

Water, carbohydrates and lipids: practice questions

10 questions • 30 marks • mark scheme at the back

For Pearson Edexcel International AS Biology XBI11 and International A Level Biology YBI11. **A Level only** is IA2 content (Units 4 to 6), not needed for the International AS.

Name

Total / 30

1 UNIT 1 STYLE [1 mark]

Which property of a water molecule explains why sodium ions dissolve in water?

- A. ☐ Water molecules are non-polar
- B. ☐ Water molecules are dipoles, with charged ends attracted to ions
- C. ☐ Water molecules are small enough to fit between the ions
- D. ☐ Water molecules have an overall positive charge

2 UNIT 1 STYLE [3 marks]

Explain why water is important as a solvent in the transport of substances in the blood.

3 UNIT 1 STYLE [1 mark]

Lactose is a disaccharide. Which pair of monosaccharides is joined to make lactose?

- A. ☐ Glucose and glucose
- B. ☐ Glucose and fructose
- C. ☐ Glucose and galactose
- D. ☐ Fructose and galactose

4 UNIT 1 STYLE [4 marks]

Explain how the structure of glycogen makes it suitable as an energy store in animal cells.

[3 marks]

[illegible]

[3 marks]

[illegible]

[4 marks]

[illegible]

[3 marks]

[illegible]

9 UNIT 3 STYLE

[5 marks]

A student is given a solution of unknown glucose concentration. Describe how the student could use Benedict's reagent and colour standards to estimate its concentration.

10 UNIT 3 STYLE

[3 marks]

A student has a 1.0 % starch stock suspension. Calculate the volume of stock and the volume of distilled water needed to make 20 cm³ of a 0.25 % starch standard. Show your working.

Answer = ...

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B: water molecules are dipoles, with charged ends attracted to ions

2. [3]

- water molecules are dipoles / polar / have slightly positive and slightly negative ends (1)
- ions and polar molecules (such as glucose and amino acids) are attracted to the charged ends of water and are surrounded by water molecules / dissolve (1)
- dissolved substances can be carried in blood plasma / moved around the body (1)
- lipids / non-polar substances do not dissolve (so need other transport) (1)
- Max 3

3. [1]

C C: glucose and galactose (A is maltose, B is sucrose)

4. [4]

- a polymer / polysaccharide of α -glucose, so hydrolysed to glucose for respiration (1)
- insoluble / large molecule, so does not affect water potential / cannot leave the cell (1)
- highly branched / coiled, so compact and stores a lot of glucose in a small space (1)
- many branches give many free ends, so enzymes hydrolyse glucose rapidly / more quickly (1)
- Max 4

5. [3]

- both are polymers of α -glucose / both joined by α -1,4 glycosidic bonds (1)
- amylose is unbranched but amylopectin is branched (1)
- amylopectin has α -1,6 glycosidic bonds (at branch points), amylose does not (1)
- amylose coils into a helix / amylopectin is less tightly coiled (1)
- Max 3. Answer must include at least one similarity and one difference.

6. [3]

- condensation reaction between two glucose molecules (1)
- -OH and -H removed / water molecule released (1)
- α -1,4 glycosidic bond formed (1)
- broken down by hydrolysis, by adding water, to give two glucose molecules (1)
- Max 3

7. [4]

- glycerol joins with three fatty acids (1)
- condensation reaction (1)
- -OH group of glycerol reacts with the -COOH / carboxyl group of a fatty acid (1)
- ester bond formed (three in total) (1)
- water released (three molecules in total) (1)
- Max 4

8. [3]

- saturated have no C=C double bonds but unsaturated have one or more (1)
- saturated chains are straight whereas unsaturated chains are kinked / bent (1)
- saturated pack more closely, so a higher melting point / solid at room temperature (ora) (1)
- both contain ester bonds / both are triglycerides of fatty acids and glycerol (1)
- Max 3. Answer must include at least one similarity and one difference.

9. [5]

- make a range of glucose solutions of known concentration (standards) by diluting a stock solution (1)
- add the same volume of Benedict's reagent to the same volume of each standard and of the unknown (1)
- heat all tubes in a water bath at the same temperature for the same time (1)
- compare the colour of the unknown with the colours of the standards (against a white background) (1)
- concentration of the unknown is that of the closest matching standard (1)
- repeat and compare / use a smaller concentration range to improve accuracy (1)
- wear eye protection / use tongs, as Benedict's reagent is an irritant and the water is hot (1)
- Max 5

10. [3]

- dilution factor = $1.0 \div 0.25 = 4$ (1)
- volume of stock = $20 \div 4 = 5 \text{ cm}^3$ (1)
- volume of distilled water = $20 - 5 = 15 \text{ cm}^3$ (1)