

Exercise walk-through

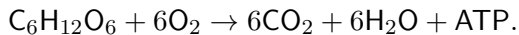
Cellular Respiration ■ 3.5

eXercise

You must be able to

- write the overall equation
- name the three stages (**glycolysis** 糖酵解, **Krebs cycle** 克雷布斯循环, **electron transport chain** 电子传递链)
- state where most ATP is made and the role of oxygen

Method — The overall reaction



Cells break down glucose with oxygen to release energy as ATP.

Method — The three stages

- **Glycolysis** (cytoplasm) — splits glucose into pyruvate, makes a little ATP.
- **Krebs cycle** (mitochondrial matrix) — releases CO_2 , makes electron carriers.
- **Electron transport chain** (inner mitochondrial membrane) — makes **most** of the ATP.

Method — Oxygen's role

Oxygen is the **final electron acceptor** in the electron transport chain, forming water. Without it, the chain stops and little ATP is made.

Method — A worked link

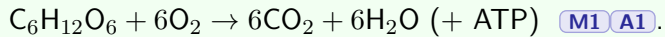
Most ATP comes from the electron transport chain, powered by electrons carried from glycolysis and the Krebs cycle, using a proton gradient across the inner membrane.

Practice 2.1 ■ 2 marks

Write the overall equation for cellular respiration.

Solution 2.1

Worked steps



Practice 2.2 ■ 3 marks

Name the three stages of respiration.

Solution 2.2

Method: The three stages

Worked steps

Glycolysis, the Krebs cycle, the electron transport chain **B1** **B1** **B1**.

Practice 2.3 ■ 1 mark

What is the role of oxygen in respiration?

Solution 2.3

Method: Oxygen's role

Worked steps

It is the final electron acceptor in the electron transport chain **B1**.

Exam-style 3.1 ■ 1 mark

Most of the ATP in cellular respiration is made in the

- A** glycolysis stage
- B** Krebs cycle
- C** electron transport chain
- D** cytoplasm

Solution 3.1

A glycolysis stage

B Krebs cycle

C electron transport chain



D cytoplasm

Worked steps

C — the electron transport chain.

Exam-style 3.2 ■ 2 marks

A cell is respiring aerobically.

- (a) State where glycolysis occurs and its main product.
- (b) Explain what happens to ATP production if oxygen runs out.

Solution 3.2

Worked steps

(a) Glycolysis occurs in the cytoplasm; its product is pyruvate **M1 A1**. (b) Without oxygen the electron transport chain stops, so most ATP production halts and the cell relies on the small amount from glycolysis (fermentation) **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain the relationship between photosynthesis and respiration in terms of their reactants and products.

Solution 3.3

Worked steps

They are opposites — photosynthesis uses CO_2 and water to make glucose and O_2 ; respiration uses glucose and O_2 to make CO_2 and water — so the products of one are the reactants of the other **M1** **A1**.