

Cell structure

Specification reference	Checklist questions	
3.2.1.1	<p>Can you describe the structure of eukaryotic cells, including:</p> <ul style="list-style-type: none"> • cell-surface membrane • nucleus • mitochondria • chloroplasts • Golgi apparatus and Golgi vesicles • lysosomes • ribosomes • rough endoplasmic reticulum and smooth endoplasmic reticulum • cell wall • cell vacuole? 	<input type="checkbox"/>
3.2.1.1	Can you explain that eukaryotic cells become specialised for specific functions in complex multicellular organisms?	<input type="checkbox"/>
3.2.1.1	Can you describe how specialised cells are organised into tissues, tissues into organs and organs into systems?	<input type="checkbox"/>
3.2.1.1	Can you explain the adaptations of eukaryotic cells?	<input type="checkbox"/>
3.2.1.2	<p>Can you describe how prokaryotic cells differ from eukaryotic cells, including:</p> <ul style="list-style-type: none"> • being much smaller • cytoplasm that lacks membrane-bound organelles • smaller ribosomes • no nucleus • a cell wall that contains murein, a glycoprotein? 	<input type="checkbox"/>
3.2.1.2	<p>Can you list other features of prokaryotic cells:</p> <ul style="list-style-type: none"> • one or more plasmids • a capsule surrounding the cell • one or more flagella? 	<input type="checkbox"/>

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3.2.1.2	Can you explain that viruses are acellular and non-living?	<input type="checkbox"/>
3.2.1.2	Can you describe the structure of virus particles, including: <ul style="list-style-type: none"> • genetic material • capsid • attachment protein? 	<input type="checkbox"/>
3.2.1.3	Can you describe the principles and limitations of: <ul style="list-style-type: none"> • optical microscopes • transmission electron microscopes • scanning electron microscopes? 	<input type="checkbox"/>
3.2.1.3	Can you measure the size of an object viewed with an optical microscope?	<input type="checkbox"/>
3.2.1.3	Can you explain the difference between magnification and resolution?	<input type="checkbox"/>
3.2.1.33	Can you use the formula: $\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$	<input type="checkbox"/>
3.2.1.3	Can you describe the principles of cell fractionation and ultracentrifugation in separating cell components?	<input type="checkbox"/>
3.2.1.3	Can you explain how the scientific community previously distinguished between artefacts and cell organelles?	<input type="checkbox"/>
3.2.2	Can you explain that not all cells, within multicellular organisms, retain the ability to divide?	<input type="checkbox"/>
3.2.2	Can you describe how eukaryotic cells that do retain the ability to divide show a cell cycle?	<input type="checkbox"/>
3.2.2	Can you explain that DNA replication occurs during the interphase of the cell cycle?	<input type="checkbox"/>

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3.2.1.2	Can you explain what happens in mitosis: a eukaryotic cell divides to produce two daughter cells, each with the identical copies of DNA produced by the parent cell during DNA replication?	<input type="checkbox"/>
3.2.2	Can you describe the behaviour of chromosomes during interphase, prophase, metaphase, anaphase and telophase of mitosis?	<input type="checkbox"/>
3.2.2	Can you explain the role of spindle fibres attached to centromeres in the separation of chromatids?	<input type="checkbox"/>
3.2.2	Can you describe how the cytoplasm usually divides (cytokinesis), producing two new cells?	<input type="checkbox"/>
3.2.2	Can you recognise the stages of the cell cycle: interphase, prophase, metaphase, anaphase, and telophase (including cytokinesis)?	<input type="checkbox"/>
3.2.2	Can you explain the appearance of cells in each stage of mitosis?	<input type="checkbox"/>
3.2.2	Can you explain that mitosis is a controlled process?	<input type="checkbox"/>
3.2.2	Can you explain how uncontrolled cell division can lead to the formation of tumours and of cancers?	<input type="checkbox"/>
3.2.2	Can you explain that many cancer treatments are directed at controlling the rate of cell division?	<input type="checkbox"/>
3.2.2	Can you explain what binary fission of prokaryotic cells involves: <ul style="list-style-type: none"> • replication of circular DNA and plasmids • division of the cytoplasm to produce two daughter cells? 	<input type="checkbox"/>
3.2.2	Can you explain that viruses do not undergo cell division, as they are non-living?	<input type="checkbox"/>
3.2.2	Can you describe how, following injection of their nucleic acid, the infected host cell replicates the virus particles?	<input type="checkbox"/>

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3.2.2	Can you prepare stained squashes of cells from plant root tips?	<input type="checkbox"/>
3.2.2	Can you set up and use an optical microscope to identify the stages of mitosis in stained squashes and calculate a mitotic index?	<input type="checkbox"/>
3.2.2	Can you measure the apparent size of cells in the root tip and calculate their actual size using the formula: $\text{actual size} = \frac{\text{size of image}}{\text{magnification}}$	<input type="checkbox"/>