

# 2.2 Carbohydrates & Lipids

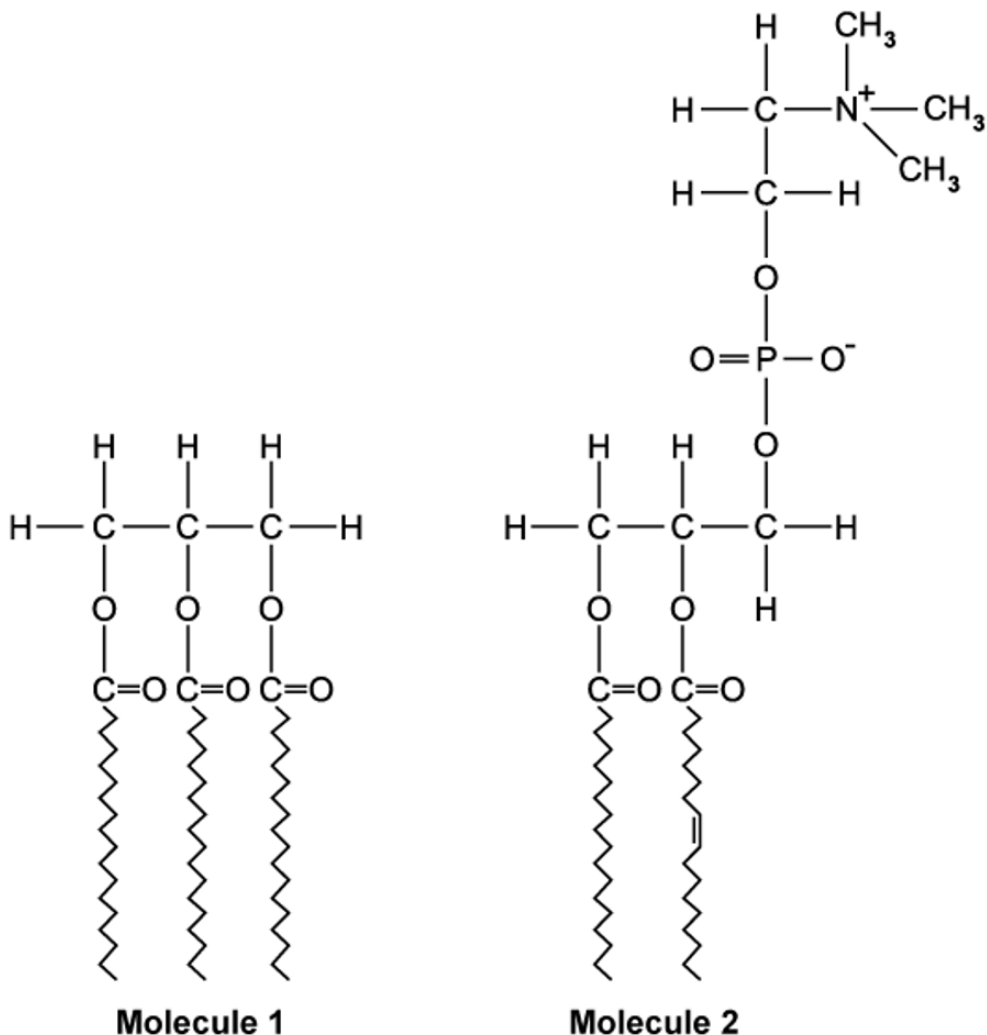
## Question Paper

Course	DP IB Biology
Section	2. Molecular Biology
Topic	2.2 Carbohydrates & Lipids
Difficulty	Medium

**Time allowed:** 20  
**Score:** /10  
**Percentage:** /100

Question 1

Two biological molecules are shown in **Diagram 1** below.



**Diagram 1**

Which row of the table correctly identifies features of these molecules?

	<b>Molecule 1</b>	<b>Molecule 2</b>
<b>A</b>	Has 3 fatty acid chains	Fatty acid chains are all saturated
<b>B</b>	Contains 3 glycosidic bonds	Has 2 ester bonds and a phosphate group

<b>C</b>	Has 3 saturated fatty acid chains	Has 1 unsaturated fatty acid chain
<b>D</b>	Molecule is polar	Molecule is polar

[1 mark]

## Question 2

The molecular structure of starch makes it suited to its function.

Which statement best explains why?

- A** Many condensation reactions, in the breakdown of amylose and amylopectin, release stored energy.
- B** Many hydrolysis reactions, in the formation of amylose and amylopectin, allow the release of stored energy to fuel cellular processes.
- C** Amylose has a branched structure and amylopectin is coiled to give a compact structure for transport around the plant through the phloem.
- D** The amylose-amylopectin complex is insoluble, so it does not affect the osmolarity of the cell.

[1 mark]

**Question 3**

There is a naturally-occurring polysaccharide which has the structure of an unbranched chain of the molecule acetylglucosamine held together by  $\beta$ -1,4 glycosidic bonds. Between these unbranched chains are many types of a much weaker bond. There are  $-\text{CH}_2\text{OH}$  groups that alternate on each side of the polysaccharide chain.

Which of the following polysaccharides has a structure similar to that described above?

- A** Glycogen
- B** Cellulose
- C** Amylopectin
- D** Amylose

[1 mark]

Question 4

Which of the structures in **Diagram 2** correctly shows the structure of  $\beta$ -glucose and of  $\alpha$ -glucose?

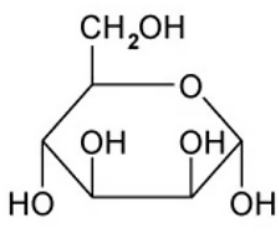
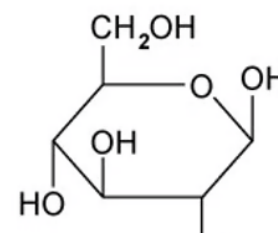
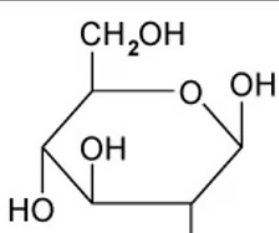
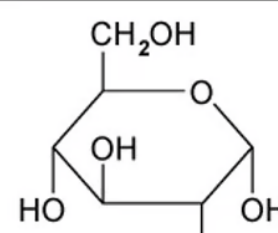
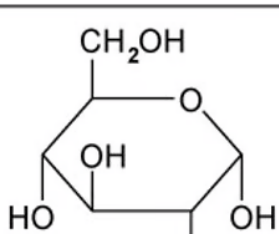
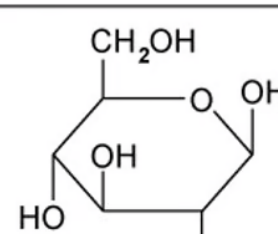
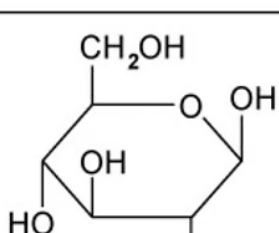
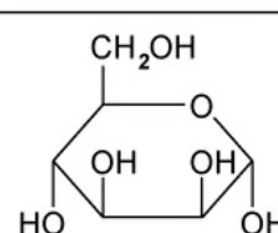
	$\beta$ -glucose	$\alpha$ -glucose
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		

Diagram 2

[1 mark]

**Question 5**

Which of the following statements correctly describes a feature of carbohydrates **OR** lipids?

- A** Glycosidic bonds form during hydrolysis reactions, joining monosaccharides together to form disaccharides and polysaccharides.
- B** A triglyceride is an example of a polymer as it is formed from many smaller, repeating subunits joined together by covalent bonds.
- C** A triglyceride is not an example of a polymer although it is formed from smaller subunits joined together.
- D** Glycosidic bonds join disaccharides together to form monosaccharides and polysaccharides.

[1 mark]

**Question 6**

Which of the following occurs when sucrose is formed from monosaccharides?

- A** Condensation of glucose and fructose, using water.
- B** Condensation of glucose and galactose, using water.
- C** Condensation of glucose and fructose, releasing water.
- D** Condensation of glucose and galactose, releasing water.

[1 mark]

**Question 7**

Which row of the table below contains two correct statements?

	<b>Cis-fatty acids</b>	<b>Trans-fatty acids</b>
<b>A</b>	Involves a saturated hydrocarbon chain	Involves an unsaturated hydrocarbon chain
<b>B</b>	H-atoms on the same side of a C=C double bond	H-atoms on different sides of a C=C double bond
<b>C</b>	Stack together more closely	Stack together further apart
<b>D</b>	Cause a kinked hydrocarbon chain	Cause a kinked hydrocarbon chain

[1 mark]

**Question 8**

Apart from being used for energy storage, lipids have a number of other roles. Which of the following is **not** a role of whole lipids?

- A** Protection for soft internal organs.
- B** Buoyancy aid.
- C** Improving intestinal absorption of nutrients.
- D** Regulators of gene expression.

[1 mark]

**Question 9**

Which of the following chemical formulae shows a carbohydrate molecule?

- A**  $C_{18}H_{34}O_2$
- B**  $C_{18}H_{32}O_{16}$
- C**  $C_{18}H_{32}O_2$
- D**  $C_3H_8O_3$

[1 mark]

**Question 10**

Which of the following is **not** a feature of lipids that contain trans-fatty acids?

- A** They tend to form liquids at room temperature.
- B** They increase the risk of coronary heart disease.
- C** They are often labelled as 'partially hydrogenated vegetable oils' on food packaging.
- D** They create more stable emulsions in food manufacture.

[1 mark]