Exercise walk-through

Cell Structure and Function ▪ 2.1

eXercise

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

Method — 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.

Method — 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.

Method — 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.

Method — Structure fits function

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

Practice 2.1 ▪ 1 mark

Which organelle makes ATP by respiration?

Solution 2.1

Method: Key organelles

Worked steps

Mitochondria B1.

Practice 2.2 ▪ 1 mark

State the function of the Golgi apparatus.

Solution 2.2

Method: Key organelles

Worked steps

It modifies, sorts, and ships proteins B1.

Practice 2.3 ▪ 1 mark

Which organelle builds proteins?

Solution 2.3

Worked steps

Ribosomes B1.

Exam-style 3.1 ▪ 1 mark

Proteins destined for export are first made on the

A smooth ER

B rough ER

C Golgi

D nucleus

Solution 3.1

Method: A worked pathway

A smooth ER

B rough ER ✓

C Golgi

D nucleus

Worked steps

B — the rough ER.

Exam-style 3.2 ▪ 3 marks

A protein is secreted from a cell.
(a) List, in order, the organelles it passes through from synthesis to export.
(b) State the role of the Golgi in this pathway.

Solution 3.2

Method: A worked pathway

Worked steps

(a) Ribosome/rough ER $\rightarrow$ vesicle $\rightarrow$ Golgi $\rightarrow$ vesicle $\rightarrow$ cell membrane M1 M1 A1. (b) It modifies, sorts, and packages the protein for export B1.

Exam-style 3.3 ▪ 2 marks

Explain why a muscle cell contains many mitochondria.

Solution 3.3

Method: Structure fits function

Worked steps

Muscle cells need a lot of ATP for contraction, and mitochondria carry out respiration to make ATP, so many are present M1 A1.