

1. (a) (i) DACB 1
- (ii) Attachment of centromeres;  
Separation of (daughter) chromatids; 2
- (b) Meiosis halves the number of chromosomes;  
Restoration of diploid number at fertilisation;  
Introduces variation;  
Correct reference to natural selection / survival; 2 max
- (c) (i) Sperm is haploid, liver is diploid / sperm formed by  
meiosis, liver cell formed by mitosis; 1
- (ii) It has no nucleus; 1
2. (a) Any two from:  
Loop of DNA; Non-cellulose cell wall;  
Plasmid; Capsule;  
Flagellum; Mesosome; 2  
*Accept small ribosomes*
- (b) (i) (Granules) turn blue-black/dark blue/black/purple with iodine; 1
- (ii) Cellulose / pectin; 1
- (c) Use principle:  
Feature of starch;  
Consequence in terms of storage;  
e.g.  
Insoluble;  
Therefore will not “wash” out of cell / affect water potential / affect osmosis;  
OR  
Molecule coiled/branched;  
Therefore large amount stored in small space / compact  
OR  
Does not affect water potential;  
So no effect on entry of water (into cell); 2

[7]

[6]

3. (a) (i) both are polymers/polysaccharides/built up from many sugar units/  
both contain glycosidic bonds/ contain (C)arbon, (H)ydrogen  
and (O)xygen; 1
- (ii) hemicellulose shorter/smaller than cellulose/fewer carbons;  
hemicellulose from pentose/five-carbon sugars and cellulose from  
hexose/glucose/six-carbon sugars; 2
- (only credit answers which compare like with like.)
- (b) protein/nucleic acid/enzyme/RNA/DNA/starch/amylose/amylopectin  
polypeptide; 1
- (c) (i) to make sure that all the water has been lost; 1
- (ii) only water given off below 90°C;  
(above 90°C) other substances straw burnt/oxidised/broken down;  
and lost as gas/produce loss in mass; 2 max
- (d) enzymes are specific;  
shape of lignin molecules;  
will not fit active site (of enzyme);  
*OR*  
shape of active site (of enzyme);  
will not fit molecule; 2 max
- (e) 1. made from  $\beta$ -glucose;  
2. joined by condensation/removing molecule of water/glycosidic bond;  
3. 1 : 4 link specified or described;  
4. "flipping over" of alternate molecules;  
5. hydrogen bonds linking chains/long straight chains;  
6. cellulose makes cell walls strong/cellulose fibres are strong;  
7. can resist turgor pressure/osmotic pressure/pulling forces;  
8. bond difficult to break;  
9. resists digestion/action of microorganisms/enzymes; 6 max
- (allow maximum of 4 marks for structural features)

[15]

4. (a) (i) Box round H and HO.(Either in upper or lower positions, or  
combination) 1
- (ii) Condensation 1
- (iii) 6 1

- (b) (i) 50 gains 2 marks.  
25% x 200, or equivalent, gains 1 mark. 2
- (ii) Long straight chain (of glucose molecules) / 1-4 link *in context*  
Hydrogen bonds hold molecules together;  
able to form (micro)fibrils. max 2
- [7]**
5. (a) glucose; 1  
(*reject alpha glucose*)
- (b) hydrolysis; 1  
(*accept catabolic*)
- (c) (long) straight/unbranched chains;  
(idea of more than 1) chains lie side by side / form (micro)fibrils;  
idea of H bonds holding chains together; 3
- [5]**