

Exercise walk-through

Carbohydrates ■ 1.4

eXercise

You must be able to

- identify **monosaccharides** 单糖, disaccharides, and **polysaccharides** 多糖
- state the functions (energy storage and structure)
- link structure to function (starch, glycogen, cellulose)

Method — The sugar building blocks

Carbohydrates are made of sugar monomers (**monosaccharides**, such as glucose).
Two joined make a disaccharide; many joined make a **polysaccharide**.

Method — Storage polysaccharides

Starch (plants) and **glycogen** (animals) store glucose for energy. Their branched/coiled shapes pack many glucose units for quick release.

Method — Structural polysaccharides

Cellulose (plant cell walls) is made of glucose linked in a way that forms strong, straight fibers — providing support, not easily digested.

Method — Structure sets function

The **same** glucose monomer builds both starch (storage) and cellulose (structure); the **difference is the type of bond**, which changes the shape and therefore the role.

Practice 2.1 ■ 1 mark

Name the monomer of carbohydrates.

Solution 2.1

Worked steps

Monosaccharide (e.g. glucose) **B1**.

Practice 2.2 ■ 2 marks

State one storage polysaccharide and one structural polysaccharide.

Solution 2.2

Worked steps

Storage: starch or glycogen; structural: cellulose **B1** **B1**.

Practice 2.3 ■ 1 mark

Which polysaccharide makes up plant cell walls?

Solution 2.3

Method: Structural polysaccharides

Worked steps

Cellulose **B1**.

Exam-style 3.1 ■ 1 mark

The monomer that makes up starch, glycogen, and cellulose is

- A** glucose
- B** an amino acid
- C** a nucleotide
- D** glycerol

Solution 3.1

Method: Structure sets function

A glucose



B an amino acid

C a nucleotide

D glycerol

Worked steps

A — glucose.

Exam-style 3.2 ■ 2 marks

Starch and cellulose are both polymers of glucose but have different functions.

- (a) State the function of each.
- (b) Explain how they can differ if they share the same monomer.

Solution 3.2

Method: Structure sets function

Worked steps

(a) Starch stores energy (in plants); cellulose provides structure/support (cell walls) **M1 A1**. (b) The glucose units are joined by **different bonds**, giving different shapes and therefore different functions **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain why glycogen's branched structure suits its role in animals.

Solution 3.3

Method: Storage polysaccharides

Worked steps

Its many branches provide many ends where glucose can be quickly added or removed, allowing fast energy storage and release to meet an animal's needs **M1** **A1**.