store glucose as starch.
(a) Explain why starch is a better storage molecule than glucose.

(2)

(b) Suggest how the storage of starch helps plants survive in winter.

(2)

**[Total: 4 marks]**

**Q41.** Photosynthesis can be represented by the equation:
$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
(a) Name the reactants and products in this equation.
Reactants: _____
Products: _____
(2)

(b) Explain the role of water in photosynthesis.

(2)

(c) Describe what happens to the oxygen produced during photosynthesis.

(1)

**[Total: 5 marks]**

**Q42.** Temperature can affect enzyme activity in photosynthesis.
(a) Describe what happens to the rate of photosynthesis if temperature exceeds the optimum.

(2)

(b) Explain why enzymes are important in photosynthesis.

(2)

**[Total: 4 marks]**

**Q43.** Plants need minerals for healthy growth.
(a) Name two minerals plants need and explain how each is used.

1. _____

Use: _____
2. _____
Use: _____
(4)

**[Total: 4 marks]**

**Q44.** (6 MARK QUESTION)
Describe the process of photosynthesis and explain the factors that affect its rate. In your answer, include:

- The main stages of photosynthesis
- The role of chlorophyll
- How light intensity, carbon dioxide concentration, and temperature affect photosynthesis

_____

_____

_____

_____

_____

_____

_____

_____

(6)

**[Total: 6 marks]**

**Q45.** Energy transfer in cells is essential for life.
(a) Explain how glucose produced in photosynthesis is converted into energy for cellular activities.

(3)

(b) Describe the difference between aerobic and anaerobic respiration in terms of oxygen use and energy yield.

(3)

**[Total: 6 marks]**