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 α / alpha glucose;

Assume 'it' refers to starch

Accept: converse arguments only if linked directly to cellulose

Accept: forms α 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}C at top of trunk and bottom.

2

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

1

[8]