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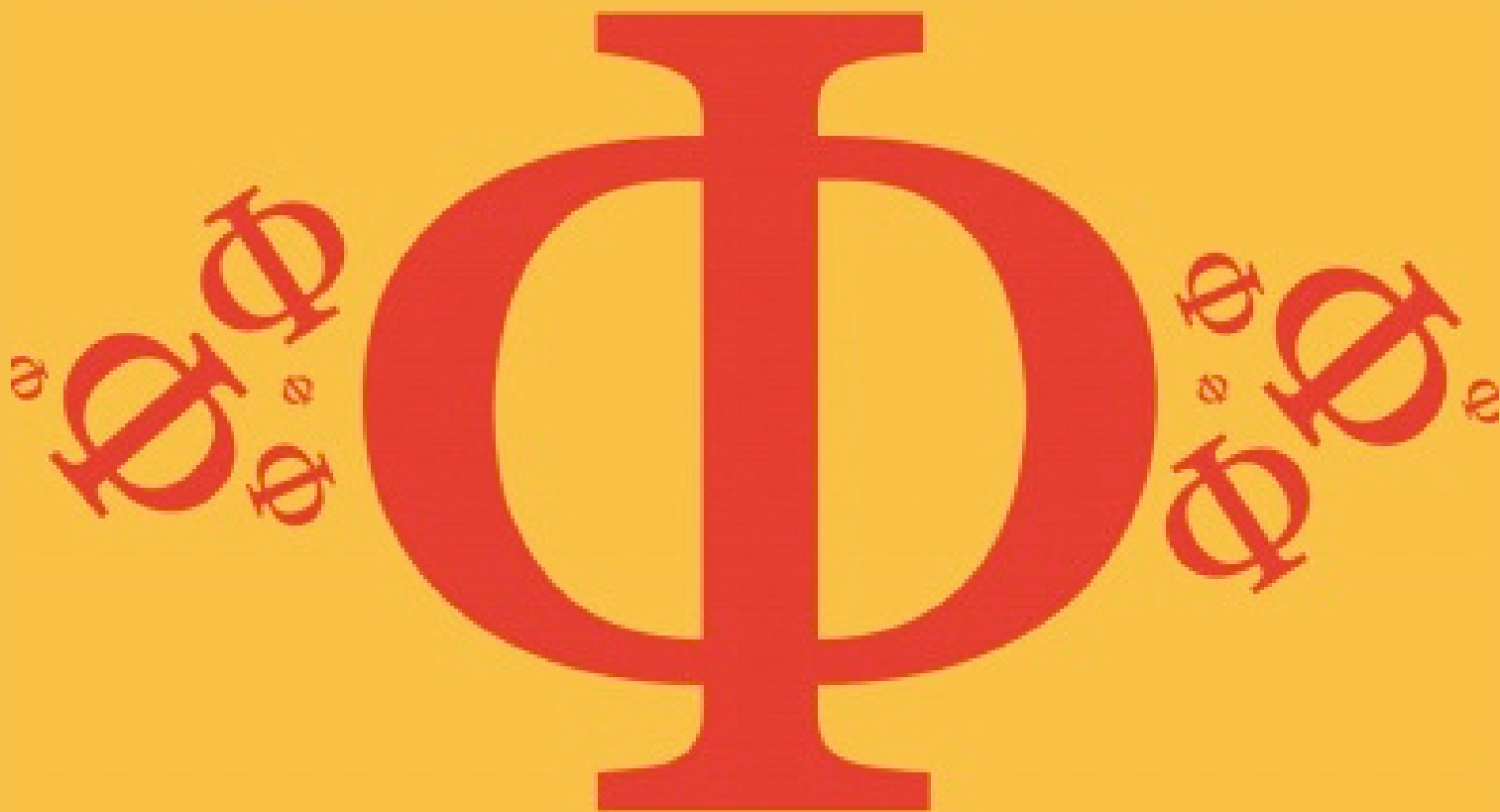
Detailed mark scheme

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2.2 Carbohydrates & Lipids

Medium



BIOLOGY

IB HL

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.

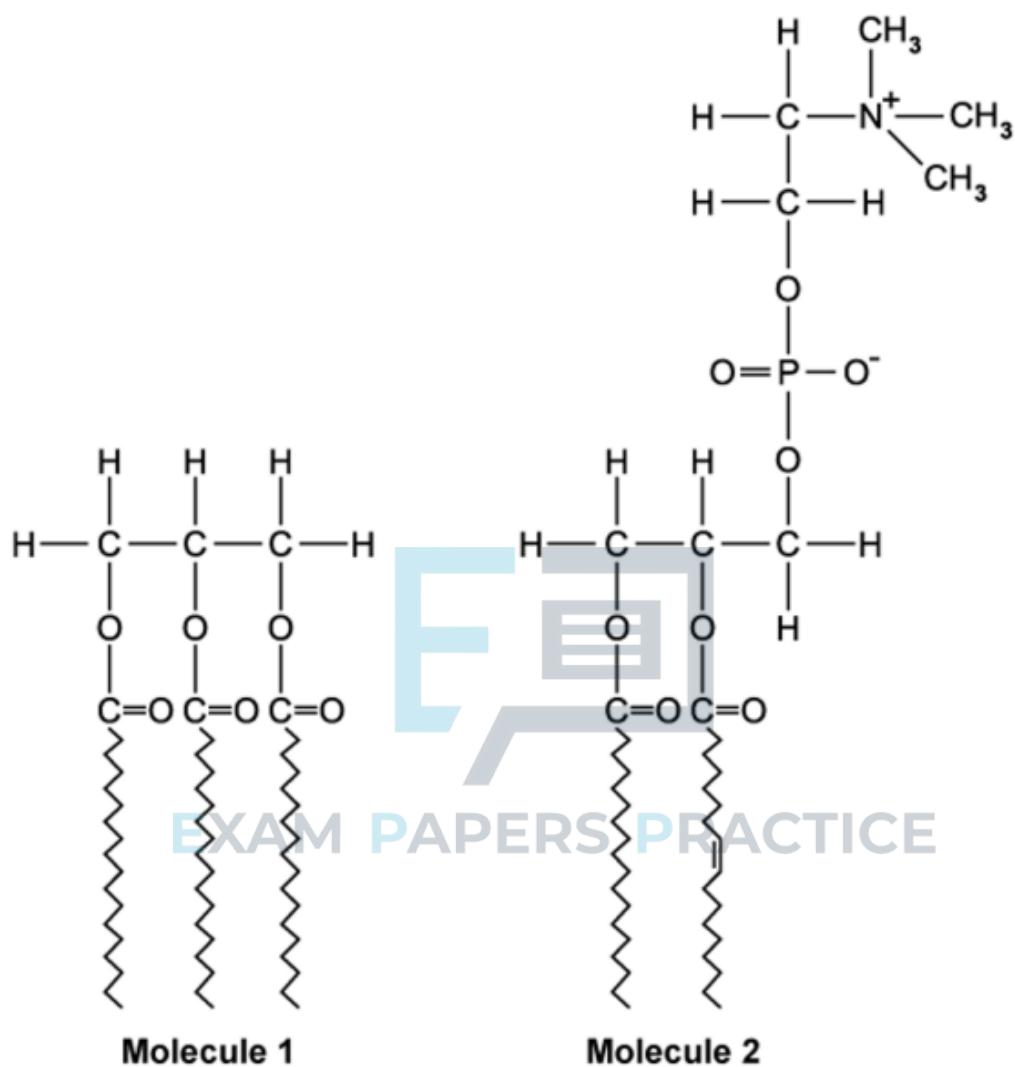


Diagram 1

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

	Molecule 1	Molecule 2
A	Has 3 fatty acid chains	Fatty acid chains are all saturated
B	Contains 3 glycosidic bonds	Has 2 ester bonds and a phosphate group
C	Has 3 saturated fatty acid chains	Has 1 unsaturated fatty acid chain
D	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 β -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 β -glucose and of α -glucose?

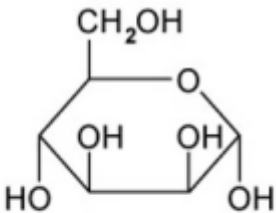
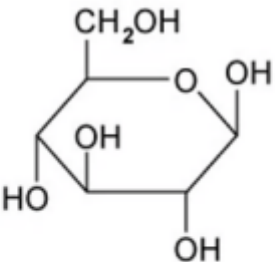
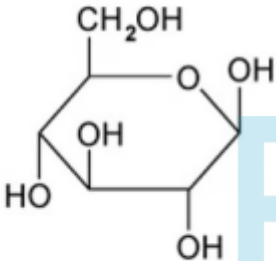
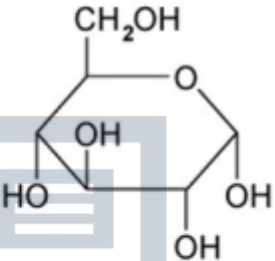
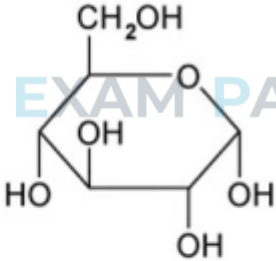
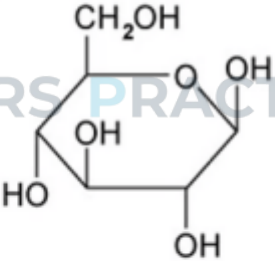
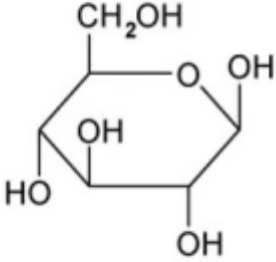
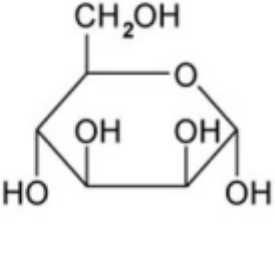
	β -glucose	α -glucose
A		
B		
C		
D		

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?

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