

# Biological Molecules

## Multiple Choice

### Question Paper 1

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Foundations in Biology
Topic	Biological Molecules
Booklet	Question Paper 1

**Time allowed:** 23 minutes

**Score:** /17

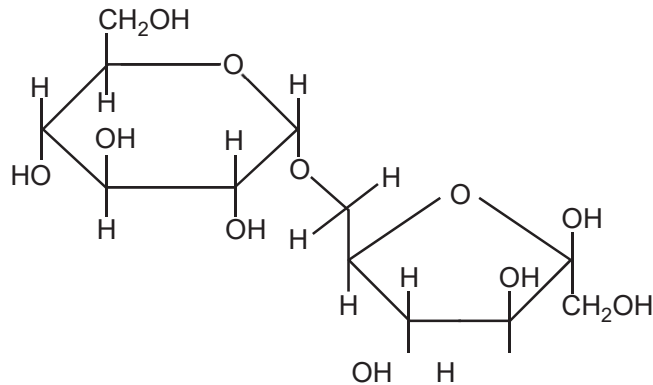
**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E
>69%	56%	50%	42%	34%	26%

## Question 1

The image below shows isomaltulose, a disaccharide formed from  $\alpha$ -glucose and fructose.



Name the bond that holds the  $\alpha$ -glucose and the fructose together.

[1]


- A 1,6-glycosidic bond
- B phosphodiester bond
- C ester bond
- D 1,4-glycosidic bond

## Question 2

The hydroxyl (-OH) group of carbohydrates is polar and makes the molecule soluble in water. The greater the number of free hydroxyl groups as a proportion of the number of carbon atoms, the more soluble the carbohydrate.

[1]

Which of the rows, **A** to **D**, lists the carbohydrates in order of most soluble to least soluble?

	Most soluble			Least soluble
<b>A</b>	glucose	ribose	amylose	amylopectin
<b>B</b>	amylose	amylopectin	glycogen	ribose
<b>C</b>	glucose	ribose	amylopectin	amylose
<b>D</b>	ribose	amylose	glucose	amylopectin

### Question 3

The table below shows four biological molecules and their component elements.

Which of the rows, **A** to **D**, correctly identifies the elements in each molecule?

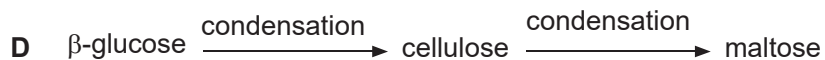
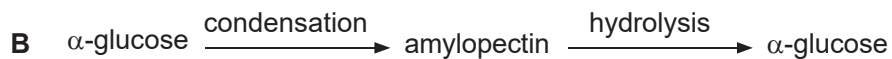
[1]

	<b>sucrose</b>	<b>cholesterol</b>	<b>insulin</b>	<b>ATP</b>
<b>A</b>	C, H, O	C, H, O, N	C, H, O, N, S	C, H, O, N, P
<b>B</b>	C, H, O, N	C, H, O	C, H, O, N, S	C, H, O, N, S
<b>C</b>	C, H, O	C, H, O	C, H, O, N, S	C, H, O, N, P
<b>D</b>	C, H, O	C, H, O	C, H, O, N, P	C, H, O, N, P

## Question 4

The following are a series of organic molecules and the chemical processes that occur to convert them into different molecules.

Which of the rows, **A** to **D**, is correct?



[1]

## Question 5

The following table describes the approximate percentage mass of different chemical elements in organic polymers.

	Polymer	N (%)	C (%)	O (%)	H (%)	P (%)
<b>A</b>	nucleic acid	20.0	30.0	20.0	10.0	20.0
<b>B</b>	carbohydrate	0.0	33.3	33.3	33.3	0.0
<b>C</b>	protein	30.0	10.0	10.0	0.0	50.0
<b>D</b>	lipid	0.0	50.0	49.0	1.0	0.0

Which of the rows, **A** to **D**, is correct?

[1]

## Question 6

Which of the following processes involves the formation of ester bonds?

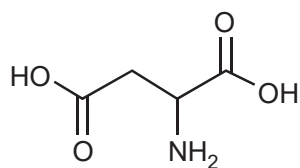
- 1 synthesis of polynucleotides
  - 2 synthesis of triglycerides
  - 3 synthesis of polypeptides
- A. 1, 2 and 3
- B. Only 1 and 2
- C. Only 2 and 3
- D** Only 1

[1]

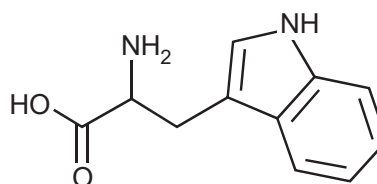
## Question 7

Which of the following could **not** be an amino acid?

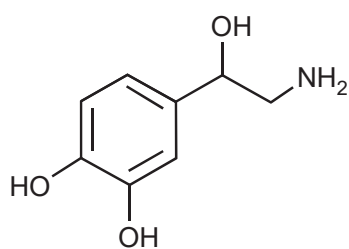
A



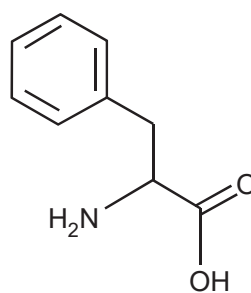
B



C



D



[1]



## Question 8

Lipids are a diverse group of chemicals that are neither polar nor charged and hence are insoluble in water. The \_\_\_(1)\_\_\_ nature of the heads of phospholipids allows them to form membranes. \_\_\_(2)\_\_\_ also contain fatty acids and form part of the membrane. Lipids can be used for energy storage in the form of \_\_\_(3)\_\_\_ . Some hormones are also lipids and they are similar in structure to \_\_\_(4)\_\_\_ .

Which row shows the correct sequence of missing words?

	1	2	3	4
<b>A</b>	hydrophilic	glycolipids	triglycerides	cholesterol molecules
<b>B</b>	hydrophilic	triglycerides	cholesterol molecules	glycolipids
<b>C</b>	hydrophobic	cholesterol molecules	triglycerides	bile
<b>D</b>	hydrophilic	cholesterol molecules	triglycerides	glycolipids

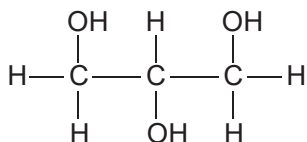
[1]

## Question 9

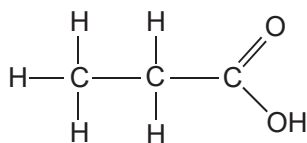
Water is known as the universal solvent as it has the ability to dissolve many ionic and covalent compounds due to its polar nature.

Which of the 3-carbon compounds will **not** form hydrogen bonds with water and will therefore **not** dissolve in water?

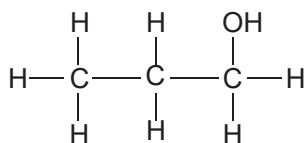
A glycerol



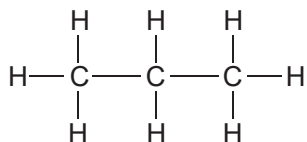
B propanoic acid



C propanol



D propane



[1]

## Question 10

Which of the options, **A** to **D**, is a correct statement about polysaccharides of glucose?

- A. Cellulose microfibrils are formed by hydrogen bonding between adjacent chains of  $\alpha$ -glucose molecules bonded with 1,4-glycosidic bonds.
- B. Amylose is a straight chain of  $\alpha$ -glucose monomers bound by 1,6-glycosidic bonds to allow for dense packing.
- C. Glycogen has a high proportion of 1,6-glycosidic bonds to produce a highly branched molecule for rapid release of  $\alpha$ -glucose.
- D. Amylopectin has a mixture of 1,4-glycosidic and 1,6-glycosidic bonds between  $\beta$ -glucose molecules for rapid release of energy.

[1]

## Question 11

A group of students was given a 1% solution of an unknown digestive enzyme.

They were also given three tubes containing an identical mixture of foods.

The students carried out a different biochemical test on each tube before and after adding the unknown enzyme. Their results are shown in the table below.

	Colour before	Colour after
<b>Biuret test</b>	purple	purple
<b>Iodine test</b>	blue / black	yellow / orange
<b>Benedict's test</b>	brick red	brick red

Name the type of enzyme the students used.

- A. protease
- B. carbohydrase
- C. lipase
- D. cellulase

[1]

## Question 12

Which of the statements, **A** to **D**, about amylopectin is correct?

- A. it contains 1-4 and 1-6 glycosidic bonds between  $\alpha$ -glucose monomers
- B. it is an unbranched chain of  $\alpha$ -glucose monomers
- C. it contains  $\alpha$  1-4 and  $\beta$  1-6 glycosidic bonds
- D. it is made up of  $\beta$ -glucose monomers and is uncoiled

[1]

## Question 13

Carbohydrates, such as starch, are made from monosaccharides joined together.

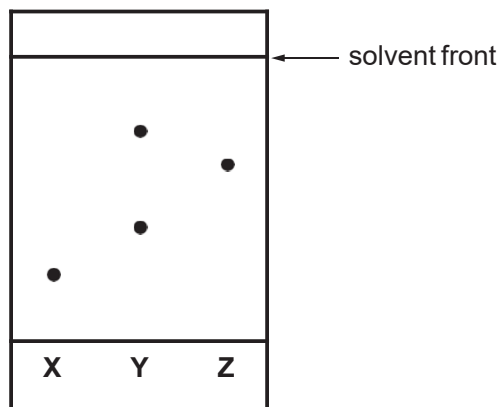
Which of the bonds, **A** to **D**, joins monosaccharides together?

- A. ester
- B. glycosidic
- C. peptide
- D. phosphodiester

[1]

## Question 14

A student investigates some solutions, **X**, **Y** and **Z**, using paper chromatography. The results are shown below.



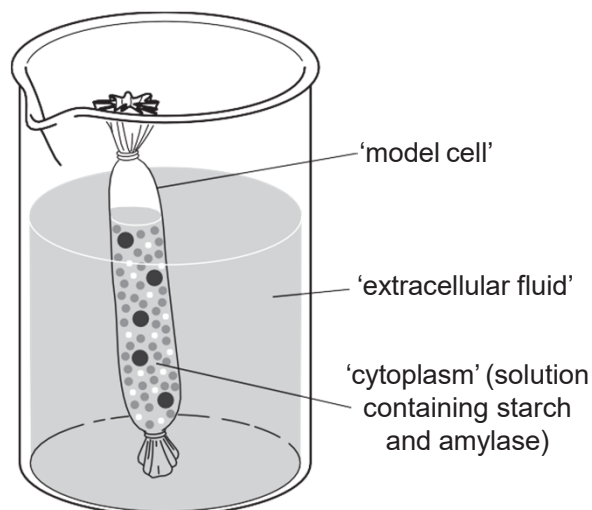
Which of the following options, **A** to **D**, is the  $R_f$  value of **Z**?

- A** 0.63
- B** 1.6
- C** 0.85
- D** 0.25

[1]

## Question 15

A group of students were investigating the diffusion of molecules across membranes using a 'model cell', as shown below.



Biochemical tests were used to identify the types of molecules present. The results are shown in the table below.

A tick (✓) represents a positive result.

Which of the rows, **A** to **D**, shows the correct results for the 'cytoplasm' at the beginning of the experiment **and** the 'extracellular fluid' at the end of the experiment?

	Benedict's test		Biuret test		Iodine test	
	'cytoplasm'	'extracellular fluid'	'cytoplasm'	'extracellular fluid'	'cytoplasm'	'extracellular fluid'
<b>A</b>			✓		✓	
<b>B</b>		✓	✓	✓	✓	
<b>C</b>	✓	✓			✓	✓
<b>D</b>	✓		✓		✓	

[1]



## Question 16

Which of the following formulae of fatty acids represents a saturated fatty acid?

**Statement 1:** Palmitic acid,  $C_{15}H_{31}COOH$

**Statement 2:** Oleic acid,  $C_{17}H_{33}COOH$

**Statement 3:** Linoleic acid,  $C_{17}H_{31}COOH$

- A** 1, 2 and 3
- B** Only 1 and 2
- C** Only 2 and 3
- D** Only 1

[1]

An unknown solution of a single sugar was tested. The results were recorded in **Table 9.1**.

<b>Colours observed after testing</b>	
<b>Benedict's test for reducing sugars</b>	<b>Benedict's test for non-reducing sugars</b>
blue	brick red

**Table 9.1**

Identify the unknown sugar.

- A. fructose
- B. lactose
- C. sucrose
- D. glucose

[1]