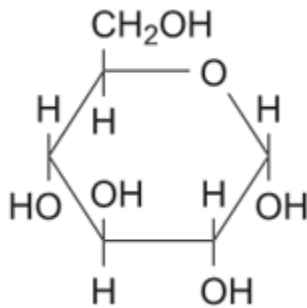
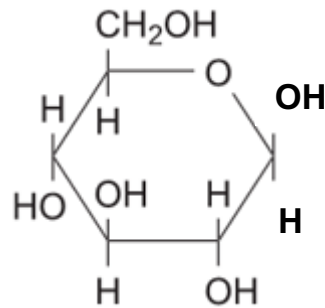


A. MONOSACCHARIDES

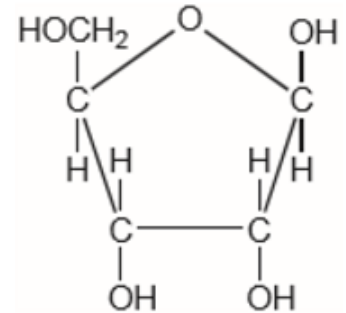
- A **monosaccharide** is a **sugar** made up of **one sub-unit** (monomer)
- Monosaccharides are **monomers** as they are **small subunits** that can be **joined** together to produce **larger molecules**.



α -D-glucose



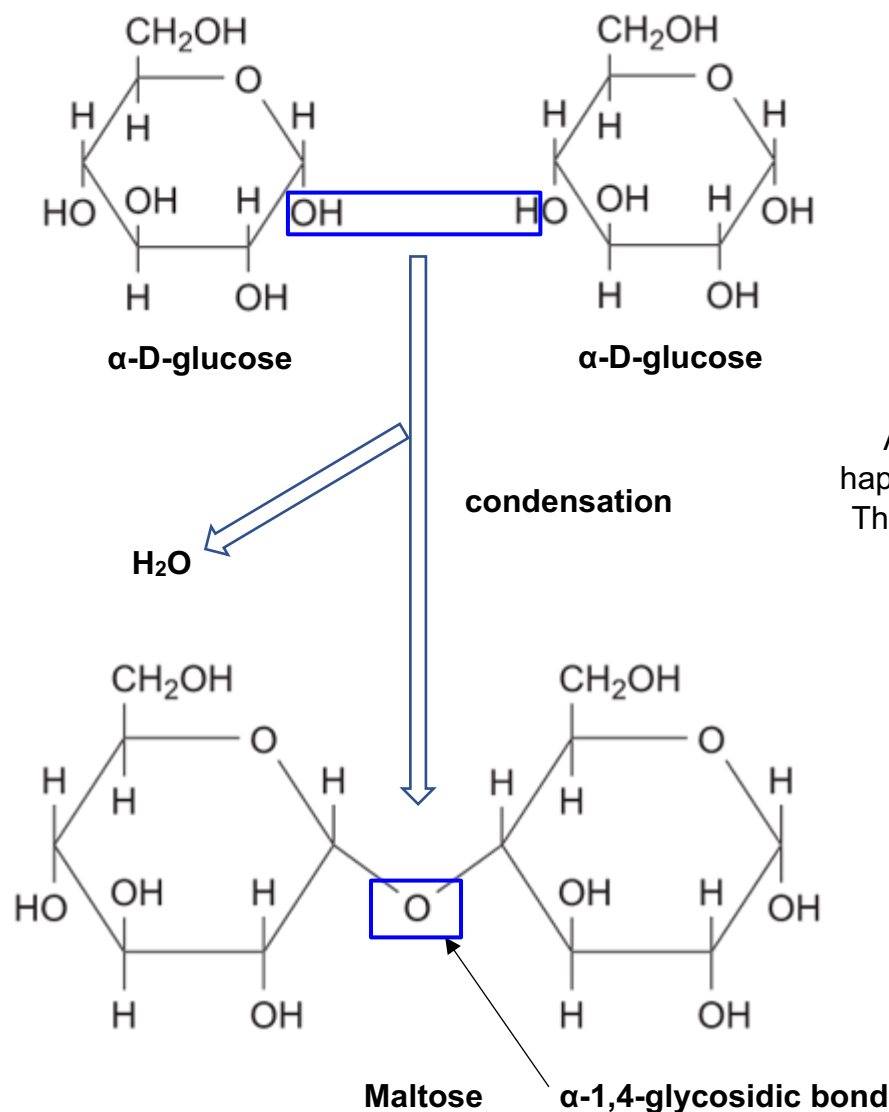
β -D-glucose



D-ribose

B. MAKING A DISACCHARIDE

- A **disaccharide** is a **sugar** made up of **two monosaccharides**, joined by a **condensation reaction**



All the **changes** happen in the **middle**. The **outside** of each molecule **stays** the **same**

How other disaccharides are made

- α -D-glucose + **fructose** \rightarrow **sucrose** + H_2O
- α -D-glucose + **galactose** \rightarrow **lactose** + H_2O

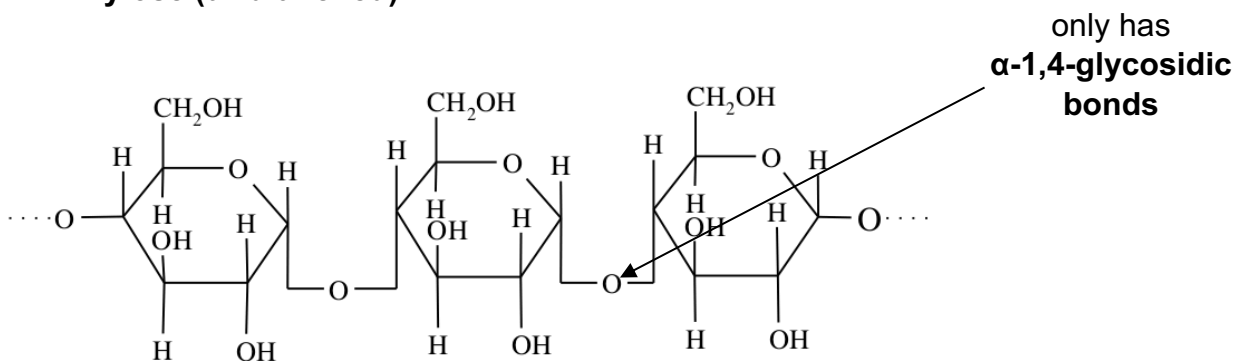
C. MAKING A POLYSACCHARIDE

- A **polysaccharide** is a **sugar** made up of **several monosaccharides**, joined together by **condensation reactions**

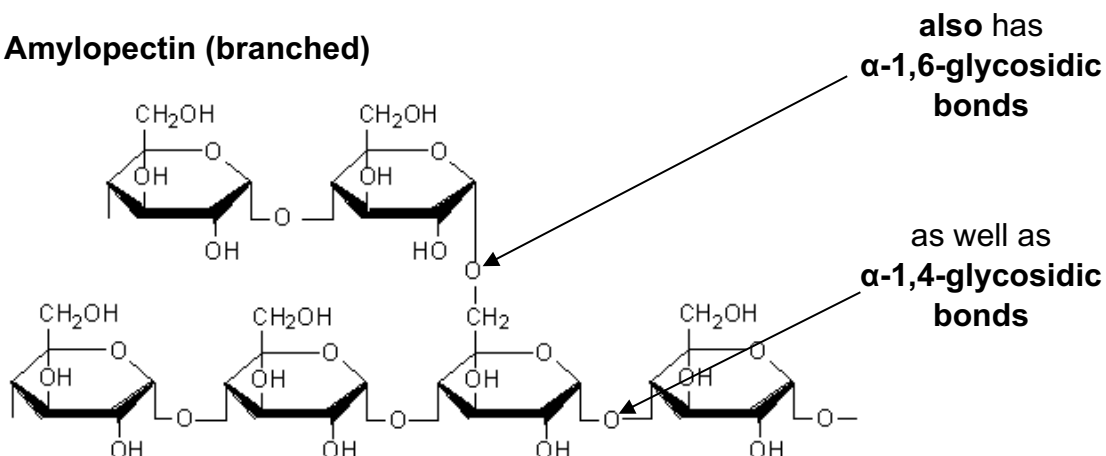
Structures of starch and glycogen

- Made from **α -D-glucose**
- **Starch** is the **storage** carbohydrate in **plant** cells
- **Glycogen** is the **storage** carbohydrate in **animal** cells
- Made up of **two** types of molecule: **amylose** and **amylopectin**
- **Overall**, starch and glycogen are **branched** molecules

Amylose (unbranched)



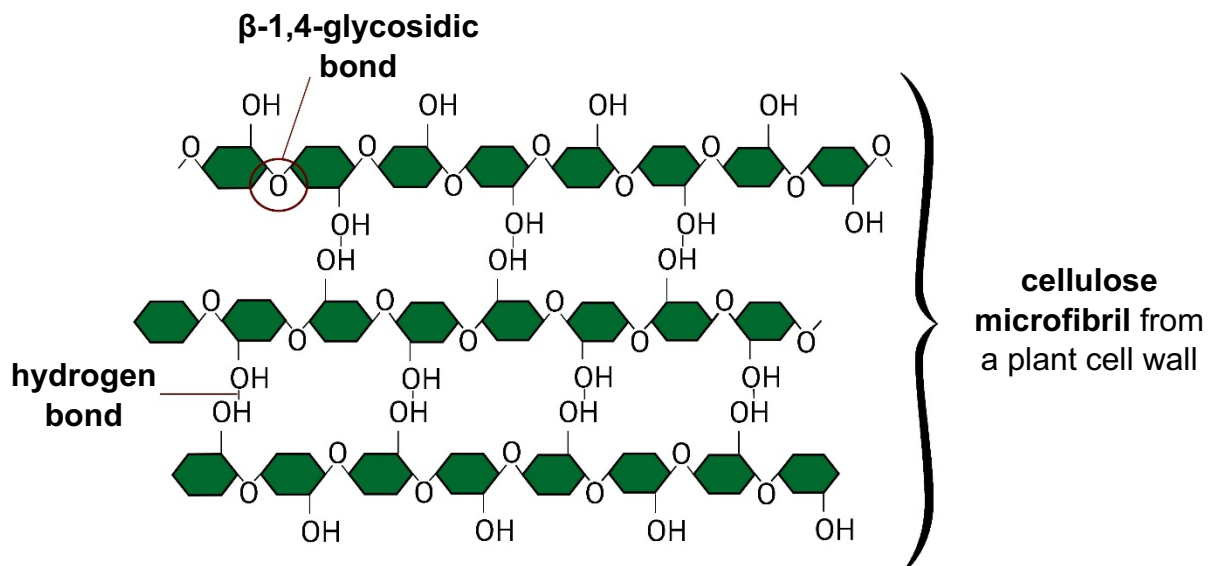
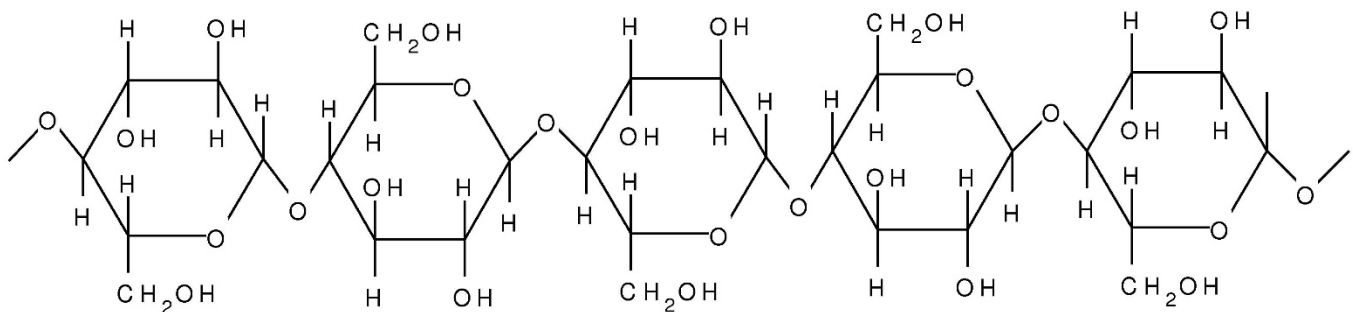
Amylopectin (branched)



1. Coiled / helical / spiral;
2. (So) compact / tightly packed / can fit lots into a small space;
3. Insoluble;
4. (So) no osmotic effect / does not leave cell / does not affect water potential;
5. Large molecule / long chain;
6. (So) does not leave cell / contains large number of glucose molecules;
7. Branched chains;
8. (So) easy to remove glucose;

Structure of cellulose

- Made from **β -D-glucose (orientation alternates: up-down-up-down)**
- This makes **cellulose** a **long** and **linear** (unbranched) molecule
- **Cellulose** strengthens **plant cell walls**



Explain how the structure of cellulose is related to its function in plant cell walls. [4]

1. Long and straight chains of β -glucose;
 2. Linked together;
 3. (By) many hydrogen bonds (between cellulose molecules)
 4. (To) form microfibrils;
 5. (So) high tensile strength/rigid/inelastic to provide support (to cell wall);
- Think of **many** of these **long, straight chains** being “glued together” by **many hydrogen bonds** to give **lots of strength**.

Application of knowledge

- You may be given the structure of a monosaccharide that you are **not expected to know** and asked to show how a disaccharide is formed

The structures of the monosaccharides α -D-glucose and fructose are shown below.

Complete and label the diagram to show how a molecule of sucrose is formed when they join. [4]

