Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Human Biology

Unit: 4HB0
Paper: 01

Wednesday 10 May 2017 – 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 ▶

P48151A

1/1/1/1/1/1/

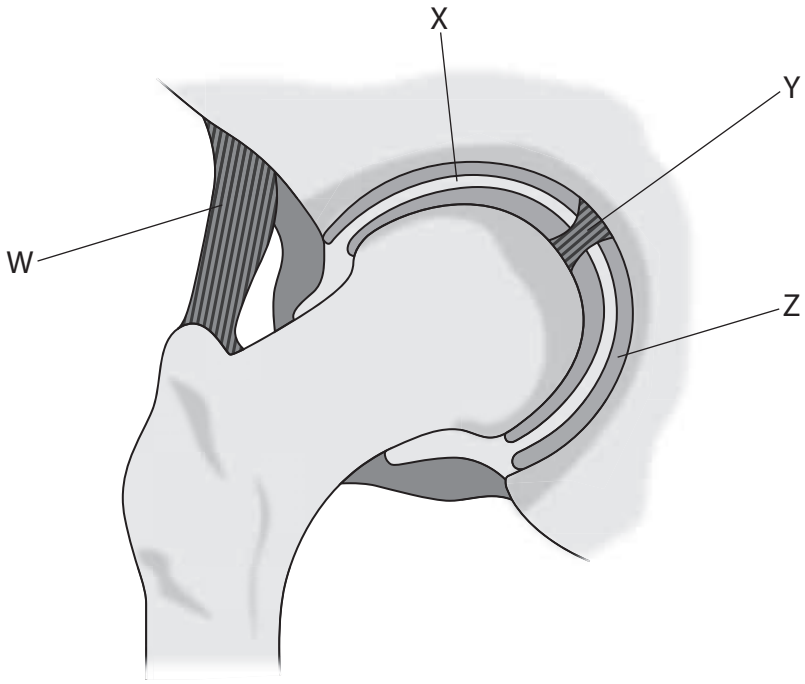
P 4 8 1 5 1 A 0 1 2 8

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 one type of joint found in the human body.



Which structures hold bones together at joints?

(1)

☒ **A** W and X

☒ **B** W and Y

☒ **C** X and Y

☒ **D** X and Z

(b) The production of testosterone is controlled by hormones that are released by the

(1)

☒ **A** pancreas

☒ **B** pituitary gland

☒ **C** prostate gland

☒ **D** testes

(c) The food chain shows the amount of energy transferred from one trophic level to the next.

What percentage of energy is transferred from the producer to the secondary consumer?

(1)

☒ **A** 0.62%

☒ **B** 6.2%

☒ **C** 8.5%

☒ **D** 12%

(d) Which of these reduces the risk of catching a disease?

(1)

☒ **A** antitoxins

☒ **B** hormones

☒ **C** painkillers

☒ **D** vaccinations

(e) Which of these is the correct word equation for photosynthesis?

(1)

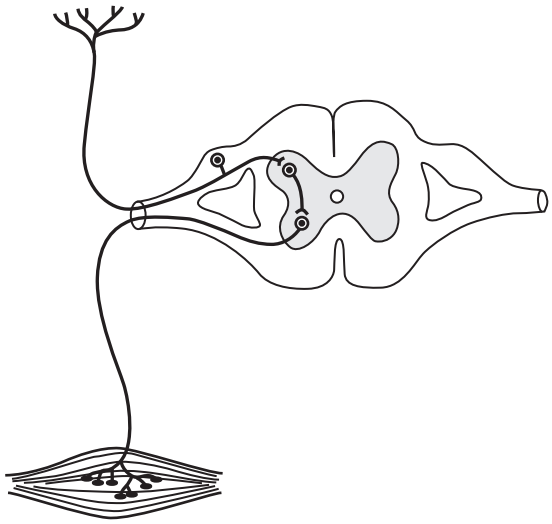
☒ **A** glucose + oxygen ⟶ carbon dioxide + water

☒ **B** oxygen + carbon dioxide ⟶ glucose + water

☒ **C** carbon dioxide + water ⟶ glucose + oxygen

☒ **D** glucose + carbon dioxide ⟶ oxygen + water

(f) The diagram shows a reflex arc.



Which of these is the correct sequence of structures in a reflex arc?

(1)

- ☒ **A** effector → motor neurone → relay neurone → sensory neurone → receptor
- ☒ **B** effector → sensory neurone → relay neurone → motor neurone → receptor
- ☒ **C** receptor → sensory neurone → relay neurone → motor neurone → effector
- ☒ **D** receptor → motor neurone → sensory neurone → relay neurone → effector

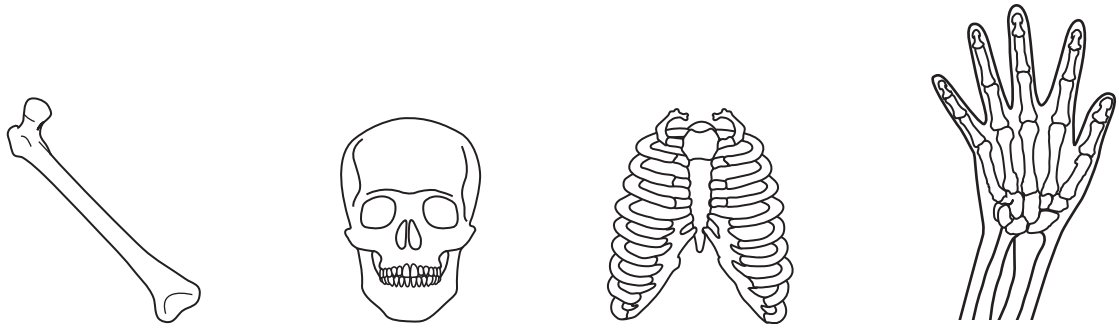
(g) Some pathogens cause endemics and epidemics.

Which of these statements is true for an epidemic disease?

(1)

- ☒ **A** It results in a higher than normal level of disease in a certain area.
- ☒ **B** It is constantly present at low levels in a small area.
- ☒ **C** It is caused only by mutations in bacteria.
- ☒ **D** It causes a lower number of deaths in a smaller area than an endemic disease.

(h) The diagram shows four different body structures.



P Q R S

Which two structures form part of the axial skeleton?

(1)

- ☒ **A** P and Q
- ☒ **B** Q and R
- ☒ **C** P and S
- ☒ **D** R and S

(i) Which of these is an example of a mutagen?

(1)

- ☒ **A** a base deletion in DNA
- ☒ **B** carbon dioxide in tobacco smoke
- ☒ **C** carbon monoxide from car exhausts
- ☒ **D** ultraviolet light from the Sun

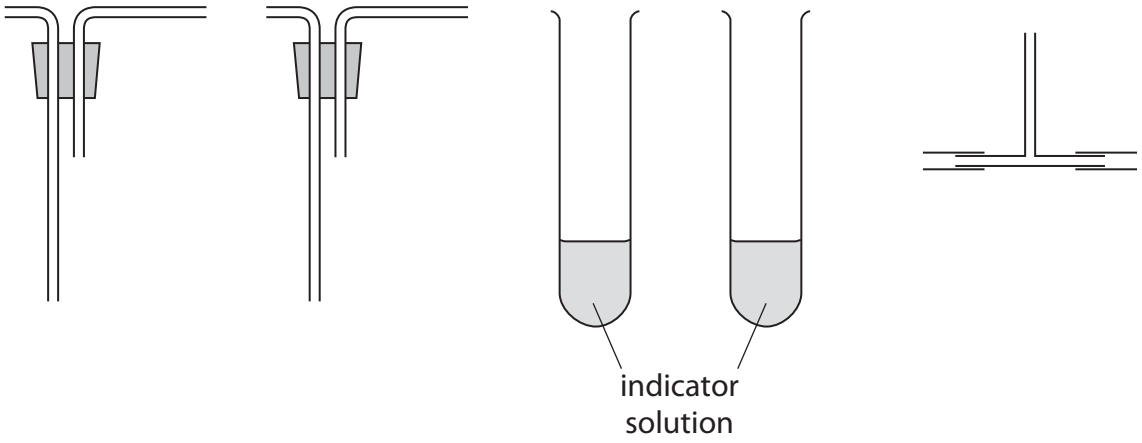
(j) Which of these is an excretory organ?

(1)

- ☒ **A** pancreas
- ☒ **B** small intestine
- ☒ **C** skin
- ☒ **D** stomach

(Total for Question 1 = 10 marks)

2 (a) The diagram shows some apparatus used in an experiment.



Draw a diagram to show how this apparatus should be set up to compare the amount of carbon dioxide in inhaled and exhaled air.

(3)

(b) Name an indicator solution that should be used in this experiment.

(1)

.....

(c) Name a piece of equipment that should be used to measure the volume of indicator solution.

(1)

.....

(d) Explain the changes that take place in the indicator solution during the experiment.

(3)

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(e) Explain one variable that should be controlled in this experiment.

(2)

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(Total for Question 2 = 10 marks)

3 (a) The table gives some information about three foods.

Food	Energy in kilojoules per 100 g	Carbohydrate in grams per 100 g	Fat in grams per 100 g
hamburgers	1188	25	13.4
chips	1323	16	39.0
chicken nuggets	1243	16	19.0

(i) Compare the amount of energy in hamburgers and chicken nuggets.
Use information from the table in your answer.

(2)

(ii) Explain which food would contribute the most to obesity if eaten often.

(4)

(b) (i) The recommended daily allowance of some nutrients in food varies for different groups of people.

Explain why a pregnant female needs more calcium than a female who is not pregnant.

(2)

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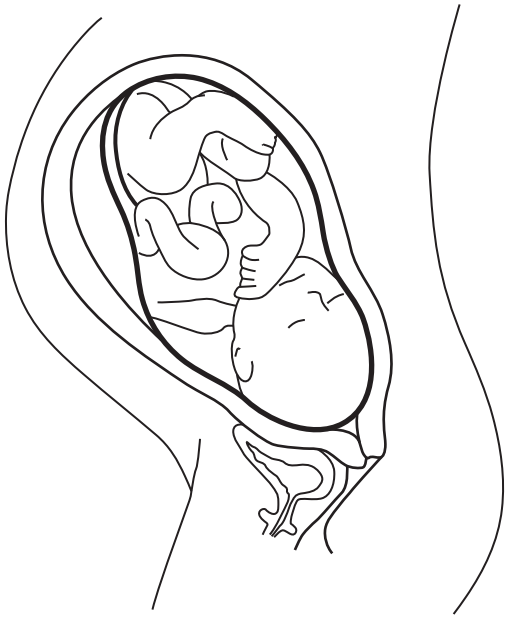
(ii) The diagram shows a growing fetus.



Add a labelled arrow to the diagram, naming the structure that gives protection to the fetus from harmful bacteria.

(2)

(c) Babies can be fed breast milk.

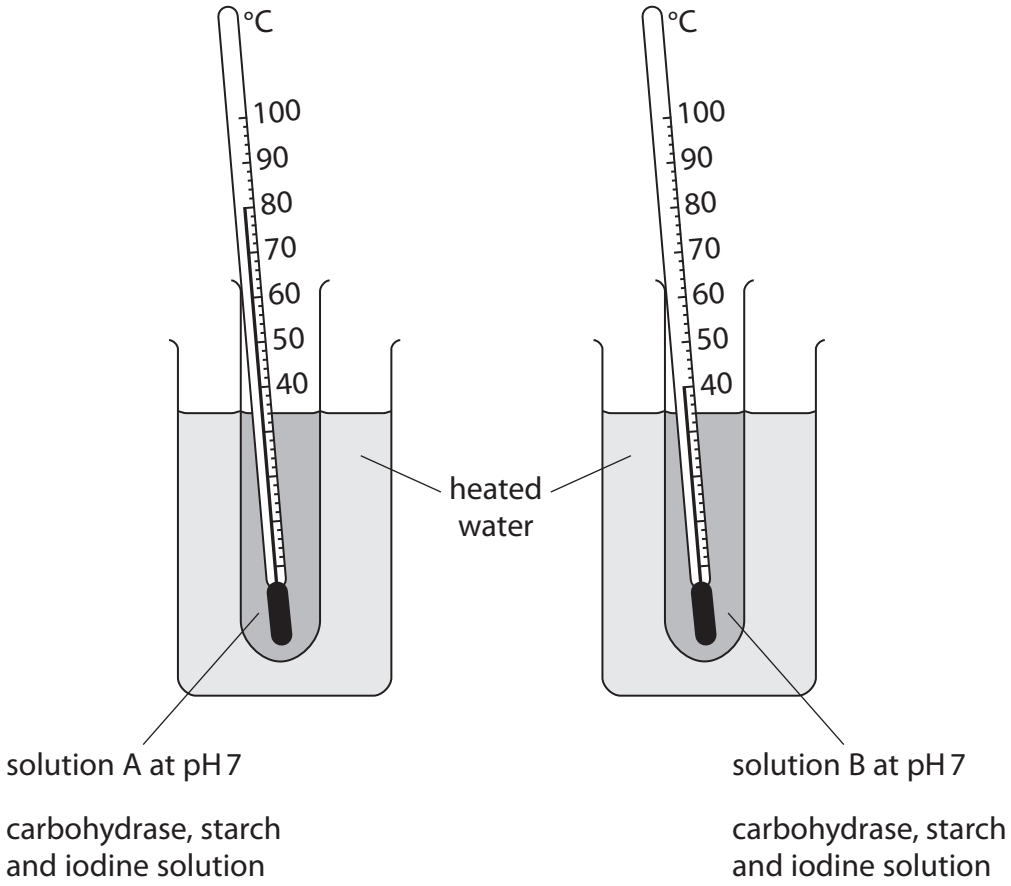
Place ticks (✓) in the boxes to show two advantages of breast milk.

(2)

is easily digestible	
contains no cholesterol	
contains antibodies	
contains no fat	

(Total for Question 3 = 12 marks)

4 The diagram shows some of the apparatus a student uses to investigate the effect of temperature on a carbohydrase enzyme.



(a) State the temperature of solution A and of solution B.

(2)

solution A ..... °C

solution B ..... °C

(b) At the start of the investigation the solution in each test tube is a blue-black colour.

Suggest what measurements the student should take to find out which reaction takes place more quickly.

(2)

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(c) Explain any changes that take place in solution B during this investigation.

(2)

(d) Explain why it would not be suitable to carry out this investigation at pH 2.

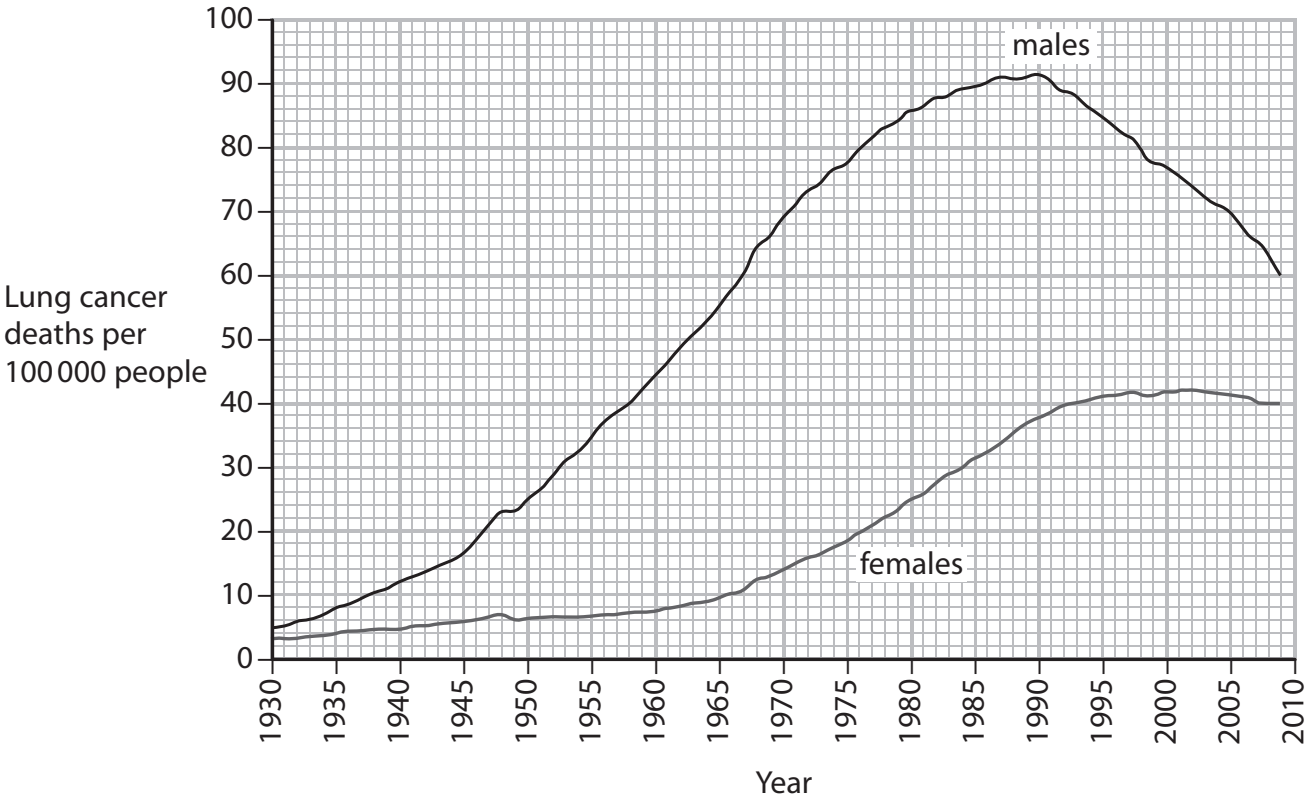
(2)

(e) Name one factor, other than pH, that the student needs to control in this investigation.

(1)

(Total for Question 4 = 9 marks)

5 (a) The graph shows the trends in lung cancer deaths per 100 000 people in males and females in the United States.



(i) Calculate the difference in lung cancer deaths per 100 000 people for males and females in 2009.

(2)

difference = ... deaths per 100 000 people

(ii) Describe the differences in the number of lung cancer deaths in males and females between 1930 and 2009.

(2)

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.....

(b) In 1984, these health warnings were introduced on cigarette packets.

SURGEON GENERAL'S WARNING: Smoking Causes Lung Cancer, Heart Disease, Emphysema, and May Complicate Pregnancy.

SURGEON GENERAL'S WARNING: Smoking By Pregnant Women May Result in Fetal Injury, Premature Birth, And Low Birth Weight.

(i) Name a substance in tobacco that causes lung cancer.

(1)

(ii) Suggest what information the Surgeon General would have needed to obtain in order to make a valid and reliable conclusion about the link between cigarette smoking and lung cancer.

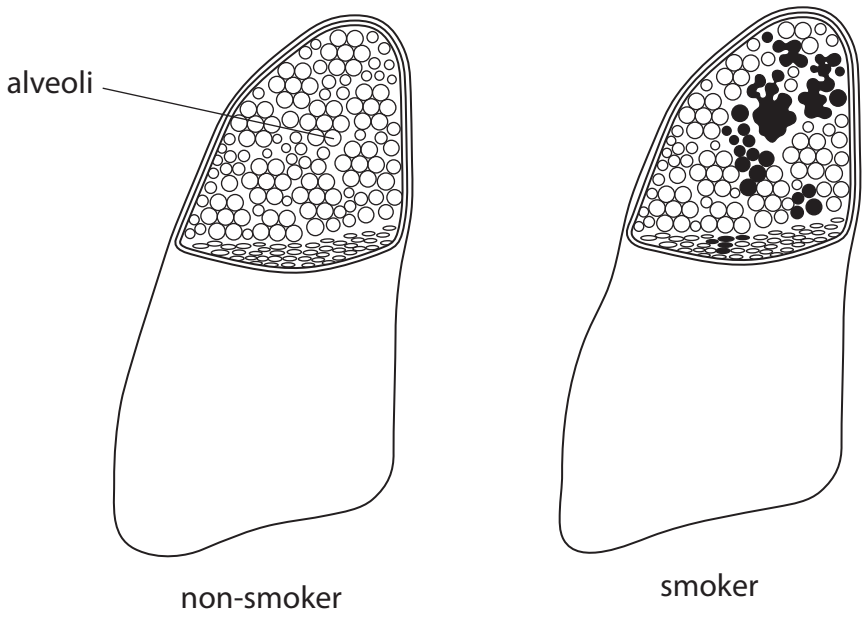
(3)

(iii) Explain why women who smoke are more likely to have babies with a low birth weight.

(2)

(c) Emphysema is a disease linked to cigarette smoking.

The diagram shows the lung of a non-smoker with healthy lungs and the lung of a smoker with emphysema.



Explain the effects of emphysema on the body.

(3)

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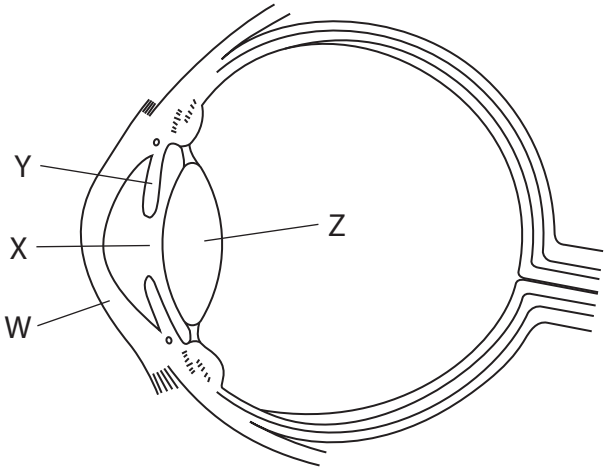
(Total for Question 5 = 13 marks)

6 (a) The diagram shows a section through a human eye.



(i) Name the parts labelled W, X and Y.

(3)

W .....

X .....

Y .....

(ii) Which two parts of the eye focus light on the retina?

(2)

1 .....

2 .....

(iii) Describe the changes that occur in the eye as it focuses from a near object to a distant object.

(3)

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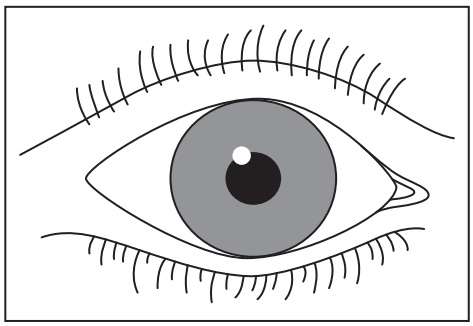
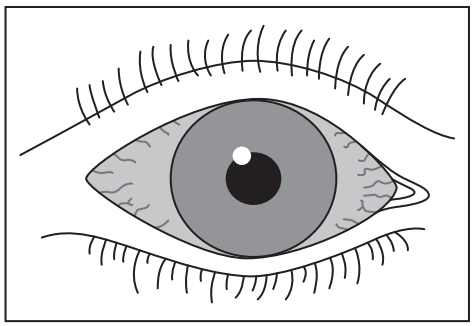
(b) The conjunctiva of the eye can be infected by bacteria causing an eye infection called conjunctivitis.

The diagram shows a healthy eye and an eye with conjunctivitis.



healthy eye



eye with conjunctivitis

Conjunctivitis is an infection that can be easily transmitted from one eye to the other and from person to person.

Suggest two ways to reduce the transmission of conjunctivitis.

(2)

1 .....

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2 .....

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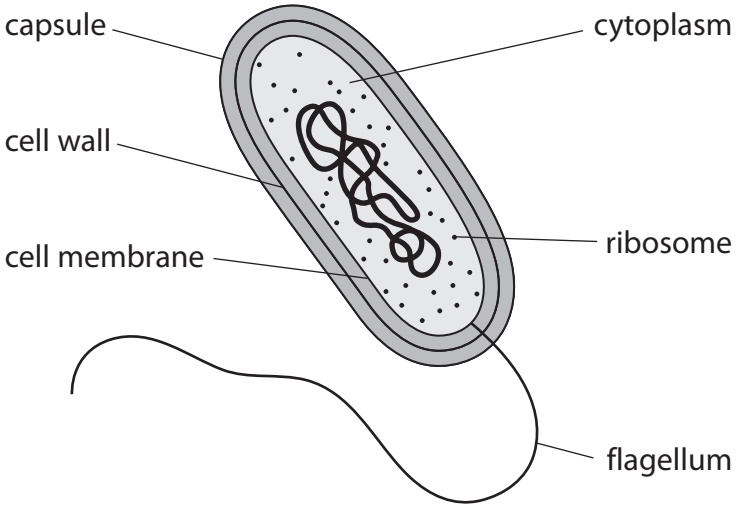
(c) The diagram shows a bacterium, similar to the one that causes conjunctivitis.



The table lists some parts of the bacterium.

(i) Complete the table by giving the correct function for each part.

(4)

Part	Function
capsule	
cell membrane	
cell wall	
flagellum	

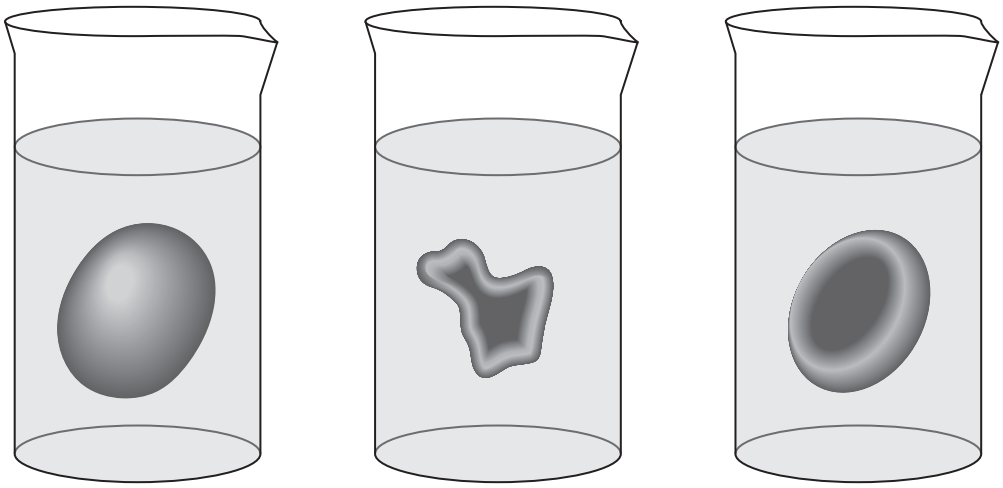
(ii) Name a substance that can be used to treat a person suffering from conjunctivitis.

(1)

.....

(Total for Question 6 = 15 marks)

7 (a) The diagram shows what happens to red blood cells in solutions of different concentrations.



solution A | solution B | solution C

Not to scale

(i) Each of the red blood cells was left in a solution for the same amount of time.

Explain which solution is more concentrated than the solution inside the red blood cell.

(3)

(ii) Explain which solution should be used to store red blood cells before a blood transfusion.

(3)

(b) Blood transfusions are necessary for people who lose a large volume of blood.

Use words or phrases from the box to complete the passage about blood transfusions.

Each word or phrase may be used once, more than once or not at all.

(6)

agglutinate	antibodies	antigens	burst
hormones	plasma	platelets	red blood cells
shrivel	toxins	white blood cells	

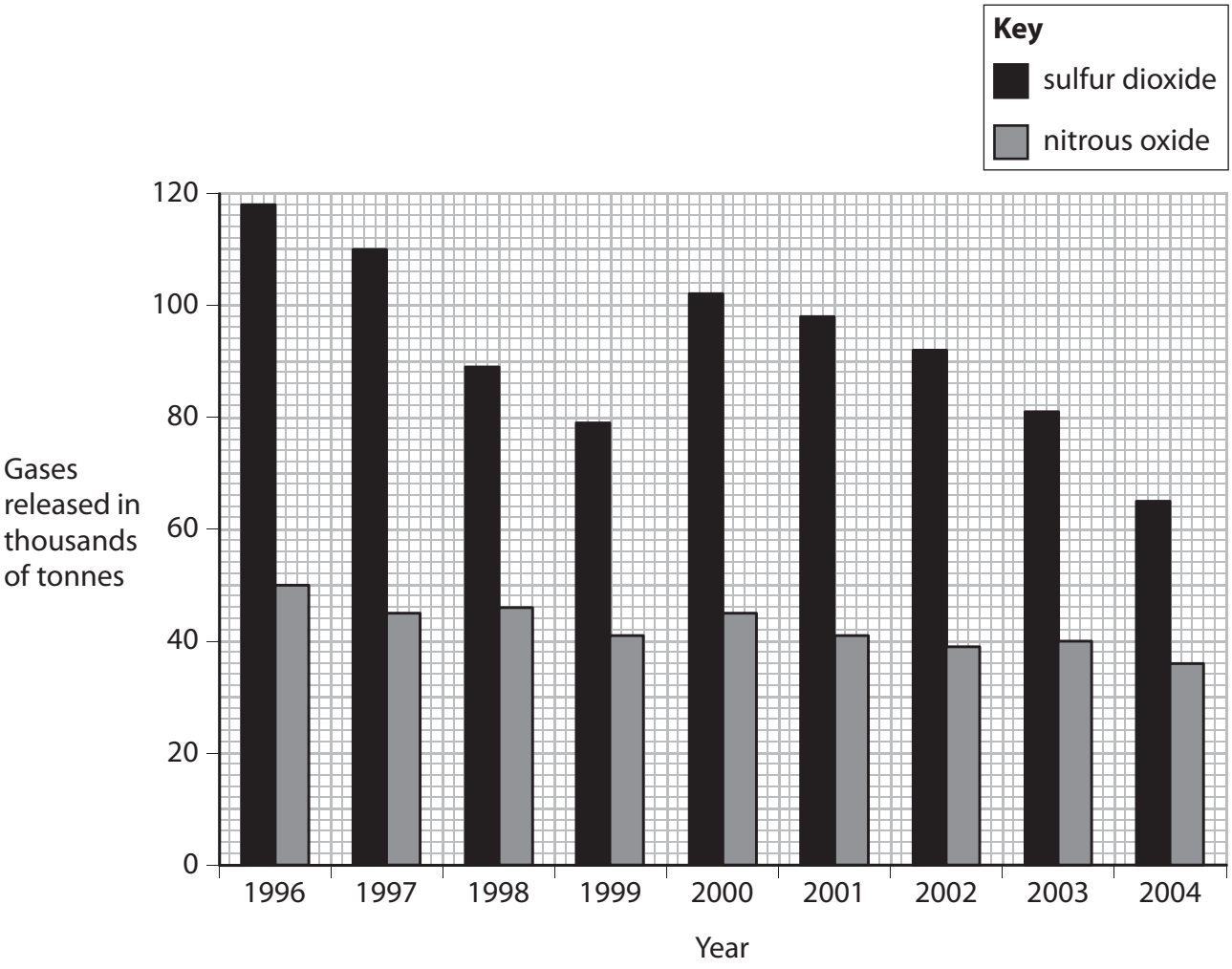
Serious injuries can result in rapid blood loss where ..... are unable to help clot the blood. Blood transfusions are necessary to replace the blood lost.

The ..... transfused into a patient will ..... if the blood of the donor contains ..... that are foreign to the patient.

This is because the patient's blood contains ..... that are produced by ..... as part of the body's natural immune response.

(Total for Question 7 = 12 marks)

8 The bar chart shows the mass of sulfur dioxide and nitrous oxide released into the atmosphere from industries in one part of the UK over nine years.



(a) Describe the overall trend in the mass of nitrous oxide released from industries from 2000 to 2004.

(1)

.....

.....

(b) Describe an environmental problem caused by nitrous oxide emissions.

(2)

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(c) Suggest a reason for the difference in the amount of sulfur dioxide released between 1999 and 2000.

(1)

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.....

(d) In 1996, a total of 2 million tonnes of sulfur dioxide were released into the atmosphere from UK industries.

Calculate the percentage of the total UK emissions of sulfur dioxide that came from the industries shown on the graph.

(3)

percentage of sulfur dioxide ..... %

(e) Describe an environmental problem caused by sulfur dioxide emissions.

(2)

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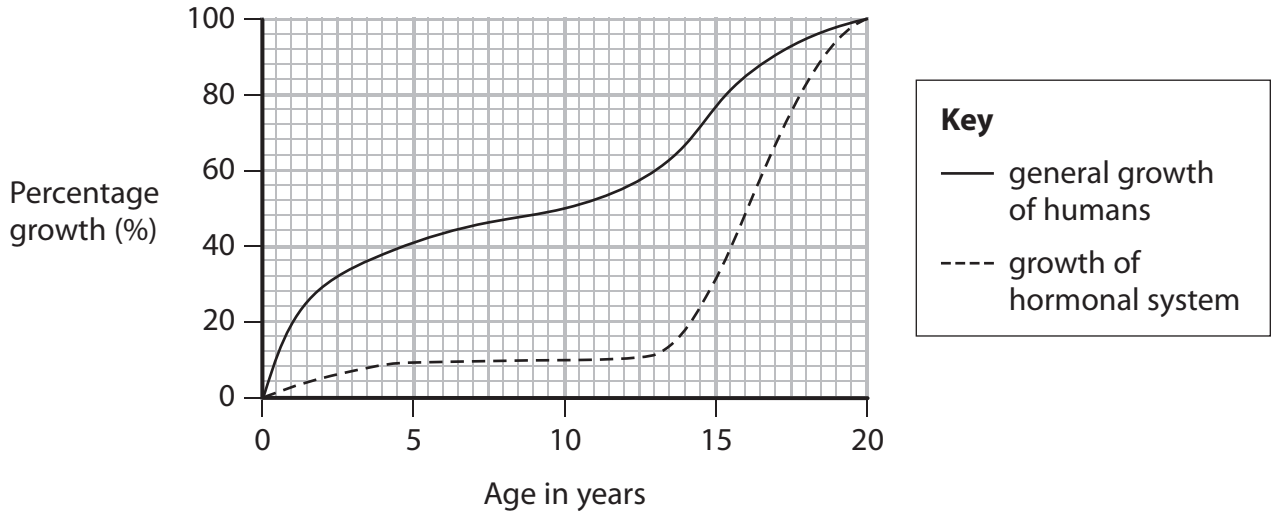
(Total for Question 8 = 9 marks)

9 (a) The graph shows the percentage general growth of humans and the human hormonal system from birth to the age of 20 years.



(i) Between which two ages is general growth of humans most rapid?

(1)

.....

(ii) Suggest how general growth of humans could be measured.

(1)

.....

(iii) State the age at which 50% of total general growth of humans is achieved.

(1)

.....

(iv) Suggest the cause of the sudden increase in the growth of the hormonal system from 13 years of age.

(2)

.....

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.....

.....

(v) State two changes in males during the growth of the hormonal system between 13 and 15 years of age.

(2)

(b) Explain the role of the following hormones in the menstrual cycle.

- oestrogen
- progesterone

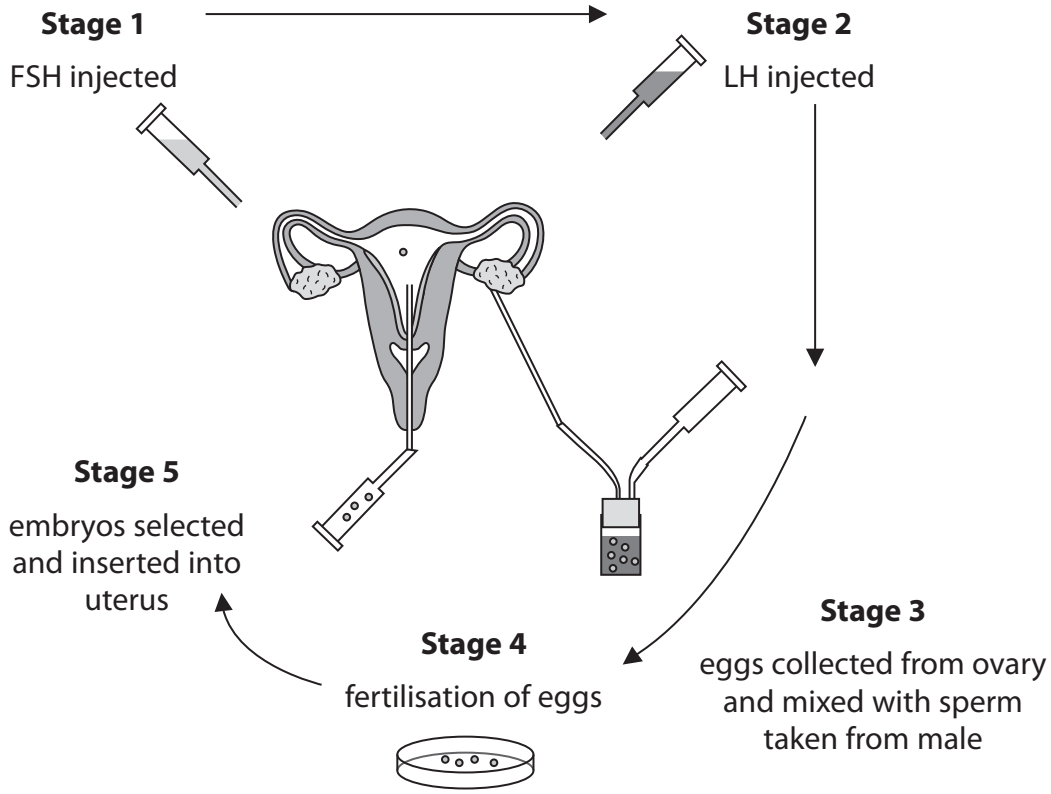
(4)

oestrogen

progesterone

(c) *In vitro* fertilisation (IVF) is a procedure used to increase the chances of pregnancy.

The diagram shows some of the stages in IVF.



(i) Suggest why FSH is used during stage 1 of the IVF procedure.

(1)

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.....

(ii) Name the part of the brain that releases FSH.

(1)

.....

(iii) Suggest why LH is used during stage 2 of the IVF procedure.

(2)

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(Total for Question 9 = 15 marks)

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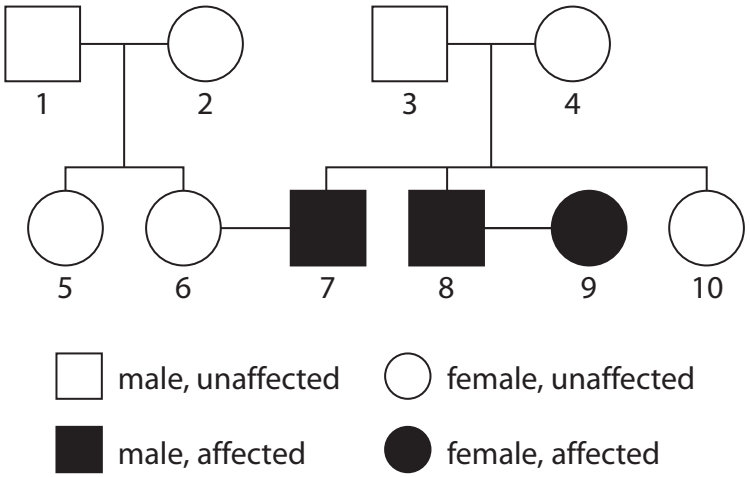
10 Tay-Sachs is a genetic disease that affects the nervous system.

The diagram shows the inheritance pattern of Tay-Sachs disease in a family.



(a) (i) Which of these alleles must a person inherit to be affected by Tay-Sachs disease?

(1)

- ☒ **A** one dominant allele only
- ☒ **B** two dominant alleles
- ☒ **C** one recessive allele only
- ☒ **D** two recessive alleles

(ii) Write down the genotype for Tay-Sachs disease for person 3 and person 8.

Use T for the normal allele and t for the Tay-Sachs allele.

(2)

person 3 .....

person 8 .....

(iii) Explain your choice of genotype for person 3.

(3)

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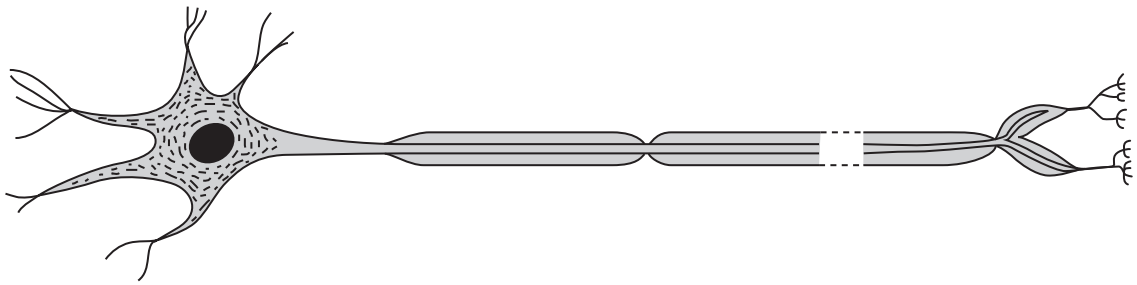
(iv) Person 6 has a heterozygous genotype.

Draw a genetic diagram to determine the probability of person 6 and person 7 having a child who is a carrier of the Tay-Sachs allele but is not affected by the disease.

(5)

probability = ...

(b) The diagram shows the type of body cell that is affected in a person with Tay-Sachs disease.



Toxins build up in the cells affected by Tay-Sachs disease. This build-up of toxins destroys the cells.

Suggest what symptoms will be shown by a person affected by Tay-Sachs.

(2)

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.....

QUESTION 10 CONTINUES ON THE NEXT PAGE.

(c) Tay-Sachs disease is caused by a faulty gene on chromosome number 15.

The diagram shows part of a normal gene, and a faulty version of the gene found in a person with Tay-Sachs disease.

normal gene

C	G	T	A	T	A	T	C	C	T	A	T	G	C	C	C	C	T

faulty gene

C	G	T	A	T	A	T	C	T	A	T	C	C	T	A	T	G	C

Explain what has happened to the normal gene to produce the faulty gene that causes Tay-Sachs disease.

(2)

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(Total for Question 10 = 15 marks)

TOTAL FOR PAPER = 120 MARKS

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