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Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel International GCSE (9–1)

Centre Number | Candidate Number

Tuesday 7 May 2019

Morning (Time: 1 hour 45 minutes) | Paper Reference **4HB1/01R**

Human Biology

Unit: 4HB1
Paper: 01R

You must have:
Ruler
Calculator

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.*
- Show all the steps in any calculations and state the units.
- 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 ☒.

Information

- The total mark for this paper is 90.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Answer ALL questions.

1 The table lists blood components and their features.

Place ticks (✓) in boxes to show the features of each blood component.

(6)

	Feature					
Blood component	**has a nucleus**	**contains haemoglobin**	**carries hormones**	**engulfs pathogens**	**produces antibodies**	**helps blood clotting**
red blood cell						
phagocyte						
lymphocyte						
platelets						
plasma						

(Total for Question 1 = 6 marks)

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2 Humans need a balanced diet.

(a) Vitamins are needed in a balanced diet.

State four other components of a balanced diet.

(2)

1 .....

2 .....

3 .....

4 .....

(b) Explain why vitamin C is needed in a balanced diet.

(2)

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(c) The vitamin C content of fruit juices varies.

(i) Design an investigation to compare the vitamin C content of fresh fruit juice and long-life fruit juice.

(5)

(ii) State two variables that should be controlled in this investigation.

(2)

1 .....

2 .....

(Total for Question 2 = 11 marks)

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3 Ebola is a disease that has become an epidemic in some countries.

(a) Which of these causes Ebola?

(1)

- ☒ **A** a bacterium
- ☒ **B** a mosquito
- ☒ **C** a protozoan
- ☒ **D** a virus

(b) State three precautions that can be taken to prevent the spread of Ebola.

(3)

1 .....

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2 .....

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(c) Symptoms of Ebola only appear two to three weeks after infection.

Explain why the symptoms do not appear immediately.

(3)

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(d) Oral rehydration is a method used to treat the symptoms of Ebola.

Explain why this method is an effective treatment.

(3)

(e) Fruit bats are thought to be a natural reservoir for the Ebola pathogen.

Suggest what is meant by the term **reservoir**.

(2)

(Total for Question 3 = 12 marks)

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4 The blood is filtered by the kidneys.

The filtrate formed passes through the kidney tubules and is changed into urine.

(a) The table lists the masses of different substances in blood, filtrate and urine passing through the kidneys in one day.

	Mass of substance in g per day		
Substance	**in blood**	**in filtrate**	**in urine**
protein	8000	0	0
glucose	180	180	0
urea	53	53	25
uric acid	9	9	1

Use the information from the table to answer these questions.

(i) Which substance does not pass into the filtrate?

(1)

☒ **A** protein

☒ **B** glucose

☒ **C** urea

☒ **D** uric acid

(ii) The molecules of this substance do not pass into the filtrate.

What is the reason for this?

(1)

☒ **A** the molecules are too large

☒ **B** the molecules are reabsorbed

☒ **C** the molecules are a waste product

☒ **D** the concentration of the molecules in the blood is too low

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(iii) A person has diabetes but is not receiving treatment.

Explain why the mass of glucose per day in the urine would be different for this person.

(3)

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(iv) Calculate the mass of urea in the urine as a percentage of the mass of urea in the filtrate.

(2)

percentage = ... %

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(b) Kidney failure can be treated by a kidney transplant or by dialysis.

Discuss the advantages and disadvantages of kidney transplants.

(5)

(Total for Question 4 = 12 marks)

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5 A student investigates the effect of temperature on the volume of sweat produced.

This is the student's method.

- sit a person in a room at 20 °C
- measure the volume of sweat the person produces
- repeat with the room at different temperatures
- repeat again when the person is active

The table shows the student's results.

Temperature of room in °C	Volume of sweat produced in arbitrary units	
	Sitting	Active
20	1	2
22	2	6
24	2	8
26	2	11
28	3	14
30	4	22

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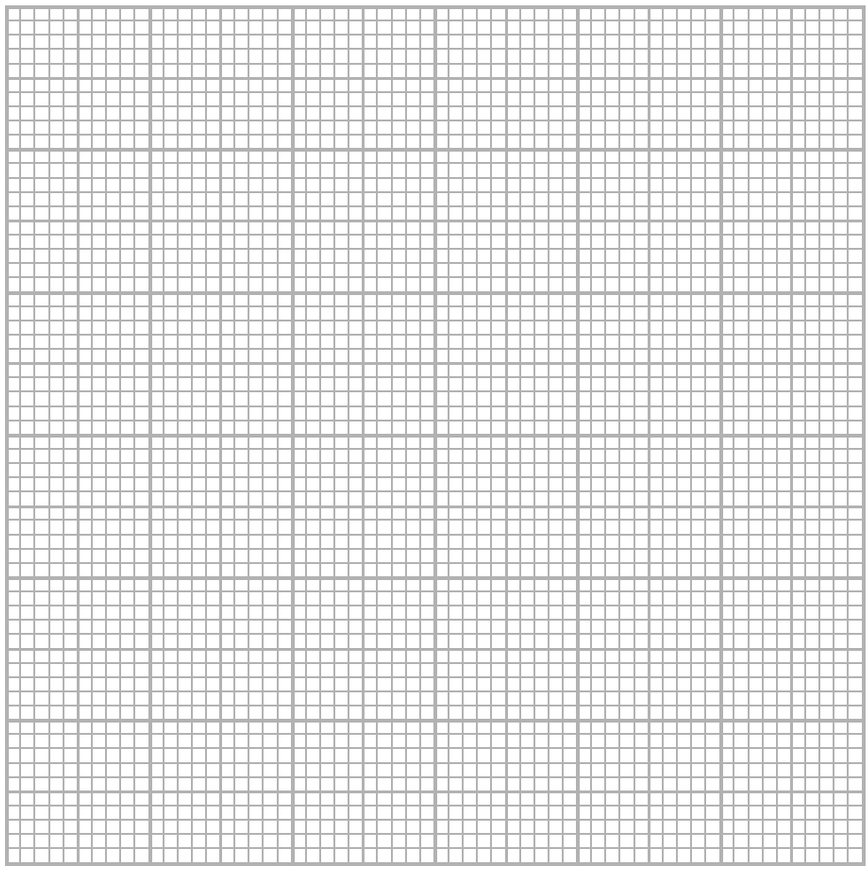
(a) Plot the student's results on the grid.

Join the points with straight lines.

(5)



(b) Use your graph to determine the difference in the volume of sweat produced at 27 °C when sitting and when active.

(2)

difference = ... arbitrary units

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(c) Explain the difference between the volume of sweat produced when sitting and when active.

(3)

(Total for Question 5 = 10 marks)

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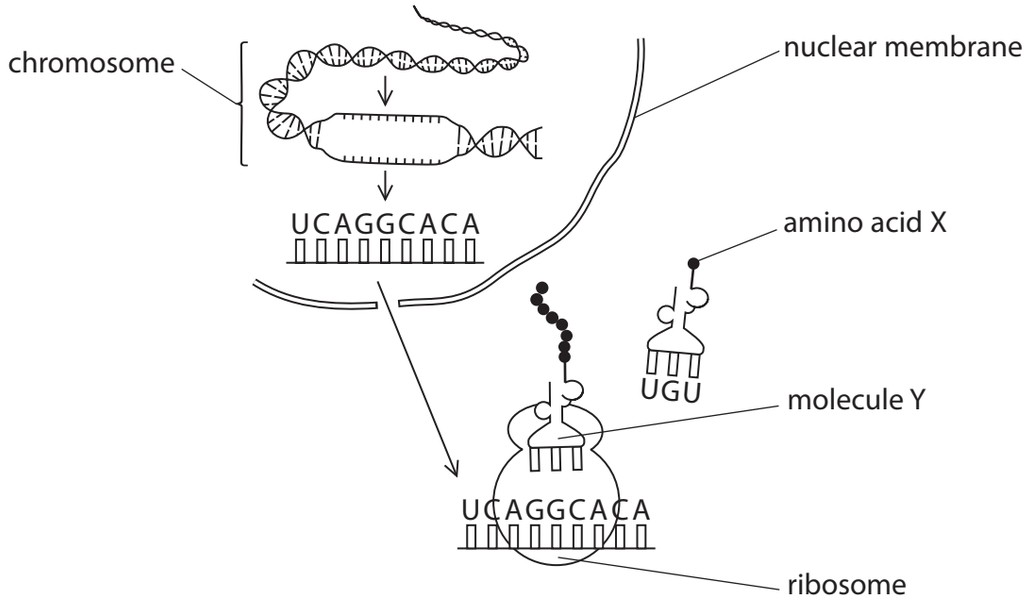
6 Protein synthesis has a number of stages.

The diagram shows some of the stages.



The table lists the base triplets of DNA that code for some of the amino acids found in a protein.

Base triplet of DNA	Amino acid
AGT	serine
CCG	glycine
TGT	threonine
GTA	histidine
CAA	valine
TCC	argenine
ACA	cysteine

(a) Describe the function of the nuclear membrane.

(2)

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(b) Which is the correct sequence for the three unpaired bases on the tRNA molecule labelled Y?

(1)

☒ **A** AAU

☒ **B** CCG

☒ **C** GGC

☒ **D** UUA

(c) Give the name of amino acid X.

(1)

(d) Describe the process occurring on the ribosome.

(6)

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(e) Describe how a mutation will affect a chromosome.

(2)

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(Total for Question 6 = 12 marks)

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7 Cheese is processed from milk. During this process, an enzyme is used to convert the lactose in milk into lactic acid.

A student uses this method to investigate the process.

- dissolve lactose in water to produce a solution
- put the lactose solution into three different test tubes
- keep the first test tube at 2 °C, the second test tube at 25 °C and the third test tube at 55 °C
- add enzyme solution to the lactose solution in each test tube
- measure the amount of lactic acid in the solution every 10 hours for a total of 60 hours

The table shows the student's results.

Time after adding enzyme in hours	Amount of lactic acid in the solution in arbitrary units		
	2 °C	25 °C	55 °C
0	0.1	0.1	0.1
10	0.1	0.2	0.2
20	0.1	0.3	0.2
30	0.2	0.8	0.4
40	0.3	1.8	0.7
50	0.4	2.2	1.0
60	0.6	2.3	1.3

(a) Describe what additional information another student would need to repeat this investigation.

(4)

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(b) (i) Estimate the optimum temperature for this enzyme.

(1)

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(ii) Explain why it is not possible to give an accurate value for the optimum temperature using the student's method.

(2)

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(c) The student continued the investigation for a further 60 hours.

Explain the results that would be obtained.

(3)

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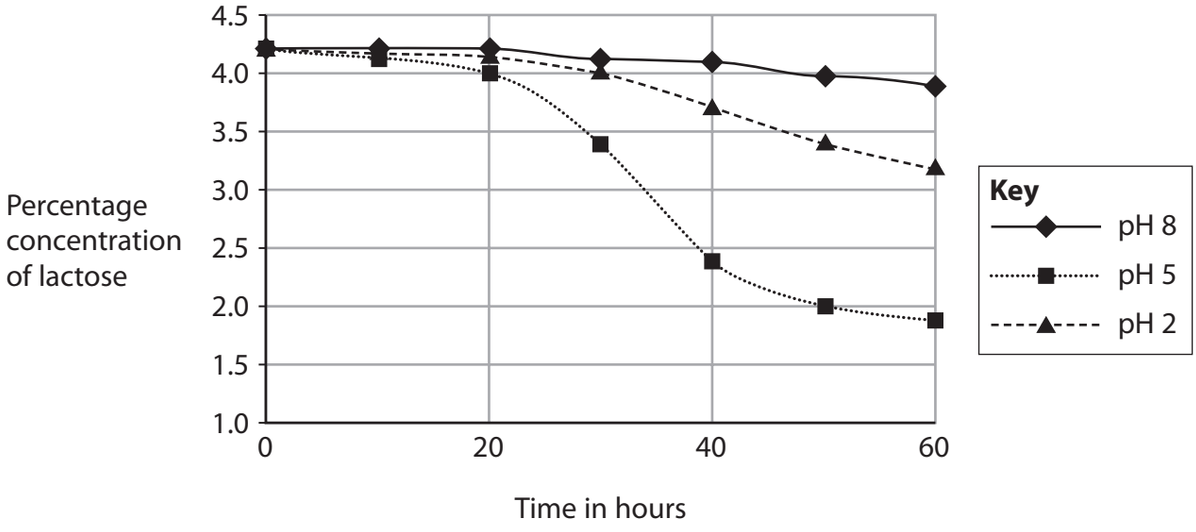
(d) The student uses the same enzyme to investigate the effect of pH on the conversion of the lactose into lactic acid.

The student's results are shown in the graph.



The student wants to determine the most effective conditions for the conversion of lactose into lactic acid in cheese manufacture.

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Discuss if this is possible using the results of the two investigations.

(5)

(Total for Question 7 = 15 marks)

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8 The table shows the rate of blood flow through different organs when a person is at rest. The table also shows the masses of these organs.

Organ	Mass in kg	Rate of blood flow in cm^3 per minute	
		through the whole organ	per 100g of the organ
kidneys	0.3	1200	
skeletal muscles	25.0		3
liver	1.5	1500	100

(a) Calculate the missing values and put them in the table.

(4)

(b) Explain why the liver has a high rate of blood flow.

(4)

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(c) Explain any changes that would occur in the blood flow through these organs during vigorous exercise.

(4)

(Total for Question 8 = 12 marks)

TOTAL FOR PAPER = 90 MARKS

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