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

[7]

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

[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 β-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]