

2.2 Carbohydrates & Lipids

Question Paper

Course	CIE A Level Biology (9700) exams from 2022
Section	2. Biological Molecules
Topic	2.2 Carbohydrates & Lipids
Difficulty	Hard

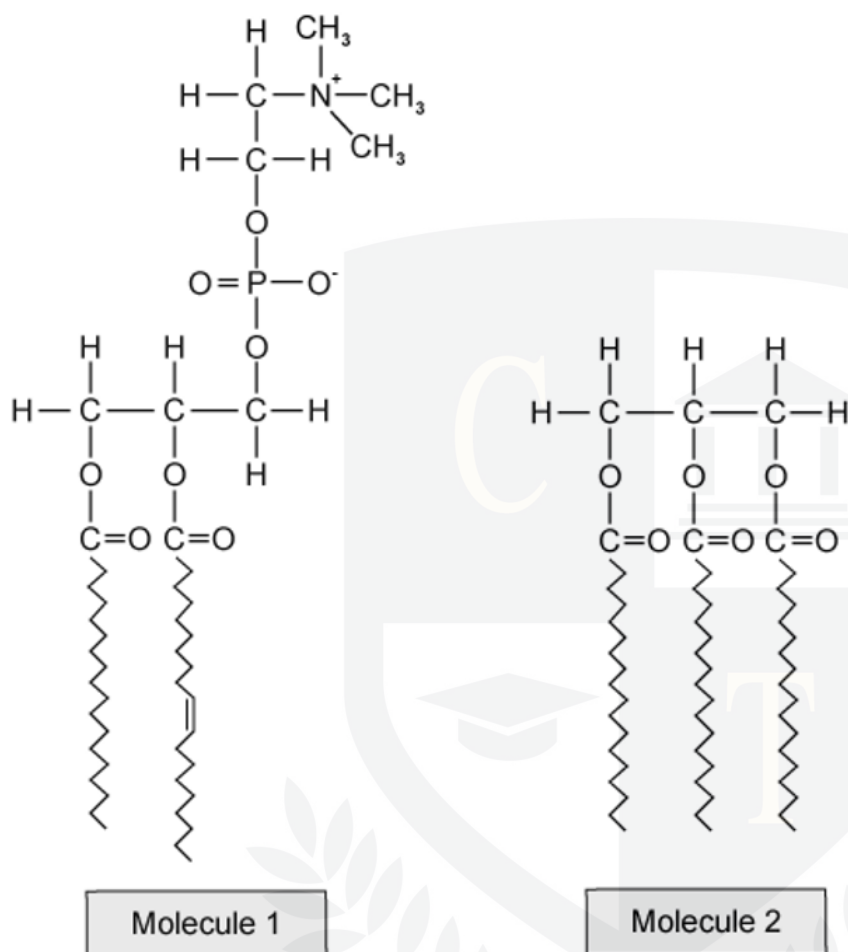
Time allowed: 10

Score: /10

Percentage: /100

Question 1

The diagram below shows the molecular structures of two molecules.



- 1 The phospholipid has fatty acid chains of the same length whereas the triglyceride has fatty acid chains of different lengths.
- 2 The phospholipid has two ester bonds in its structure whereas the triglyceride has three.
- 3 The triglyceride is non-polar and will form hydrogen bonds with water molecules
- 4 The fatty acid chains in the triglyceride are all saturated, whereas in the phospholipid there is an unsaturated bond.

Which of the above statements are true?

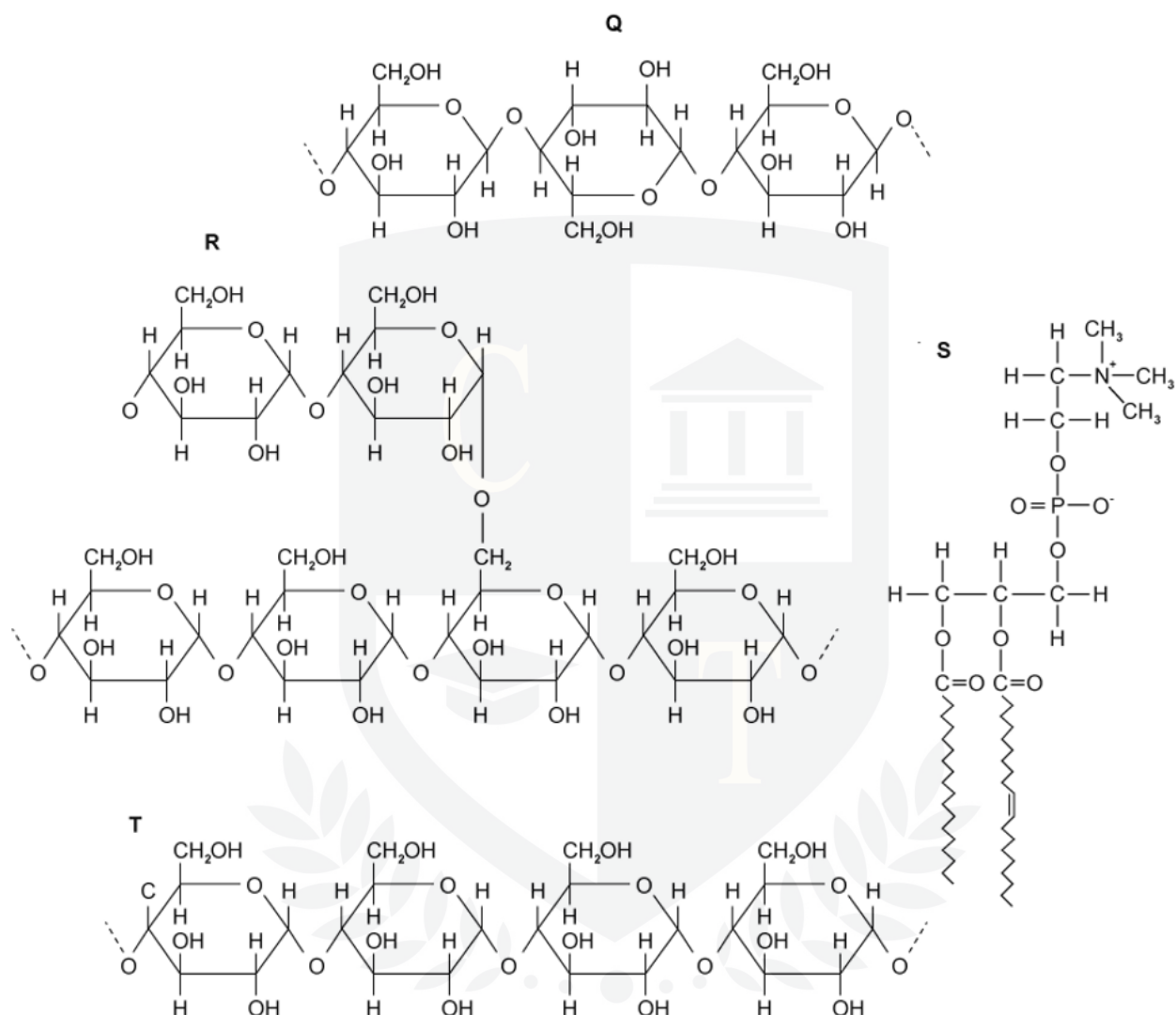
A 1 and 3 only **B** 1, 2 and 4 **C** 2 and 4 only **D** 2 only

[1 mark]



Question 2

A number of biological molecules are shown in the diagram below.



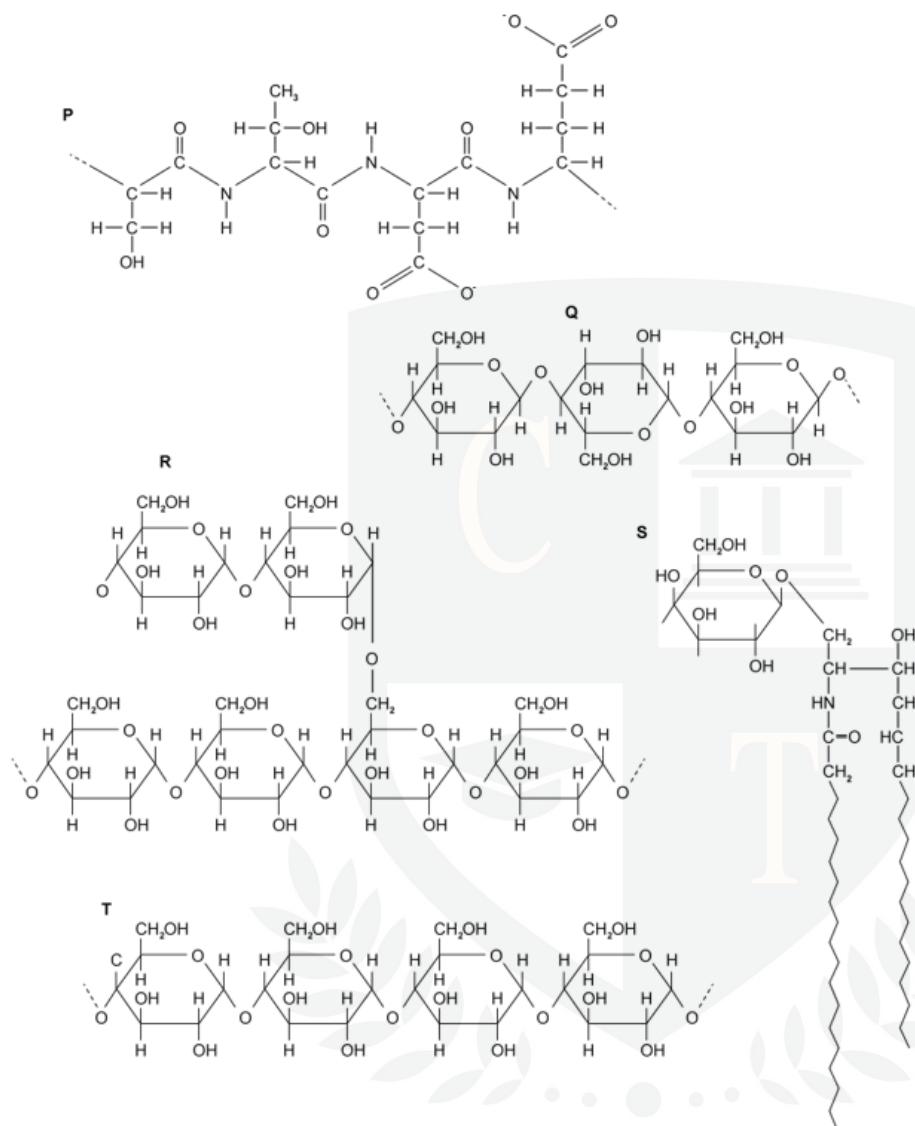
Which row of the table below correctly identifies some of the products of hydrolysis of the molecules above?

	Q	R	S	T
A	α -glucose	β -glucose	glycerol	α -glucose
B	α -glucose	β -glucose	fatty acids	α -glucose
C	β -glucose	α -glucose	glycerol	β -glucose
D	β -glucose	α -glucose	phosphate group	α -glucose

[1 mark]



Question 3



1. Molecule **P** contains peptide bonds, whereas Molecules **R** and **Q** are polymers with one type of covalent bond holding their sub-units together
2. Molecules **R** and **T** could both be found in animals and plants, whereas Molecule **Q** will never be found in animals.
3. Molecule **S** is commonly used for every storage in plants, whereas Molecule **Q** has a structural role only.
4. Molecule **T** has a helical structure, and Molecule **R** is commonly used for energy storage in plants.

Which of the statements above are not true?

- A** 1 and 3 only **B** 1, 2 and 3 **C** 2 and 4 only **D** 4 only

[1 mark]

Question 4

Which of the following molecules would have a structural formula that contains C=O bonds?

- 1 fatty acids
- 2 glucose
- 3 glycerol

A 1 and 2 only **B** 2 and 3 only **C** 1 only **D** 3 only

[1 mark]

Question 5

The names of four biological molecules are given below:

- 1 glucose
- 2 fructose
- 3 maltose
- 4 sucrose

Which of the following combinations contains a disaccharide that would act as a reducing agent when mixed with copper (II) sulfate ions, and a disaccharide that wouldn't?

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

[1 mark]

Question 6

- 1 Sucrose hydrolysis results in the breakage of glycosidic bonds, releasing equal amounts of fructose and α -glucose molecules, whereas the hydrolysis of amylose in plant cells results in only β -glucose molecules.
- 2 The glycosidic bonds of glycogen have been formed between two α -glucose molecules and only contain 1,4-glycosidic bonds, whereas the structure of amylose contains both 1,4 and 1,6-glycosidic bonds.
- 3 Triglycerides are polymers of three fatty acid chains joined to a glycerol molecule, forming a macromolecule which is not soluble in water.

Which of the statements above are not true?

- A** 1 and 2 **B** 2 and 3 **C** 1, 2 and 3 **D** None of the above

[1 mark]

Question 7

Lactose is a disaccharide that can be broken down to two different monosaccharides, one of which is galactose.

Which of the following correctly describes what occurs when lactose breaks down?

- A** Hydrolysis, releasing galactose and glucose and using water
- B** Condensation of galactose and glucose, using water
- C** Hydrolysis, releasing maltose and galactose and using water
- D** Condensation, releasing maltose and galactose, releasing water

[1 mark]

Question 8

Which of the following is a correct description?

- A** Sucrose and maltose are disaccharides that do not react with Cu^{2+} ions in Benedict's reagent, resulting in no colour change signifying that reducing sugars are present
- B** Sucrose and maltose are disaccharides, sucrose is a reducing sugar that can donate electrons to Cu^{2+} ions in Benedict's reagent, resulting in a colour change whereas maltose does not reduce Cu^{2+} ions
- C** Sucrose and maltose are disaccharides that do not react with Cu^{2+} ions in Benedict's reagent, resulting in no colour change signifying that non-reducing sugars are present
- D** Sucrose and maltose are disaccharides, maltose is a reducing sugar that can donate electrons to Cu^{2+} ions in Benedict's reagent, resulting in a colour change whereas sucrose does not reduce Cu^{2+} ions

[1 mark]

Question 9

Which of the following is a correct description of a monosaccharide?

- A** An OH group projects below the plane of the ring of ^1C and ^4C in α -glucose, and above the plane of the ring of ^2C and ^4C in β -glucose
- B** An OH group projects below the plane of the ring of ^1C and ^4C in β -glucose, and above the plane of the ring of ^2C and ^4C in α -glucose
- C** An OH group projects below the plane of the ring of ^1C and ^3C in β -glucose, whereas the OH group projects above the plane of ^1C in α -glucose.
- D** An OH group projects above the plane of the ring of ^1C and ^3C in β -glucose, whereas the OH group projects below the plane of ^1C in α -glucose.

[1 mark]

Question 10

Glycosidic bonds join monosaccharides together to form disaccharides and polysaccharides. Peptide bonds join amino acid subunits together to form polypeptide chains. Triglyceride molecules contain three fatty acid chains joined to one glycerol molecule via three ester bonds.

Which of the following statements correctly describes a feature all of the polymers described above share?

- A** They all contain monomers which are formed by many smaller molecules joined together by hydrogen bonds, which form during condensation reactions.
- B** They all contain monomers which are formed by many smaller molecules joined together by hydrogen bonds, which form during condensation reactions.
- C** They all contain monomers which are formed by many smaller molecules joined together by covalent bonds, which form during condensation reactions.
- D** They all contain monomers which are formed by many smaller molecules joined together by covalent bonds, which form during hydrolysis reactions.

[1 mark]

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