

**M1.(a) (i) (Both)**

1. Are polymers / polysaccharides / are made of monomers / of monosaccharides;
2. Contain glucose / carbon, hydrogen and oxygen;
3. Contain glycosidic bonds;
4. Have 1–4 links;

*Neutral: references to 'unbranched', insoluble, formed by condensation, flexible and rigid*

*Are made of the monomer glucose = MP 1 and 2 = 2 marks*

5. Hydrogen bonding (within structure).

*Ignore reference to H bonds between cellulose molecules*

**2 max**

**(ii) (Starch)**

1. Contains  $\alpha$  / alpha glucose;

*Assume 'it' refers to starch*

*Accept: converse arguments only if linked directly to cellulose*

*Accept: forms  $\alpha$  glycosidic bonds*

2. Helical / coiled / compact / branched / not straight;
3. 1,6 bonds / 1,6 branching;
4. Glucoses / monomers same way up;
5. No H-bonds between molecules;
6. No (micro / macro) fibres / fibrils.

**2 max**

**(b) (i)**

1. No / few organelles / very little cytoplasm / cytoplasm at edge / more room / hollow / large vacuole / large space / thick walls;

*Accept strong walls for thick walls*

2. (So) easier / more flow / (thick / strong walls) resist pressure.

*Easier flow may be expressed in other ways e.g. lower resistance to flow*

**2**

**(ii)**

1. Mitochondria release energy / ATP / site of respiration;

**Q Reject:** 'produce energy'

*but accept produce energy in form of ATP*

2. For active transport / uptake against concentration gradient.

*Note: no mark is awarded for simply naming an organelle*

**OR:**

3. Ribosomes / rough endoplasmic reticulum produce(s) proteins;  
*Concept of making proteins needed*
4. (Proteins) linked to transport e.g. carrier proteins / enzymes.

2

[8]

- M2.(a)**
1. Water potential becomes lower / becomes more negative (as sugar enters phloem);
  2. Water enters phloem by osmosis;
  3. Increased volume (of water) causes increased pressure.

3

- (b)
1. Rate of photosynthesis related to rate of sucrose production;
  2. Rate of translocation higher when sucrose concentration is higher.

2

- (c)
1. Rate of translocation does not fall to zero / translocation still occurs after 120 minutes;
  2. But sucrose no longer able to enter cytoplasm of phloem cells.

2

[7]

- M3.(a)**
1. Facilitated diffusion involves channel or carrier proteins whereas active transport only involves carrier proteins;
  2. Facilitated diffusion does not use ATP / is passive whereas active transport uses ATP;
  3. Facilitated diffusion takes place down a concentration gradient whereas active transport can occur against a concentration gradient.

*Since 'contrast', both sides of the differences needed*

3

- (b) 3.3:1.

*Correct answer = 2 marks*

*If incorrect, allow 1 mark for 470–360 / 60 for rate in second*

*hour*

2

- (c)
1. Group **A** – initial uptake slower because by diffusion (only);
  2. Group **A** – levels off because same concentrations inside cells and outside cells / reached equilibrium;
  3. Group **B** – uptake faster because by diffusion plus active transport;
  4. Group **B** fails to level off because uptake against gradient / no equilibrium to be reached;
  5. Group **B** – rate slows because few / fewer chloride ions in external solution / respiratory substrate used up.

4 max

[9]

- M4.(a)**
1. In source / leaf sugars actively transported into phloem;
  2. By companion cells;
  3. Lowers water potential of sieve cell / tube and water enters by osmosis;
  4. Increase in pressure causes mass movement (towards sink / root);
  5. Sugars used / converted in root for respiration for storage.

*Accept starch*

4 max

- (b) Respiration.

1

- (c)
1. (About) 30 hours;
  2. Time between peak  $^{14}\text{C}$  at top of trunk and bottom.

2

- (d) Length of trunk (between top and bottom).

1

[8]