Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Human Biology

Unit: 4HB0
Paper: 01

Tuesday 8 May 2018 – Morning
Time: 2 hours

Paper Reference
4HB0/01

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 120.
- 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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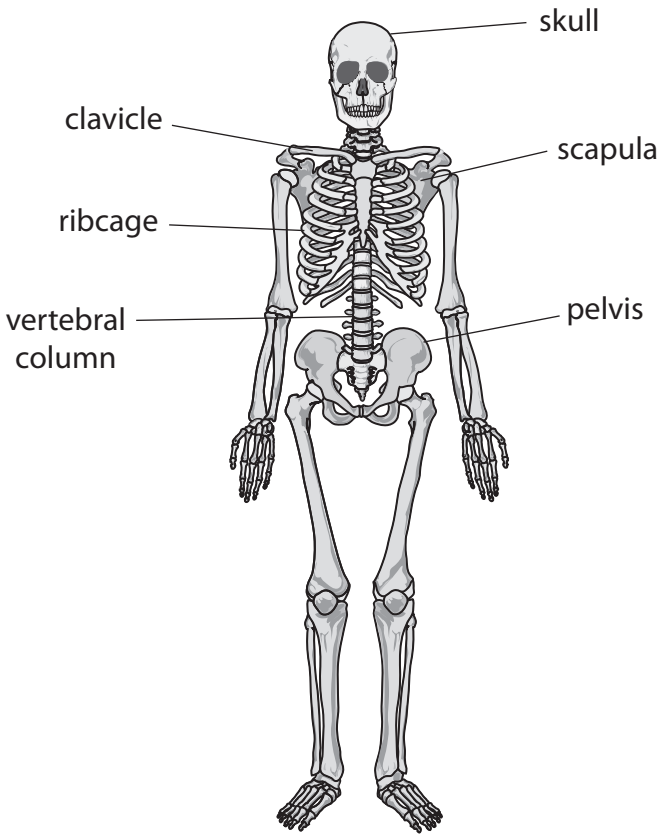
P 5 2 5 9 2 A 0 1 3 6

Pearson

Answer ALL questions.

1 For each of the questions (a) to (j), choose an answer, **A**, **B**, **C** or **D**, and put a cross in the box ☒. Mark only one answer for each question. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

(a) The diagram shows the human skeleton.



Which two labels show parts of the axial skeleton?

(1)

☒ **A** skull and pelvis

☒ **B** clavicle and scapula

☒ **C** vertebral column and skull

☒ **D** ribcage and pelvis

(b) Why is it important for pregnant women to include more iron in their diet?

(1)

☒ **A** to produce haemoglobin

☒ **B** to improve blood circulation

☒ **C** for healthy white blood cells

☒ **D** to produce oxygen

(c) Which gas is produced by plants during photosynthesis?

(1)

☒ **A** carbon dioxide

☒ **B** methane

☒ **C** nitrogen

☒ **D** oxygen

(d) Fruit flies can have curly wings or vestigial wings.

In a breeding experiment, there were 52 offspring and 48 had curly wings.

What is the ratio of curly wings to vestigial wings?

(1)

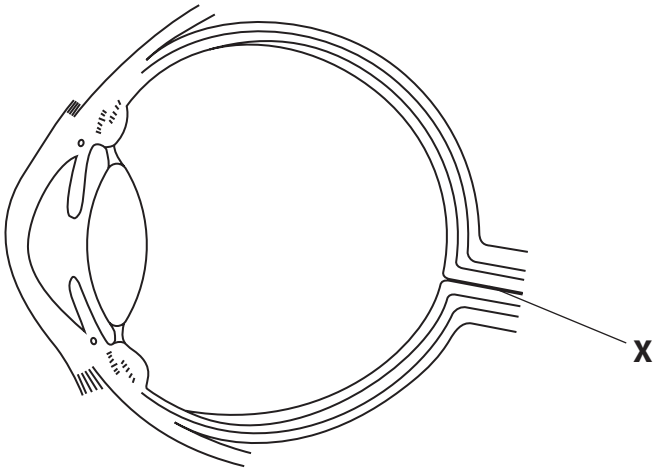
☒ **A** 1 : 12

☒ **B** 12 : 1

☒ **C** 12 : 13

☒ **D** 13 : 12

(e) The diagram shows the human eye.



Which neurones are found in part X?

(1)

☒ **A** sensory neurones

☒ **B** motor neurones

☒ **C** relay neurones

☒ **D** relay neurones and motor neurones

(f) Where is luteinising hormone (LH) produced?

(1)

☒ **A** uterus

☒ **B** ovaries

☒ **C** adrenal gland

☒ **D** pituitary gland

(g) Which row of the table shows the products of meiosis?

(1)

☒ **A**	haploid cells	2 cells
☒ **B**	haploid cells	4 cells
☒ **C**	diploid cells	2 cells
☒ **D**	diploid cells	4 cells

(h) Which statement describes a gene mutation?

(1)

☒ **A** bases pairing up incorrectly

☒ **B** an incorrect amino acid is inserted into a protein

☒ **C** a change in the order of bases

☒ **D** uracil substituted for thymine in DNA

(i) How is aerobic respiration different from anaerobic respiration?

(1)

☒ **A** aerobic respiration releases energy

☒ **B** aerobic respiration uses glucose

☒ **C** aerobic respiration produces lactic acid

☒ **D** aerobic respiration uses oxygen

(j) What does the hormone oxytocin stimulate?

(1)

☒ **A** the development of breasts in females

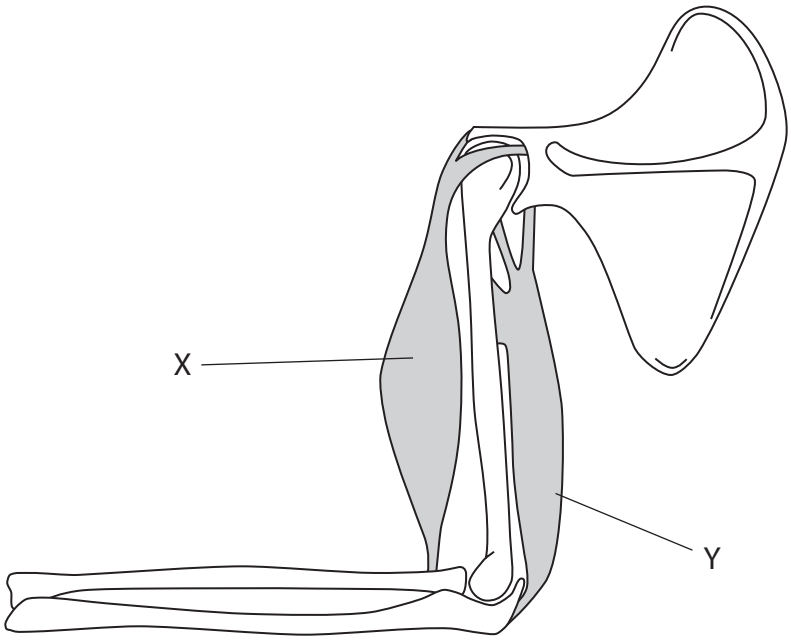
☒ **B** contractions of the uterus wall during labour

☒ **C** the release of FSH

☒ **D** ovulation

(Total for Question 1 = 10 marks)

2 (a) The diagram shows two muscles that are used to raise and lower the bones in the forearm.



(i) Name the muscles labelled X and Y.

(2)

X .....

Y .....

(ii) Describe how the action of these muscles causes the forearm to be raised and lowered.

(3)

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(b) Muscles and bones form part of a body system known as the musculoskeletal system.

The table lists structures in the musculoskeletal system.

Write the numbers 2, 3 or 4 in the table to show the order of the structures, from the simplest level of organisation to the most complex.

One has been done for you.

(2)

Structure	Order
skeleton	
bone cell	
bone tissue	
nucleus	1

(Total for Question 2 = 7 marks)

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3 (a) The nutritional labels are from two different types of food.

Nutrition Facts	
	% Daily Values
Total Fat 1.5 g	2%
Saturated Fat 0.5 g	3%
Cholesterol 35 mg	12%
Sodium 580 mg	24%
Total Carbohydrate 1 g	0%
Dietary Fibre 0 g	0%
Sugars 1 g	
Protein 21 g	42%
Calcium 2%	Iron 8%

Food A

Nutrition Facts	
	% Daily Value
Total Fat 71 g	109%
Saturated Fat 21 g	101%
Cholesterol 197 mg	62%
Sodium 2790 mg	133%
Total Carbohydrate 114 g	40%
Dietary Fibre 14 g	11%
Sugars 8 g	
Protein 60 g	120%
Calcium 55%	Iron 38%

Food B

(i) Explain which food is more likely to increase muscle mass.

(2)

(ii) Explain which food is more likely to increase bone strength.

(2)

(iii) Explain why food B could increase the risk of heart disease if eaten often.

(3)

(b) The table lists some of the nutrients found in food.

Complete the table by putting ticks (✓) in the correct boxes to show the elements found in each of the nutrients.

(3)

Nutrient in food	Carbon	Hydrogen	Oxygen	Nitrogen
carbohydrate				
fat				
protein				

(Total for Question 3 = 10 marks)

4 The passage is about the blood and circulatory system.

Use words or phrases from the box to complete the passage.

(8)

white blood cells	pulmonary vein	atrium	ventricle	oxygenated
vena cava	carbon dioxide	pulmonary artery	valve	oxygen
red blood cells	plasma	deoxygenated	aorta	

The right side of the heart pumps ..... blood to the lungs through a blood vessel called the ..... .

In the lungs, ... passes through the walls of the alveoli into ..... . These are then transported in blood ..... to the left side of the heart. They enter the left ..... , which pumps the blood down into the left ..... . This part of the heart contracts and pumps the blood through a blood vessel called the ..... to all parts of the body.

(Total for Question 4 = 8 marks)

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5 (a) (i) Diseases are caused by different types of organism.

Draw a straight line from each disease to the type of organism that causes the disease.

(3)

Disease	Type of organism
typhoid	bacteria
malaria	fungi
poliomyelitis	houseflies
	virus
	protozoa

(ii) What name describes a microorganism that causes disease?

(1)

- ☒ **A** antigen
- ☒ **B** pathogen
- ☒ **C** antitoxin
- ☒ **D** bacillus

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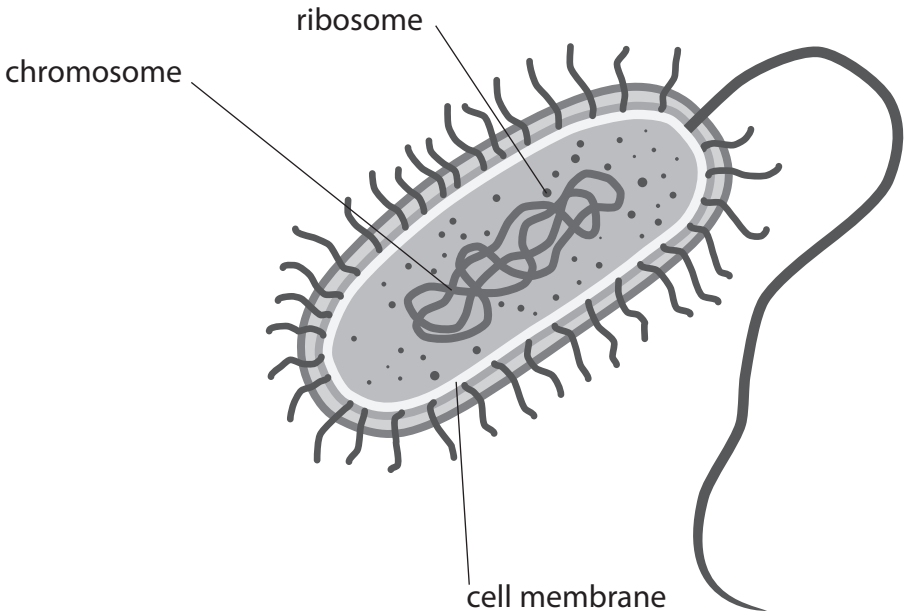
(b) *Salmonella enterica* is a type of bacteria that causes food poisoning.

The diagram shows a bacterium similar to *Salmonella*.



(i) Describe how the structure of this bacterium is different from the structure of an animal cell.

(2)

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(ii) State a function of the chromosome, the ribosomes and the cell membrane in a bacterial cell.

(3)

chromosome .....

.....

ribosomes .....

.....

cell membrane .....

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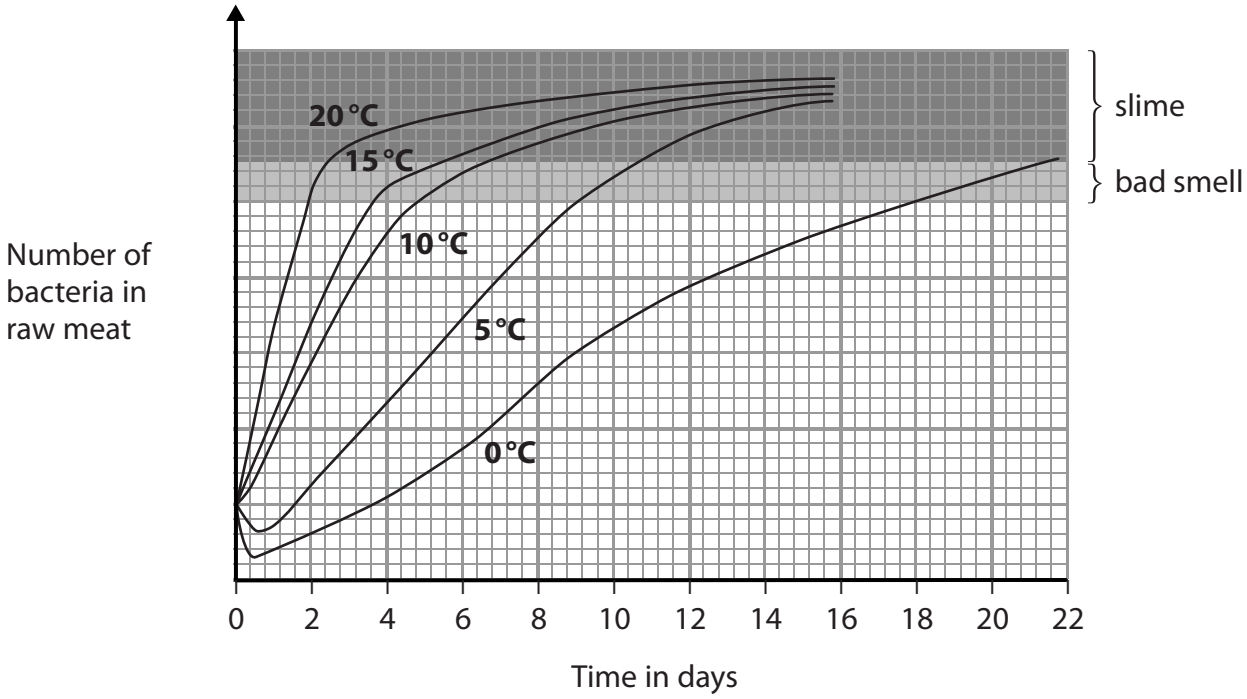
(c) Bacteria that cause food poisoning can be found in raw meat.

The graph shows the effect of different storage temperatures on the growth of bacteria found in raw meat over different periods of time.



(i) Explain the pattern of growth of bacteria in raw meat between 2 and 14 days at 20 °C.

(2)

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(ii) Explain which temperature is best for storing raw meat.

(3)

(d) Explain how the body defends itself against infections.

(3)

(Total for Question 5 = 17 marks)

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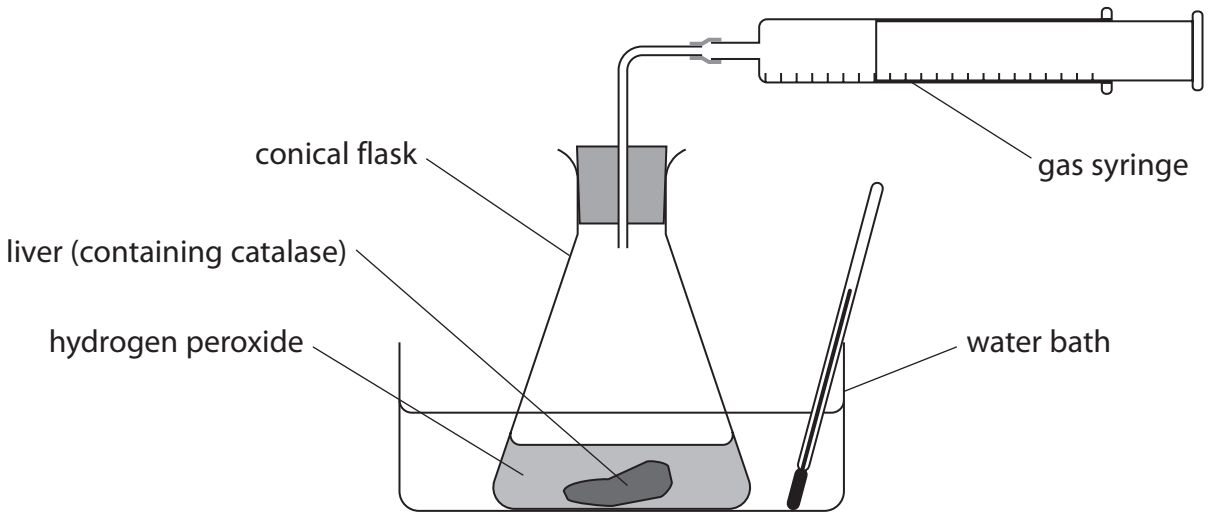
6 Catalase is an enzyme found in most body cells, including liver cells.

The equation shows the reaction where catalase is acting as a catalyst.

$$\text{hydrogen peroxide} \xrightarrow{\text{catalase}} \text{oxygen} + \text{water}$$

The diagram shows some of the apparatus used to investigate the effect of temperature on the activity of catalase.



(a) (i) Describe how this apparatus can be used to investigate the effect of temperature on the activity of catalase.

(4)

(ii) State the independent variable and dependent variable in this investigation.

(2)

independent variable .....

dependent variable .....

(iii) Explain why the contents of the conical flask should remain at pH 7 throughout the investigation.

(3)

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(iv) Name two variables, other than pH, that should be controlled in this investigation.

(2)

1 .....

2 .....

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(b) The same apparatus is used to investigate how the activity of catalase is affected by different concentrations of hydrogen peroxide solution.

The table shows the results for four different concentrations.

Concentration of hydrogen peroxide solution (%)	Volume of oxygen produced after one minute in cm^3			Average (mean) volume of oxygen produced after one minute in cm^3
	test 1	test 2	test 3	
5	0.6	0.7	0.6	0.6
10	0.9	1.0	1.1	
15	1.8	0.9	1.7	1.8
20	2.5	2.3	2.4	2.4

(i) Calculate the average volume of oxygen produced when 10% hydrogen peroxide solution is used in this investigation.

(1)

average volume = ... cm^3

(ii) Circle the anomalous result in the table.

(1)

(iii) Explain why this result is anomalous.

(2)

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(iv) Give two possible reasons for the anomalous result.

(2)

1 .....

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2 .....

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(Total for Question 6 = 17 marks)

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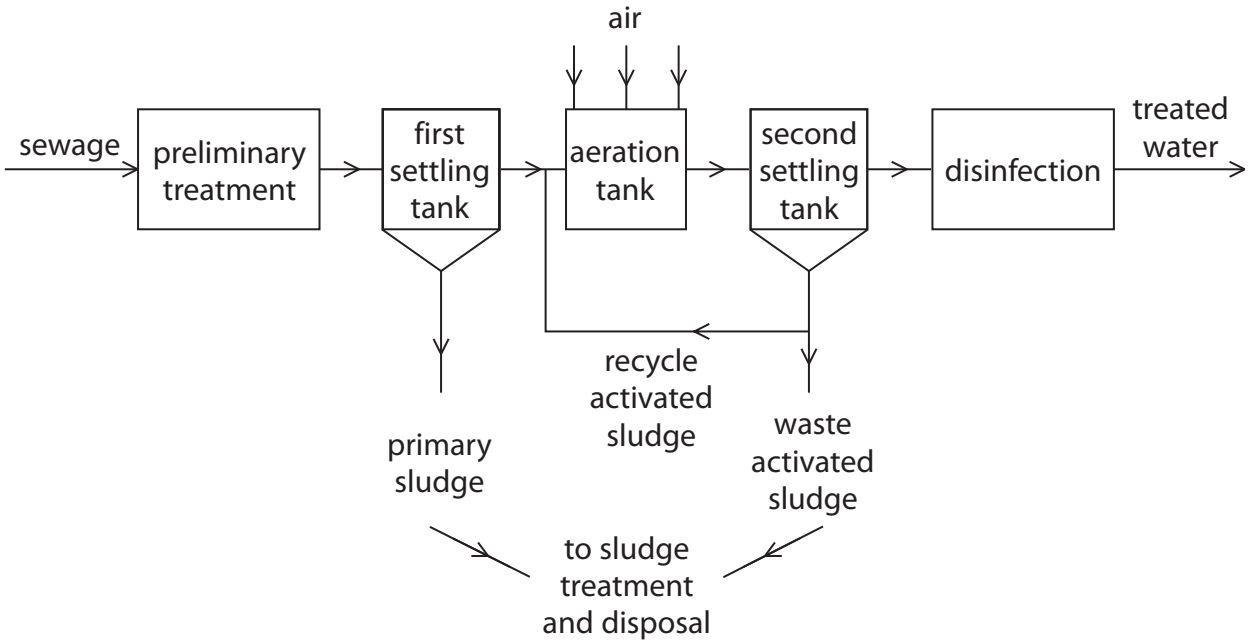
7 (a) The diagram shows stages in the treatment of sewage.



Use information from the diagram to explain how sewage is processed to become treated water.

Include details about the role of aerobic and anaerobic bacteria in your answer.

(5)

(b) Explain how untreated sewage can cause the depletion of oxygen in water.

(3)

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(Total for Question 7 = 8 marks)

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8 (a) A student makes this hypothesis.

Different exercises will increase pulse rate by different amounts.

Describe a method that the student could use to test her hypothesis.

(4)

(b) In a second investigation the student exercises for different periods of time while counting the number of breaths she takes per minute.

The table shows the average (mean) number of breaths per minute for each period of time exercising.

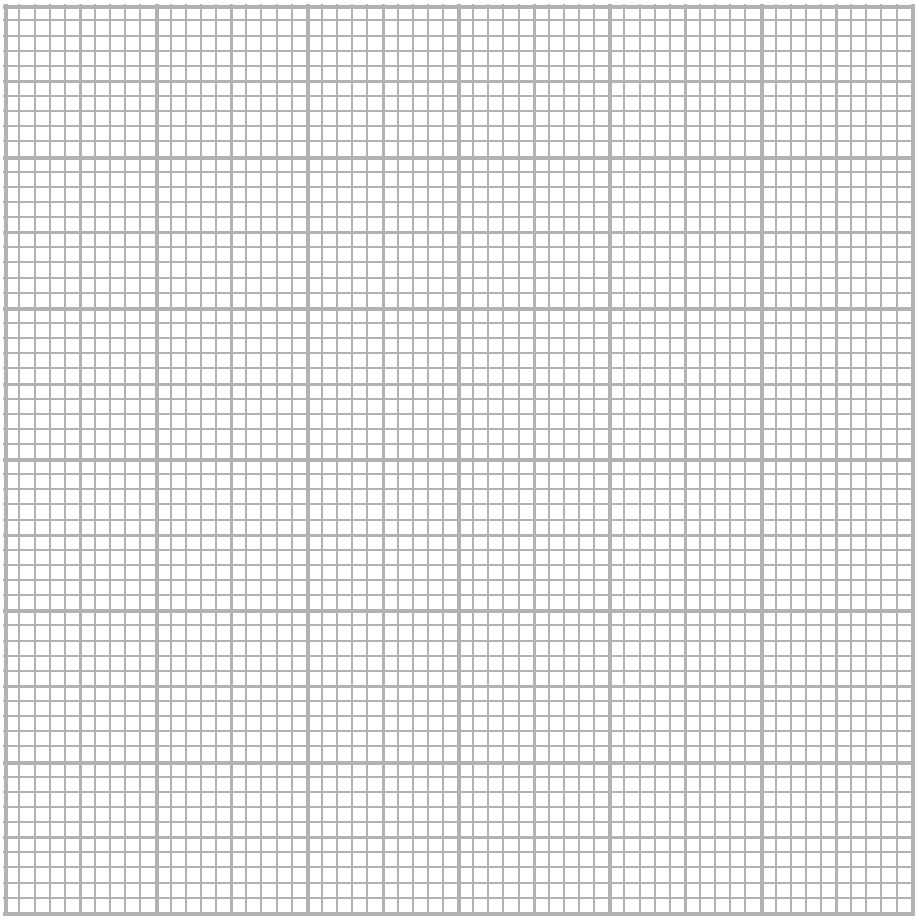
Period of time spent exercising in minutes	1.0	2.0	3.0	4.0	5.0
Average number of breaths per minute	18	24	30	38	45

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

(4)

(ii) Draw a line of best fit.

(1)



(iii) Describe the relationship between the period of time exercising and the average number of breaths per minute.

(2)

(iv) Explain why the number of breaths per minute changes as the student exercises for longer periods of time.

(3)

(Total for Question 8 = 14 marks)

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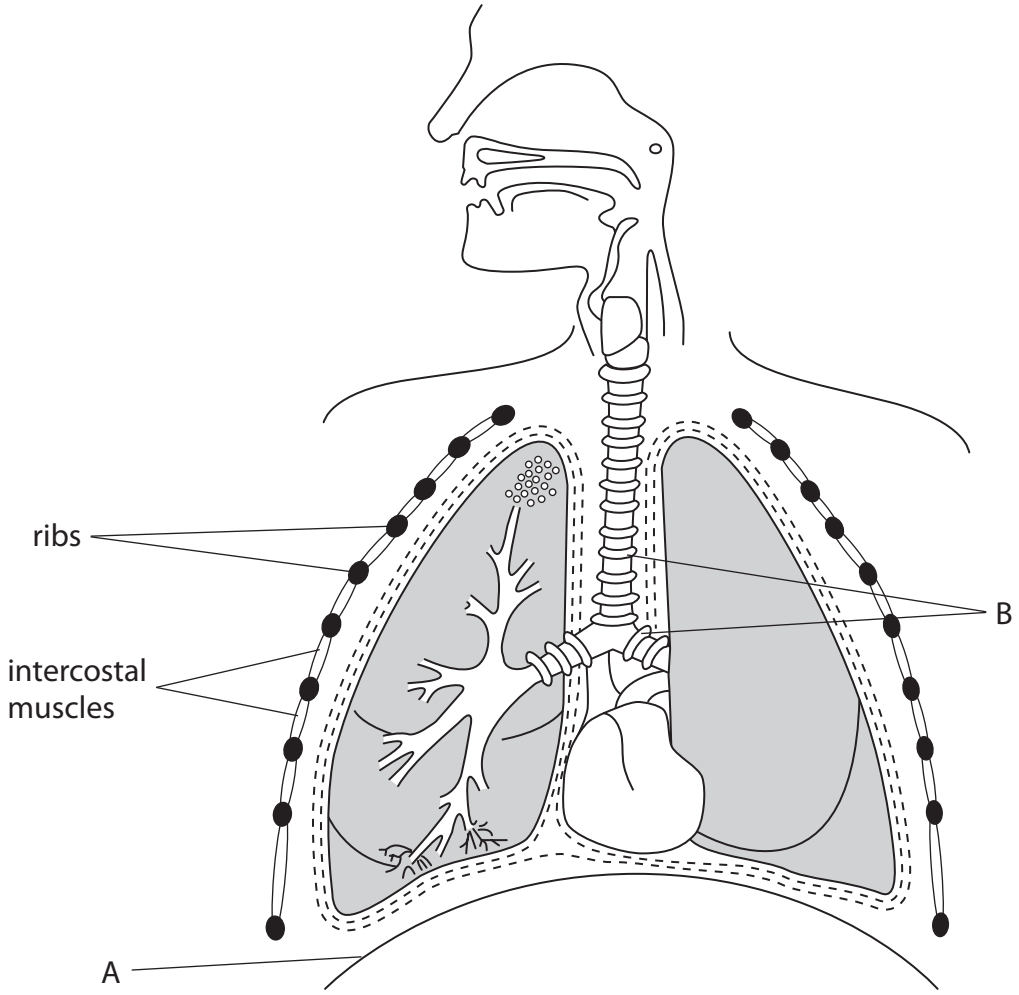
9 The diagram shows the structure of the respiratory system.



(a) (i) Name the structures labelled A and B.

(2)

A .....

B .....

(ii) Describe the function of structure A in breathing.

(3)

(iii) The boxes give terms related to breathing and descriptions of these terms.

Draw a straight line from each term to its correct description.

(2)

Term	Description
residual volume	the volume of air inhaled during one normal, relaxed breath
tidal volume	the maximum volume of air that can be forcefully exhaled in one breath
vital capacity	the volume of air left in the lungs after a forced exhalation

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(iv) Explain how gases are exchanged between the lungs and the blood.

(2)

(b) Explain one harmful effect of smoking on the respiratory system.

(2)

(Total for Question 9 = 11 marks)

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10 (a) The table lists four components found in glomerular filtrate and in urine.

It also shows the amount of each component found in glomerular filtrate and in urine per day.

Component	Amount of component in glomerular filtrate per day	Amount of component in urine per day
water	180 litres	2.0 litres
glucose	162 grams	0 grams
protein	2 grams	0.1 grams
urea	53 grams	25 grams

(i) Calculate the percentage of water reabsorbed from the glomerular filtrate per day.

(2)

percentage = ... %

(ii) Explain the difference in the amount of glucose in the glomerular filtrate and in the urine.

(3)

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(iii) Blood plasma contains about 200 g of protein.

State why only a small amount of this protein passes into the glomerular filtrate.

(1)

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(iv) Name two organs involved in maintaining water balance in the body.

(2)

1 .....

2 .....

(b) Urea is a main component of urine.

Describe how the human body produces urea.

(2)

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(Total for Question 10 = 10 marks)

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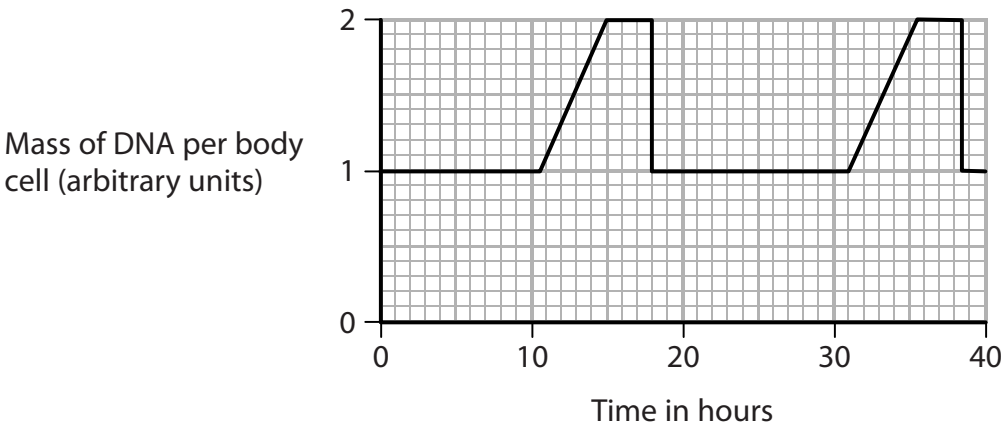
11 The graph shows how the mass of DNA in a body cell changes as the cell divides to produce two new body cells.



(a) (i) Use the graph to determine the time taken for mitosis to occur.

(2)

time taken = ... hours

(ii) Describe the properties of the new cells produced by this type of cell division.

(3)

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(b) Humans reproduce by a process called sexual reproduction.

Other organisms are able to reproduce by a process called asexual reproduction.

Describe how sexual reproduction differs from asexual reproduction.

(3)

(Total for Question 11 = 8 marks)

TOTAL FOR PAPER = 120 MARKS

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