

Cell Structure and Function

Learning objective 2.1.A Explain how the structure and function of subcellular components and organelles contribute to the function of cells.

Name:

Date:

Period:

Use the tool **The Secretory Route**. Work on the **Explore the cell** tab for Parts 1 to 3, then switch to **Match them up** for Part 4. Click any organelle to read its panel. Predicting: wherever a Part asks you to predict, write a specific number or word and one reason before you touch the tool, in the form “I think ... because ...”. A wrong prediction costs nothing; a prediction made after looking is not a prediction.

*switch tab**scroll down**record from the tool**score yourself*

The purple bar in the margin names the AP science practice a question uses.

Part 1 · Structure to function

Explore the cell

Match them up



Use the **Explore the cell** tab. It is the one showing when the tool opens.



Click each organelle in turn and record what it does. Write the **function** in your own words — do not copy the panel word for word.

Organelle	Membrane <i>circle one</i>	What it does
Ribosome	none / single / double	
Rough ER	none / single / double	
Smooth ER	none / single / double	
Golgi complex	none / single / double	
Lysosome	none / single / double	
Mitochondrion	none / single / double	
Chloroplast	none / single / double	
Vacuole	none / single / double	

Part 2 · The endomembrane system



Stay on the **Explore the cell** tab.



Keep the plant cell showing. Press Highlight the endomembrane system. List every structure that lights up, then list the three that stay dim.

In the endomembrane system	Not in the endomembrane system

1. The ribosome, the mitochondrion and the chloroplast are all excluded. State what the endomembrane structures have in common that these three do not.

2. Name the three structures in this cell that have a double membrane.

Part 3 · Trace a protein



Stay on the **Explore the cell** tab.



Press **Send a protein** and watch the whole journey. Then fill in the route from memory, in order.

Stop	Structure	What happens there
1		
2		
3		
4		
5		
6		

3. Every stop on that route is either a ribosome or part of the endomembrane system. Explain why that has to be true for a protein the cell is going to secrete.

Part 4 · Explain it

Explore the cell

Match them up



Click the **Match them up** tab at the top of the tool.

Work the **Match them up** cards first. Then answer these on your own, in complete sentences.

4. Rough ER and smooth ER are the same organelle with one structural difference. Describe that difference and explain how it produces their different functions.

5. A mitochondrion's inner membrane is highly folded. Explain how that structure supports its function.

6. Explain why it matters that a lysosome is enclosed by a membrane.

7. Ribosomes are found in cells in all forms of life, including prokaryotes. Explain what that observation is evidence for.

Part 5 · Learning check self-report



Scroll down to the **Learning check** at the bottom of the tool. Type each answer in your own words, check it, and tick the points you earned. Then record your score here and, for every point you did not earn, write what the rubric asked for that your answer left out.

Question	Points possible	Points I earned	Missed opportunities (what the rubric wanted that I left out)
1	3		
2	2		
3	2		
4	2		
Total	9		

What the model simplifies

The cell is drawn as a flat cross-section with one of each organelle. A real cell contains hundreds of mitochondria, thousands of ribosomes and a far more tangled ER.

Organelles are drawn at readable sizes, not to scale. A ribosome is roughly a thousand times smaller relative to the nucleus than this diagram shows.

The secretory route is shown as a single protein taking one clean path. In a real cell many proteins move at once, some are recycled, and some never leave the ER.

The tool covers only the structures the CED names for this topic. Structures such as the cytoskeleton, centrioles and peroxisomes exist in real cells but are not assessed here.