Write your name here

Surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

Candidate Number

Biology

Advanced Subsidiary
Unit 1: Lifestyle, Transport, Genes and Health

Thursday 24 May 2018 – Afternoon
Time: 1 hour 30 minutes

Paper Reference
WBI01/01

You must have:
Calculator, HB pencil, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name,
  centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*****) are ones where the quality of your
  written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as
  well as the clarity of expression, on these questions.*
- Candidates may use a calculator.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

Pearson

Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Excessive energy intake can contribute to ill health.

(a) Most of the energy in the diet is obtained from proteins, lipids and carbohydrates.

Put a cross ☒ in the box next to the correct words to complete each of the following statements.

(i) The bond that joins amino acids into a chain is

(1)

☒ **A** an ester bond

☒ **B** a hydrogen bond

☒ **C** a peptide bond

☒ **D** a phosphodiester bond

(ii) The type of reaction involved in breaking down lipids into fatty acids and glycerol is a

(1)

☒ **A** condensation reaction that produces a water molecule

☒ **B** condensation reaction that uses a water molecule

☒ **C** hydrolysis reaction that produces a water molecule

☒ **D** hydrolysis reaction that uses a water molecule

(iii) Starch is made from amylose and amylopectin. Amylose is a

(1)

☒ **A** branched molecule that contains both 1,4 and 1,6 glycosidic bonds

☒ **B** branched molecule that contains only 1,4 glycosidic bonds

☒ **C** helical molecule that contains both 1,4 and 1,6 glycosidic bonds

☒ **D** helical molecule that contains only 1,4 glycosidic bonds

P 5 1 8 4 9 A 0 2 2 4

(b) The table below shows the major sources of energy and the body mass index (BMI) of three people, **L**, **M** and **N**.

For each person, the energy obtained from each food source is shown.

Person	Energy from food source / kJ day⁻¹			BMI
	Protein	**Carbohydrate**	**Lipid**	
L	1741	4354	2612	23
M	3333	6665	3333	22
N	1139	5693	4554	30

(i) Put a cross ⊠ in the box next to the percentage of energy obtained from carbohydrate by person **L**.

(1)

⊠ **A** 20 %

⊠ **B** 30 %

⊠ **C** 50 %

⊠ **D** 70 %

(ii) Suggest a difference in **lifestyle** that could explain the differences between person **L** and person **M**.

(1)

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(iii) Using the information in the table, explain why a doctor might prescribe statins for person **N**.

(2)

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(Total for Question 1 = 7 marks)

2 Genes are made of DNA.

Before a cell divides, the DNA molecules replicate.

(a) Put a cross ⊠ in the box next to the correct structure for a nucleotide found in DNA.

(1)

A
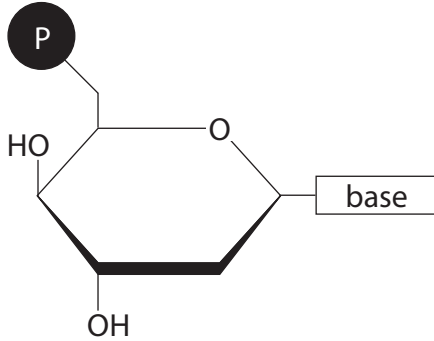
B
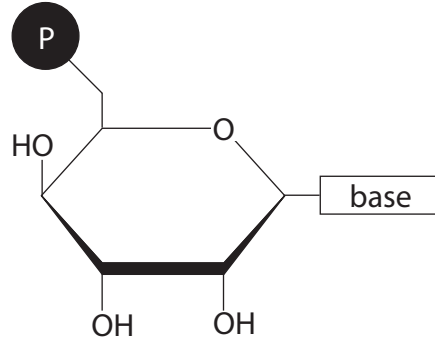
C
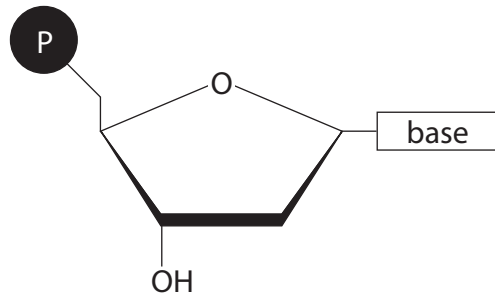
D
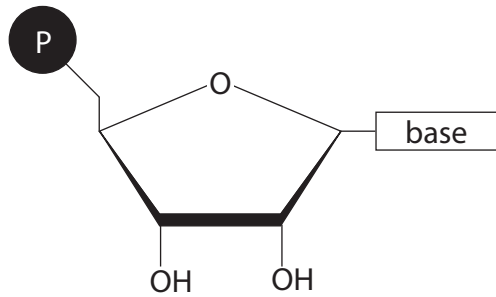
⊠ **A**

⊠ **B**

⊠ **C**

⊠ **D**

(b) Explain what is meant by the term **gene**.

(2)

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P 5 1 8 4 9 A 0 4 2 4

(c) Describe the process of DNA replication.

(4)

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(d) Explain the roles of RNA in translation.

(3)

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(Total for Question 2 = 10 marks)

P 5 1 8 4 9 A 0 5 2 4

3 Mammals have a heart that has two chambers on the left and two chambers on the right. This provides a double circulatory system.

(a) The diagram below shows a heart with its major blood vessels.
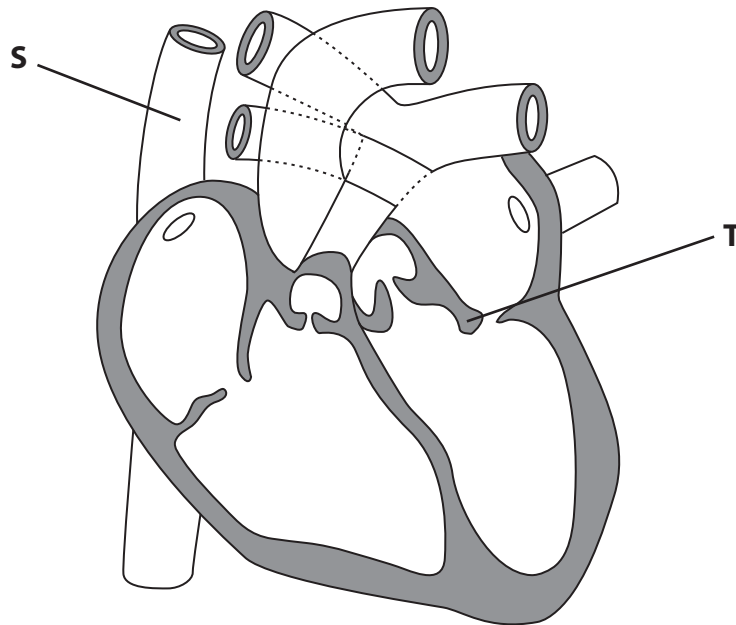
Put a cross ⊠ in the box next to the correct word or words to complete the following statements.

(i) The blood vessel labelled **S** is the

(1)

⊠ **A** aorta

⊠ **B** pulmonary artery

⊠ **C** pulmonary vein

⊠ **D** vena cava

(ii) The structure labelled **T** is the

(1)

⊠ **A** left atrioventricular valve

⊠ **B** left semilunar valve

⊠ **C** right atrioventricular valve

⊠ **D** right semilunar valve

(b) The graph below shows the changes in the volume of blood in the left ventricle during one second.
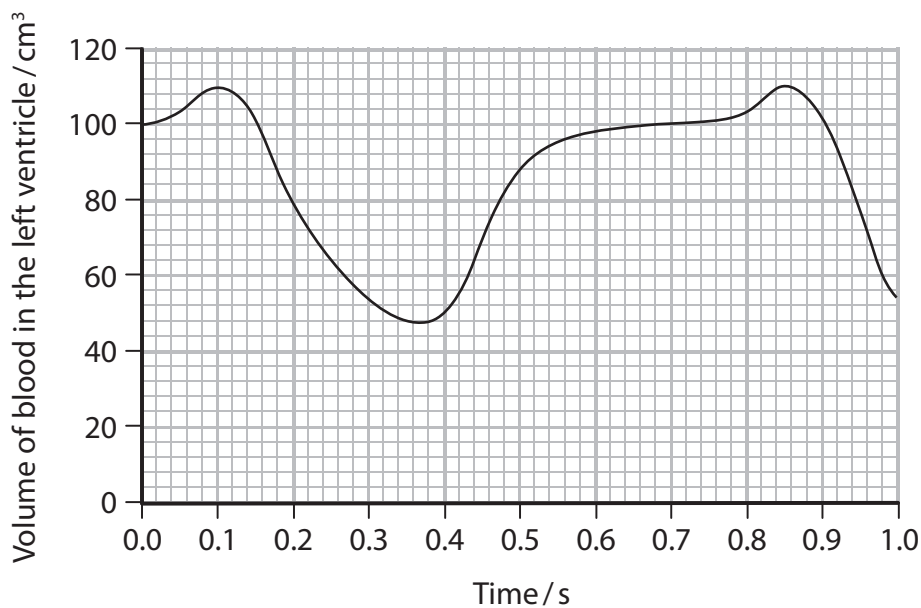
(i) Using the information in the graph, calculate the heart rate.

(2)

.... beats min^{-1}

(ii) Using your answer to (i) and the information in the graph, calculate the volume of blood pumped out of the left ventricle in each minute.

(2)

.... cm^3

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(iii) Put a cross ⊠ in the box next to the correct words to complete the following statement.

Compared with the left ventricle, the blood pumped from the right ventricle each minute will be

(1)

⊠ **A** a lower volume at a lower pressure

⊠ **B** a lower volume at the same pressure

⊠ **C** the same volume at a lower pressure

⊠ **D** the same volume at a higher pressure

(c) Describe the role of the cardiac cycle in moving blood through the heart.

(3)

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(d) Explain the advantages of the double circulatory system found in mammals.

(3)

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(Total for Question 3 = 13 marks)

4 Human diets contain both saturated and unsaturated lipids.

(a) Give **two** differences between the structures of saturated and unsaturated lipids.

(2)

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(b) The effect of replacing dietary saturated lipids with unsaturated vegetable oils rich in linoleic acid was investigated.

One group of 4700 people received saturated lipids. A second group of 4800 people received unsaturated lipids rich in linoleic acid.

The investigation lasted for 4.5 years.

The table below shows information relating to this investigation.

Diet	Mean blood cholesterol / mg dm^{-3}	Deaths from all causes during the investigation (%)
Saturated lipids	208	18
Unsaturated lipids rich in linoleic acid	177	20

(i) Using the information in the table, describe the results of this investigation.

(2)

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(ii) Suggest **two** limitations in the design of this investigation.

(2)

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(Total for Question 4 = 6 marks)

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5 Obesity is one risk factor for cardiovascular disease (CVD).

(a) Coronary heart disease is one type of cardiovascular disease.

(i) Read through the following passage on atherosclerosis, then write on the dotted lines the most appropriate word or words to complete the passage.

(4)

In atherosclerosis, the .... cells lining the artery are

damaged. This damage triggers an .... response.

White blood cells collect at the site and accumulate large quantities of

the lipid .... This develops into a fatty deposit

called ....

(ii) Suggest how atherosclerosis can result in coronary heart disease.

(3)

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P 5 1 8 4 9 A 0 1 3 2 4

(b) In a study, people were asked to state whether they thought their risk of developing CVD was below average, average or above average. This was recorded as perceived risk.

The perceived risk was then compared with their actual risk of developing CVD determined from their BMI.

The results are shown in the table below.

		Actual risk of developing CVD based on BMI (%)			
		below average	**average**	**above average**	**total**
Perceived risk of developing CVD (%)	**below average**	25	15	17	57
	average	11	9	10	30
	above average	3	4	6	13
	total	39	28	33	100

(i) Using the information in the table, describe how the perceived risk of developing CVD compares with the actual risk of developing CVD.

(3)

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(ii) Suggest why some people with a high BMI might not believe they are at an increased risk of developing CVD.

(2)

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(Total for Question 5 = 12 marks)

6 Cystic fibrosis is a genetic disorder that can affect many body systems, including the respiratory system.

(a) Cystic fibrosis results from the expression of inherited gene mutations.

State what is meant by the term **gene mutation**.

(1)

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*(b) Explain how a child can have cystic fibrosis when neither of the parents has this disorder.

(5)

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P 5 1 8 4 9 A 0 1 6 2 4

(c) Two bacteria that can cause lung infections are *P. aeruginosa* and *S. aureus*.

The table below shows information on the percentage of people of different ages with cystic fibrosis who are infected with these bacteria.

Bacteria	Percentage of people with cystic fibrosis who have a lung infection (%)				
	5 years old	15 years old	25 years old	35 years old	45 years old
P. aeruginosa	34	70	82	82	75
S. aureus	42	45	35	31	25

(i) Using the information in the table, describe the relationship between the age of a person and the incidence of these bacterial infections.

(3)

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(ii) Suggest why people with cystic fibrosis are more likely to have lung infections than people without cystic fibrosis.

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(Total for Question 6 = 12 marks)

7 Enzymes are involved in many chemical reactions.

(a) State what is meant by the term **enzyme**.

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(b) Catalase is an enzyme that breaks down hydrogen peroxide into water and oxygen.

The graph below shows the effect of catalase on the initial rate of reaction at different concentrations of hydrogen peroxide.
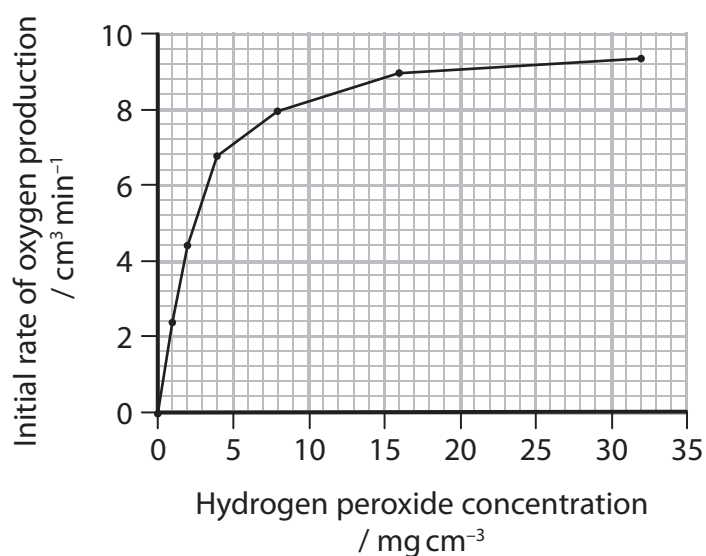
(i) Explain why it is necessary to measure the initial rate of reaction when investigating the effect of substrate concentration on enzyme activity.

(2)

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(ii) Using the graph, explain the effect of substrate concentration on the activity of catalase.

(3)

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*(c) Describe an experiment that could be carried out to collect data to plot a graph similar to the one shown in part (b).

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(Total for Question 7 = 11 marks)

8 Blood loss from damaged vessels is reduced by the clotting process.

(a) Name the factor released by platelets that initiates the clotting process.

(1)

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(b) When blood is stored, it is mixed with EDTA.

EDTA binds strongly to calcium ions.

Suggest why EDTA is added to blood before storage.

(2)

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(c) During the clotting process, the soluble protein fibrinogen is converted to insoluble fibrin.

(i) Explain how the primary structure of fibrinogen produces this soluble protein.

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P 5 1 8 4 9 A 0 2 1 2 4

(ii) Fibrinogen is converted into fibrin by a protease enzyme.

Suggest how the structure of fibrinogen is changed to form fibrin.

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(Total for Question 8 = 9 marks)

TOTAL FOR PAPER = 80 MARKS

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