



Plant cells and cell walls: practice questions

8 questions · 26 marks · mark scheme at the back

For Pearson Edexcel International AS Biology XBI11 and International A Level Biology YBI11. **A Level only** is IA2 content (Units 4 to 6), not needed for the International AS.

Name

Total / 26

1 UNIT 2 STYLE [1 mark]

Which organelle in a plant cell contains starch grains but no chlorophyll or thylakoid membranes?

- A . ☐ Chloroplast
- B . ☐ Amyloplast
- C . ☐ Vacuole
- D . ☐ Mitochondrion

2 UNIT 2 STYLE [4 marks]

Compare and contrast the structure of a plant cell with the structure of an animal cell.

3 UNIT 2 STYLE [3 marks]

Describe the structure and function of plasmodesmata.

4

UNIT 2 STYLE

[4 marks]

An electron micrograph of a leaf cell shows an organelle surrounded by two membranes. Inside it are stacks of flattened, disc-shaped membranes and a few pale oval grains. (a) Identify the organelle. (1) (b) Give two features visible in the micrograph that support your identification. (2) (c) State the function of this organelle. (1)

5

UNIT 2 STYLE

[4 marks]

Explain why cellulose microfibrils have high tensile strength.

6

UNIT 2 STYLE

[3 marks]

Explain why starch is a suitable molecule for storing glucose in a plant cell.

7

UNIT 2 STYLE

[4 marks]

Explain how the structure of the wall of a xylem vessel makes it suited to supporting the plant and transporting water.

Hemp fibres are used to make rope. Suggest how the structure of the fibres makes them suitable for this use.

.....

.....

.....

.....

.....

.....

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B: amyloplast (stores starch, colourless, no thylakoids)

2. [4]

- similarity: both have a nucleus / cell surface membrane / mitochondria / ribosomes / RER / Golgi apparatus (any one)
- plant cell has a cellulose cell wall, animal cell does not
- plant cell has chloroplasts, animal cell does not
- plant cell has a large permanent vacuole (with a tonoplast), animal cell has none or small temporary vacuoles
- plant cell stores starch, animal cell stores glycogen
- Max 4. Do not accept a statement about one cell type only, as compare needs both.

3. [3]

- narrow channels / gaps that pass through the cell walls between adjacent cells
- lined with cell surface membrane and containing a strand of cytoplasm
- allow movement of substances / chemical signals / water between cytoplasm of neighbouring cells

4. [4]

- (a) chloroplast
- (b) double membrane / envelope
- (b) stacks of thylakoids / grana
- (b) starch grains (accept stroma as a feature)
- (c) site of photosynthesis
- Max 4. In (b) any two features, one mark each.

5. [4]

- cellulose is made of β -glucose and alternate glucose units are rotated through 180°
- this forms long, straight, unbranched chains
- many hydrogen bonds form between the -OH groups on adjacent chains
- each hydrogen bond is weak but there are very many, so together they are strong
- many chains bundled together form microfibrils, which are laid in layers / embedded in a matrix in the wall
- Max 4

6. [3]

- insoluble, so does not affect the water potential / does not move out of the cell by osmosis or diffusion
- compact (amylose coiled into a helix) so stores a lot of glucose in a small space
- amylopectin is branched, giving many ends where enzymes can hydrolyse it quickly to release α -glucose

7. [4]

- secondary thickening with cellulose microfibrils gives a strong, rigid wall that supports the plant / resists compression
- lignin is waterproof, so water cannot leak out of the vessel
- wall does not collapse inwards under tension / negative pressure from transpiration pull
- pits (thin areas of wall without thickening) allow water to move sideways into neighbouring cells
- Max 4

8. [3]

- fibres are sclerenchyma: long cells with thick lignified secondary walls
- cellulose microfibrils in layers / parallel to the length give high tensile strength, so the rope is difficult to break
- cells overlap / are long and narrow, so they can be twisted together and remain flexible