Solutions

Each answer shows the steps, then the **result**.

2.1

(a)

- glycosidic bond

(b)

- ester bond

2.2

- Any two: compact / insoluble (does not leave the cell or affect water potential) / branched so many ends for fast hydrolysis / large molecule

2.3

- β-glucose means every other glucose is flipped, so chains are long and straight; many straight chains lie side by side, held by hydrogen bonds into strong microfibrils

3.1 B

- They differ only in the position of the –OH on carbon 1

3.2 C

- Three ester bonds form, so three water molecules are released

3.3 C

- Cellulose is made of β-glucose and forms straight chains

3.4

(a)

- a glycosidic bond forms by condensation, removing one water molecule

(b)

- glycogen is highly branched, giving many ends for fast hydrolysis to release glucose for respiration; cellulose is straight β-glucose chains held side by side by hydrogen bonds into strong fibres that support the cell wall

3.5

- insoluble / does not affect water potential; releases about twice the energy per gram of carbohydrate

3.6

(a)

- **monomer**: a small molecule that can join with others like it to form a polymer, e.g. glucose
- **polymer**: a large molecule of many repeating monomers joined by **covalent bonds**, e.g. glycosidic bonds in starch
- **macromolecule**: a very large molecule, e.g. a polysaccharide, protein or nucleic acid

(b)

- **sucrose**
- a Benedict's test on the solution gives no colour change, staying blue
- boil a fresh sample with dilute hydrochloric acid to hydrolyse the glycosidic bond, neutralise with sodium hydrogencarbonate, then heat with Benedict's reagent: a brick-red precipitate shows sucrose was present