IGCSE BIOLOGY • EXERCISE SHEET

12.1 Respiration

Name: _____ Class: _____ Date: _____ **Total: 20 marks**

KEY WORDS temperature 温度 • respiration 呼吸作用 • yeast 酵母 • carbon dioxide 二氧化碳 • energy 能量

Objective

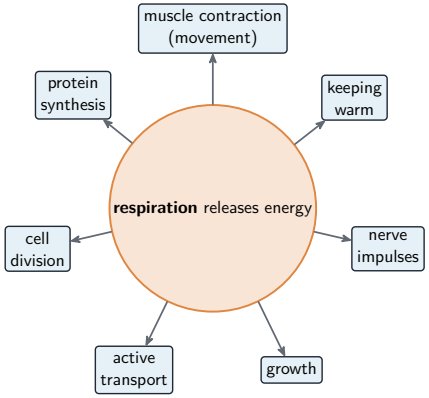
Build the skills to answer exam questions on **respiration** 呼吸作用 — what it is, why it is needed, and how it differs from breathing.

You must be able to:

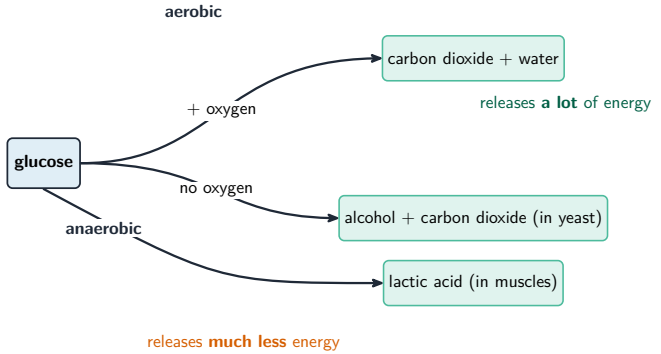
- define respiration as the release of energy from food in cells
- list the uses of the energy released
- distinguish respiration from breathing

1 Worked examples

■ Uses of energy



Respiration releases energy in all living cells, all the time (not the same as breathing)



Respiration can be aerobic or anaerobic

- **uses:** muscle contraction, protein synthesis, cell division, active transport, growth, nerve impulses, keeping warm.

2 Practice

2.1 Define respiration. [1]

2.2 State two uses cells make of the energy from respiration. [2]

3 Exam-style questions

3.1 Respiration takes place in: [1]

- **A** the lungs only
- **B** all living cells
- **C** the blood only
- **D** the air spaces

3.2 Respiration is often confused with breathing.

(a) State the difference between respiration and breathing. [2]

(b) In a yeast experiment, explain why warmer yeast gives off carbon dioxide faster (up to a point). [2]

3.3 Respiration and breathing are often confused.

(a) Write the word equation and the balanced symbol equation for aerobic respiration. [3]

(b) State **three** ways in which a cell uses the energy released by respiration. [3]

(c) Explain the difference between respiration and breathing. [3]

(d) A student says "plants respire only at night". Explain why this is wrong. [3]

Solutions

2.1 the release of energy from food (nutrient molecules) in cells.

2.2 any two of: muscle contraction; protein synthesis; cell division; active transport; growth; nerve impulses; keeping warm.

3.1 B. Respiration happens in all living cells.

3.2 (a) respiration is the release of energy from food in cells; breathing is the movement of air in and out of the lungs.
(b) warmer yeast respires faster as the enzymes work faster, so more carbon dioxide is given off.

3.3 (a) glucose + oxygen → carbon dioxide + water; $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$.
(b) Muscle contraction / movement; building large molecules from small ones, such as proteins from amino acids; active transport, cell division, or keeping a constant body temperature in mammals and birds.
(c) Respiration is a **chemical reaction inside every living cell** that releases energy from glucose; breathing is the **movement of air** in and out of the lungs; breathing supplies the oxygen that respiration uses and removes the carbon dioxide it makes, but breathing itself releases no energy.
(d) Plants respire **all the time**, day and night, because their cells need energy constantly. In daylight they also photosynthesise, usually faster than they respire; so they take in more carbon dioxide than they release, which makes it look as though they are not respiring.