

2.1 Organelles and the Endomembrane System

Name: _____ Class: _____ Date: _____

Total: 10 marks

Objective

Build the skills to answer exam questions on **organelles and the endomembrane system**.

You must be able to:

- state the functions of key **organelles** 细胞器 (nucleus, mitochondria, ribosomes, ER, Golgi)
- describe the **endomembrane system** 内膜系统 pathway
- link each organelle's structure to its role

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

■ Key organelles

- **Nucleus** —holds DNA, controls the cell.
- **Ribosomes** —build proteins.
- **Mitochondria** —carry out cellular respiration (make ATP).
- **Rough ER** —has ribosomes; makes and folds proteins.
- **Smooth ER** —makes lipids.
- **Golgi apparatus** —modifies, sorts, and ships proteins.

■ The endomembrane system

The **endomembrane system** is a set of connected membranes that make, process, and transport proteins and lipids: nuclear envelope → ER → Golgi → vesicles → membrane/secretion.

■ A worked pathway

A protein for export is made on the **rough ER**, sent in a **vesicle** to the **Golgi** for modification, then packaged and released at the cell membrane.



More mitochondria appear in cells needing lots of energy (e.g. muscle); many ribosomes appear in cells making lots of protein.

2 Practice

Now apply the methods above.

2.1 Which organelle makes ATP by respiration? [1]

2.2 State the function of the Golgi apparatus. [1]

2.3 Which organelle builds proteins? [1]

3 Exam-style questions

3.1 Proteins destined for export are first made on the [1]

- **A** smooth ER
- **B** rough ER
- **C** Golgi
- **D** nucleus

3.2 A protein is secreted from a cell.

(a) List, in order, the organelles it passes through from synthesis to export. [3]

(b) State the role of the Golgi in this pathway. [1]

3.3 Explain why a muscle cell contains many mitochondria.

[2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **2.1 Organelles and the Endomembrane System** lesson on the **Learn** page;
- read the **Organelles and the Endomembrane System** section of the AP Biology handout on the **Know** page.

Solutions

2.1 Mitochondria.

2.2 It modifies, sorts, and ships proteins.

2.3 Ribosomes.

3.1 B —the rough ER.

3.2 (a) Ribosome/rough ER → vesicle → Golgi → vesicle → cell membrane. (b) It modifies, sorts, and packages the protein for export.

3.3 Muscle cells need a lot of ATP for contraction, and mitochondria carry out respiration to make ATP, so many are present.