Model Answers: Hard

1

The correct answer is **B** because:

- In column 1 the cell contains: a cell wall, chloroplast, Golgi apparatus and a large vacuole. These would all be features of a leaf cell. The leaf cell in the options is the spongy mesophyll
- In column 2 the cell contains: a cell wall, Golgi apparatus and a large vacuole. The absence of chloroplasts show that this could be a root cell
- In column 3 the cell contains: centrioles and Golgi apparatus. This is an animal cell. The animal cell option is the ciliated epithelial cell
- As outlined in column 4, this cell only contains a cell wall; all the other features are seen in eukaryotic cells. This cell must be prokaryotic

2

The correct answer is **D** because:

- Lipids are synthesised by the smooth endoplasmic reticulum
- The smooth endoplasmic reticulum is a network of membranes that enclose flattened sacs called cisternae

A is incorrect as this structure describes the Golgi apparatus, which has the function of modifying and packaging new lipids and proteins.

B is incorrect as this structure describes ribosomes; which have the function of protein synthesis.

C is incorrect as this describes the structure of the nucleus, which has the function of storing the genetic information in the form of DNA packaged as chromosomes.

3

The correct answer is **D** because the link between chloroplasts, mitochondria and prokaryotic cells is that they all have 70S ribosomes!

All the other options have 80S ribosomes linking 3 and 5. 80S ribosomes are only found eukaryotes and not prokaryotes.

4

The correct answer is **A** because:

- The DNA in prokaryotic cells is found in a circular form
- The DNA is not found inside a nuclear membrane

B is incorrect ascentrioles are found in eukaryotic cells. They are involved in organising mitotic spindle during mitosis to separate **chromatids.**

C is incorrect as the **smooth endoplasmic reticulum** is a membrane-bound organelle involved in the synthesis of lipids, steroids and carbohydrates.

D is incorrect as the cell wall in a prokaryotic cell is made of **peptidoglycan (or murein),** not **cellulose.**

5

The correct answer is **A** because:

- The rough endoplasmic reticulum has **ribosomes** on its surface membrane
- The function of **ribosomes** in the cell is protein synthesis.

B is incorrect as the function of the **Golgi apparatus** is to modify, process and package proteins once produced.

C is incorrect as the **mitochondria** are the site of aerobic respiration reactions.

D is incorrect as the **nucleus** contains the genetic information (chromosomes).

6

The correct answer is **C** because the protein coat surrounding the genetic material of a virus is called the capsid.

A is incorrect as a **peplomer** is a glycoprotein spike on a viral capsid.

B is incorrect as a **capsomere** is a subunit of the capsid.

D is incorrect as a **virion** is the complete infective form of the virus including the RNA and capsid.

7

The correct answer is **A** because:

- The virus genome is either made of RNA or DNA
- Retroviruses like HIV, and the virus responsible for the Coronavirus pandemic in 2020, SARS-CoV-2 are RNA viruses (their genetic material is just RNA)
- The varicella zoster virus and smallpox virus both have DNA genomes

B & **C** are incorrect as a virus can contain either RNA or DNA.

D is incorrect as a virus will not have both RNA and DNA it will be one or the other.

8

The correct answer is **A** because:

- This is pointing to a very faint Golgi apparatus

- The function of the Golgi apparatus is to modify and package the proteins once produced on the ribosomes

B & **C** are incorrect as both of these labels are indicating the nucleus; with B in particular highlighting a dense region which is a nucleolus (there can be multiple nucleoli per nucleus!)

D is incorrect as this structure is the rough endoplasmic reticulum.

9

The correct answer is **B** because:

- This cell has a large quantity of rough endoplasmic reticulum, the role of the **RER** is **protein synthesis**
- The cell has a large number of mitochondria (circular structures), the role of the mitochondria is **aerobic respiration**

A, C & **D** are incorrect a as glucose is not produced in aerobic respiration it is a substrate used to generate ATP synthesis.

10

The correct answer is **C** because:

- This shows a high biochemical activity in the nuclei, which is where DNA would be transcribed into mRNA
- The cell has a reasonably high biochemical activity in the mitochondria, providing the ATP for the biochemical activity in the nuclei

A is incorrect as the highest biochemical activity is in the ribosomes this will indicate a cell that is producing proteins. The ribosomes are the site of translation of the mRNA, but this is not what the question is asking.

B is incorrect as the highest biochemical activity is in the mitochondria. This indicates a cell that is producing large quantities of ATP.

D is incorrect as the highest biochemical activity is in the lysosomes. This indicates a cell within the digestive system or immune system. Lysosomes A is incorrect as contain **hydrolytic** enzymes.