Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Wednesday 9 January 2019

Afternoon (Time: 2 hours) | Paper Reference **4HB0/01**

Human Biology

Unit: 4HB0
Paper: 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 ▶

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 mark your new answer with a cross ☒.

(a) The body responds to changes in room temperature.

Which row of the table shows what happens when there is an increase in
room temperature?

(1)

	Sweat production	Urine production
☒ **A**	increases	decreases
☒ **B**	increases	increases
☒ **C**	decreases	decreases
☒ **D**	decreases	increases

(b) Which of these secretes antibodies?

(1)

☒ **A** lymphocytes

☒ **B** phagocytes

☒ **C** platelets

☒ **D** red blood cells

(c) Which statement describes the structure of DNA?

(1)

☒ **A** the number of adenine and cytosine bases are equal

☒ **B** the number of thymine and cytosine bases are equal

☒ **C** the number of adenine, guanine, cytosine and thymine bases are equal

☒ **D** the number of guanine and cytosine bases are equal

(d) The diagram shows a human cheek cell.
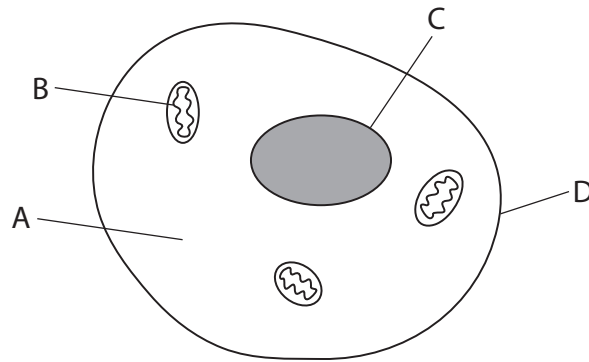
Which cell component is the site of aerobic respiration?

(1)

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(e) Why is it necessary for human cells to contain many different enzymes?

(1)

☒ **A**   many enzymes are affected by inhibitors

☒ **B**   enzymes have different optimum pH levels

☒ **C**   enzymes catalyse at different rates

☒ **D**   each enzyme catalyses one type of reaction

(f) The diagram shows some of the bones of the shoulder and the arm.
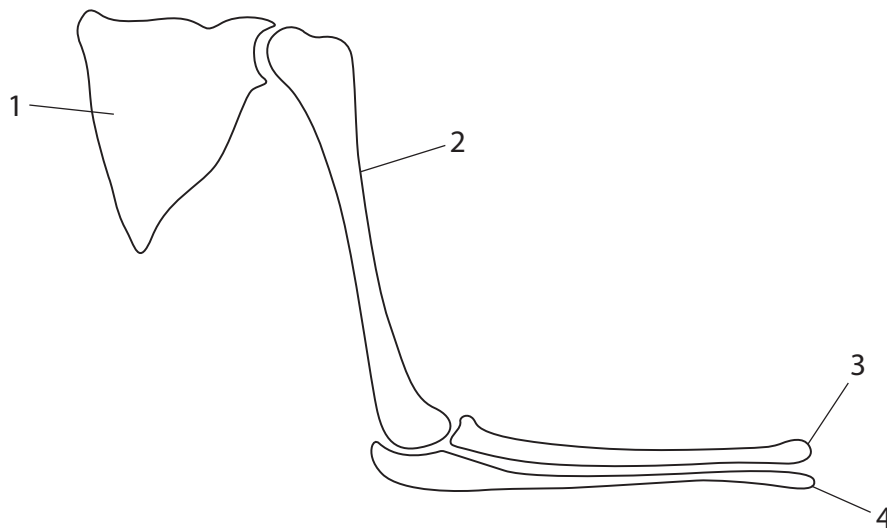
Which row of the table correctly identifies the bones labelled 1, 2, 3 and 4?

(1)

	Humerus	Radius	Scapula	Ulna
☒ A	3	2	1	4
☒ B	2	3	1	4
☒ C	3	4	1	2
☒ D	4	3	2	1

(g) What is the function of the semicircular canals in the ear?

(1)

☒ **A** maintaining balance

☒ **B** equalising pressure

☒ **C** involved in hearing

☒ **D** transmitting vibrations

(h) Which statement correctly describes tooth decay?

(1)

☒ **A** plaque eats tooth enamel

☒ **B** digested food dissolves tooth enamel

☒ **C** respiration of glucose by bacteria dissolves tooth enamel

☒ **D** oxygen produced by bacteria reacts with enamel

(i) Which type of molecule contains the elements carbon, hydrogen, oxygen and nitrogen?

(1)

☒ **A** carbohydrate

☒ **B** enzyme

☒ **C** fatty acid

☒ **D** oil

(j) Which type of neurone carries nerve impulses from the spinal cord to a muscle?

(1)

☒ **A** association

☒ **B** motor

☒ **C** relay

☒ **D** sensory

(Total for Question 1 = 10 marks)

2 (a) The diagram shows a section through the eye with parts labelled A to J.
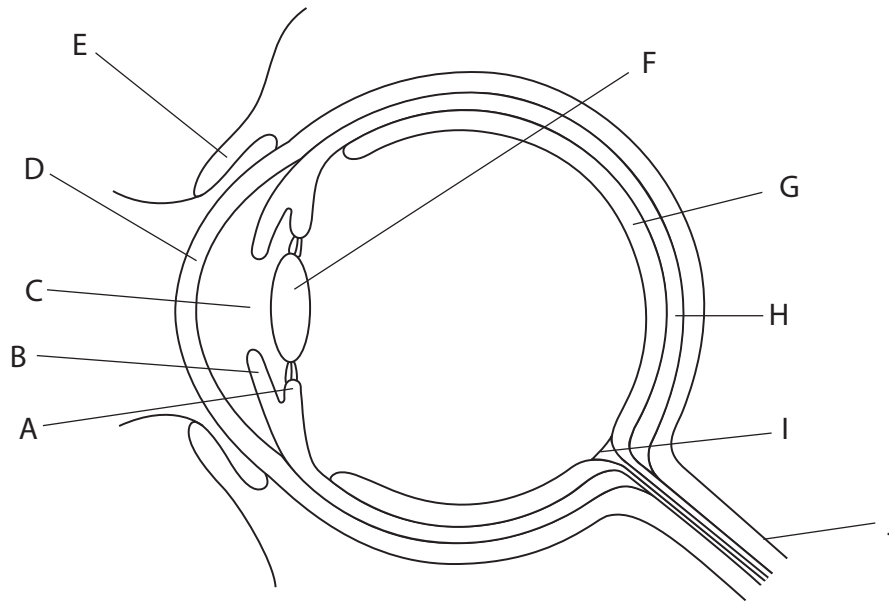
The table gives descriptions of parts of the eye.

Complete the table by giving the correct letter for each description.

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

(8)

Description	Letter
light sensitive layer	
muscles that change the shape of the lens	
contains nerve fibres	
protects the eye from dust and particles	
where most refraction of light occurs	
controls the amount of light entering the eye	
detects colour	
area of the retina that has no light sensitive cells	

P 5 5 7 9 9 R A 0 6 2 8

(b) (i) Explain why having two eyes makes it easier for a person to catch a ball.

(2)

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(ii) Describe an investigation that can be carried out by students to show that using two eyes rather than one eye makes it easier for a person to catch a ball.

(5)

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(Total for Question 2 = 15 marks)

3 (a) Plants produce glucose using the energy transferred by sunlight.

(i) Name the process plants use to produce glucose.

(1)

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(ii) This process can be shown as a word equation.

Complete the word equation to show this process.

(3)

$$\text{...............................} + \text{...............................} \xrightarrow[\text{chlorophyll}]{\text{sunlight}} \text{glucose} + \text{...............................}$$
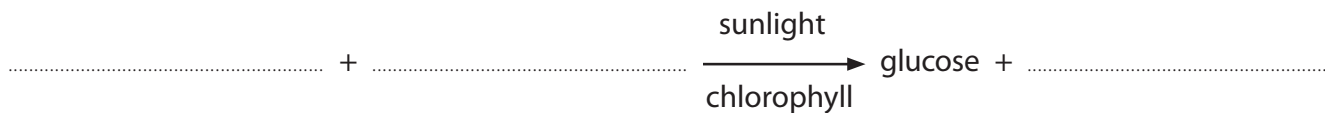
(b) The graph shows the mass of glucose found in a plant over a period of seven days.
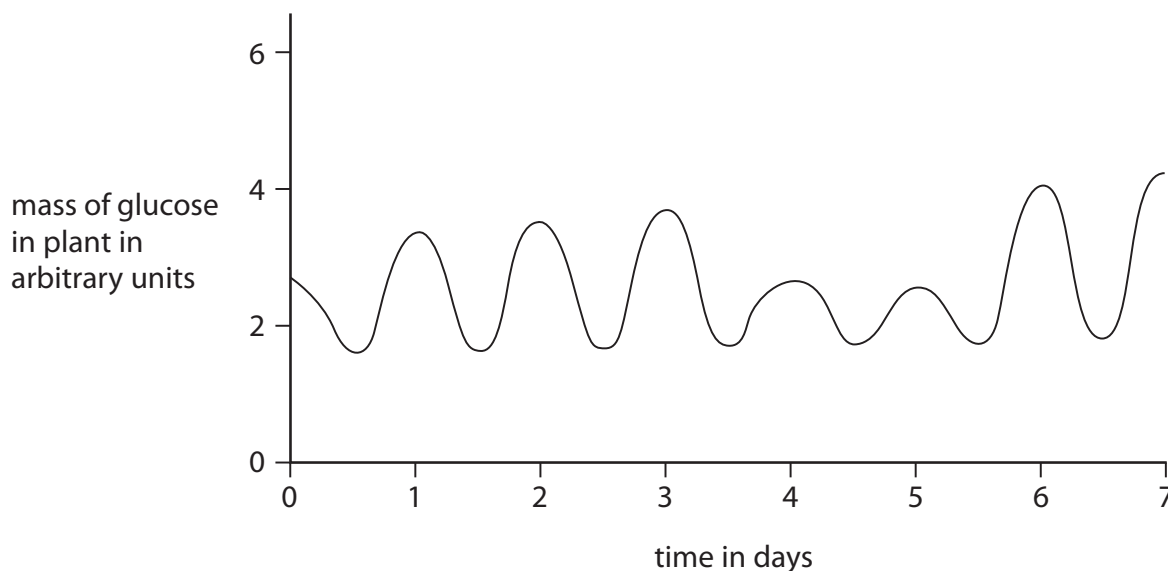
(i) Describe the changes in the mass of glucose over this period of time.

(2)

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(ii) Explain the changes in the mass of glucose over this period of time.

(4)

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(c) (i) Describe how to use the Benedict's test to show the presence of glucose in a leaf.

(3)

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(ii) Suggest a practical difficulty of using the Benedict's test to show the presence
of glucose in a leaf.

(2)

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(Total for Question 3 = 15 marks)

4 The diagram shows part of the male reproductive and urinary systems.
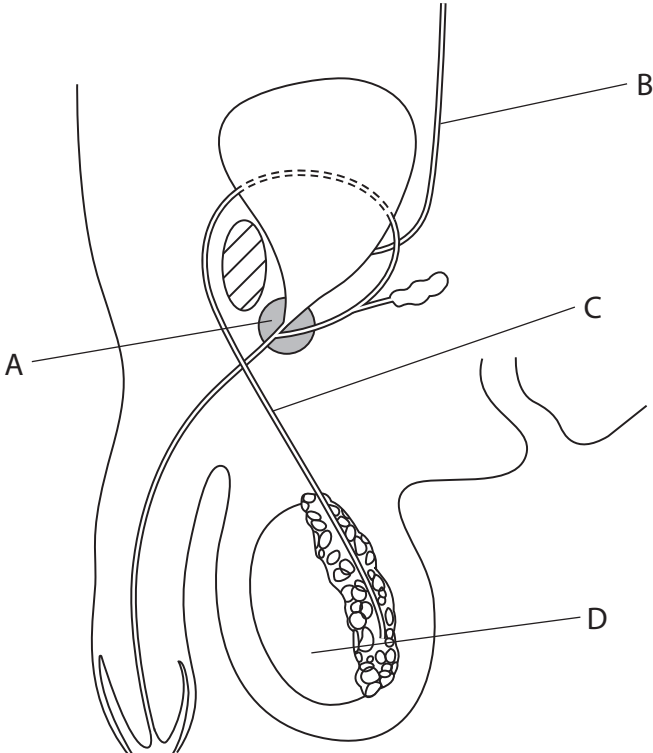
(a) (i) Name the structures labelled B, C and D.

(3)

B...

C...

D...

(ii) Explain the function of structure A in reproduction.

(3)

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(iii) A condition known as benign prostatic hyperplasia can occur in older males. This condition causes structure A to grow and swell.

Suggest a symptom shown by a male who has this condition.

Give a reason for your answer.

(2)

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(b) Structure D produces sperm.

(i) Draw a labelled diagram to show the structure of a sperm.

(3)

(ii) Describe one other function of structure D.

(3)

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(c) (i) Complete the table by giving three ways that a sperm differs from an ovum.

(3)

Sperm	Ovum

(ii) State how a sperm and an ovum are genetically similar.

(1)

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(Total for Question 4 = 18 marks)

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5 The diagram shows a section through alveoli in the lungs.

X
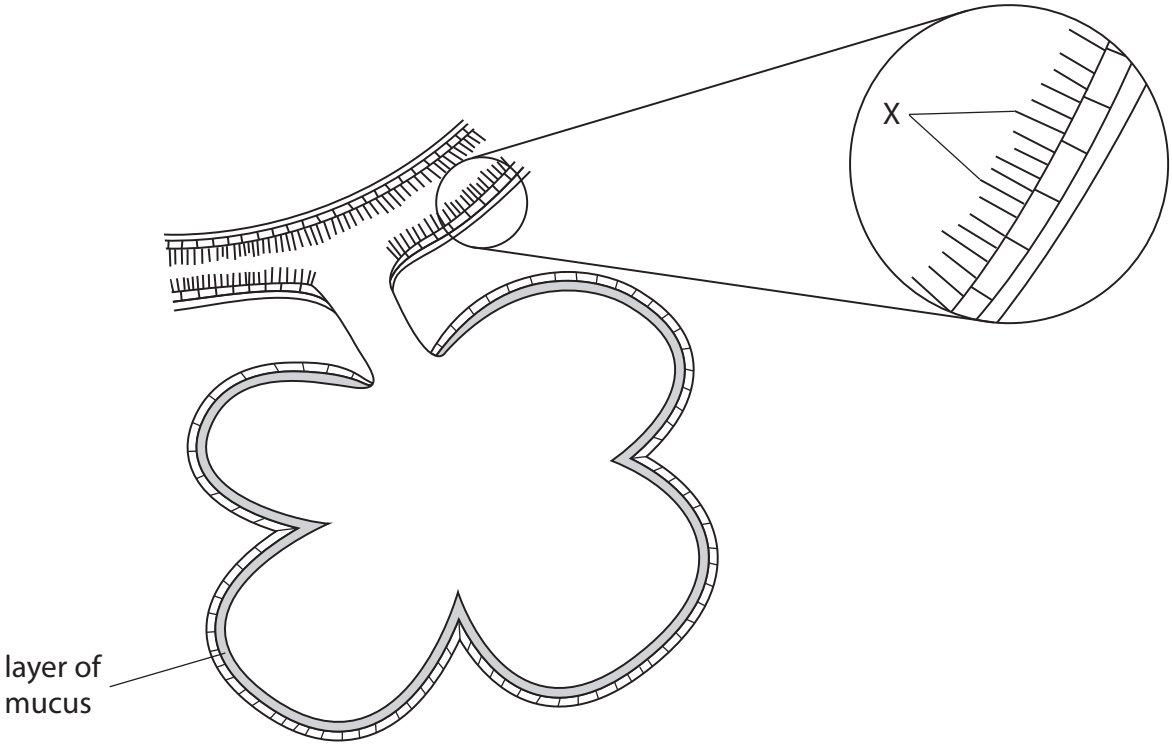
layer of
mucus

(a) (i) Name the structures labelled X.

(1)

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(ii) Describe the function of the structures labelled X.

(3)

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(b) Describe the function of the layer of mucus.

(2)

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(c) Describe the possible differences that would be seen in the diagram if the person had smoked a lot of cigarettes for many years.

(2)

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(Total for Question 5 = 8 marks)

6 The diagram shows a section through an artery.

×4
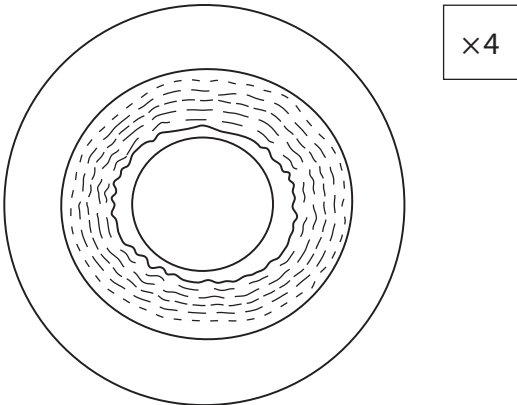
(a) (i) Explain what is meant by the term ×4, as shown in the diagram.

(2)

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(ii) Determine the actual diameter of the artery lumen shown in the diagram.

Show your working.

(2)

diameter of lumen = ... mm

(iii) State the difference between the diameter of the lumen in an artery and the diameter of the lumen in a vein.

(1)

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(iv) State three other differences between an artery and a vein.

(3)

1 ....

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2 ....

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(b) Capillaries allow the exchange of substances between tissue fluid and blood.

(i) Name two substances that pass from tissue fluid into blood through capillary walls.

(2)

1 ....

2 ....

(ii) State three features of capillaries that allow them to exchange substances efficiently.

(3)

1 ....

2 ....

3 ....

(Total for Question 6 = 13 marks)

7 (a) Explain what is meant by the term **homeostasis**.

(3)

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(b) A scientist investigates the effectiveness of different types of clothing on maintaining core temperature and skin temperature of the human body.

The scientist carries out an experiment using three people.

- person A is dressed in dry, thin clothing

- person B is dressed in dry, thin clothing and is sprayed with cold water for ten minutes

- person C is dressed in dry, thin clothing, a waterproof jacket and waterproof trousers and is sprayed with cold water for ten minutes

At the end of the ten-minute period, the scientist measures the core temperature and skin temperature of each person.

(i) Describe how the scientist could measure each person's core temperature.

(2)

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(ii) The table shows the scientist's results.

	Temperature after ten minutes in °C		
	Person A	**Person B**	**Person C**
Core	37.0	35.5	37.0
Skin	30.5	14.0	30.0

Calculate the difference between core and skin temperature for each person.

(1)

person A...

person B...

person C...

(iii) Using results from the investigation, explain which type of clothing would be most effective for a person going out in cold, wet weather.

(4)

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(iv) Suggest three ways that the scientist could improve this investigation.

(3)

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(v) Explain the changes that would occur in the body of person B in response to the decrease in their core body temperature.

(5)

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(Total for Question 7 = 18 marks)

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8 (a) The table shows the energy content of some portions of food.

Food	Portion in g	Energy content of the portion in kJ
bacon	56	735
liver	112	672
cauliflower	56	84
tea with milk	200	84
black coffee	200	2
butter	7	273
slice of bread	14	294
grapefruit	112	105
boiled potatoes	112	399
peanuts	56	1407

(i) Using information from the table, explain whether liver, peanuts or butter contains the most energy per gram.

(3)

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(ii) Person X and person Y both have three meals a day.

This is their main meal of the day.

bacon 112 g

liver 112 g

cauliflower 112 g

boiled potatoes 112 g

slice of bread with 7 g of butter

tea with milk

Show that the total energy content of the meal is approximately 3500 kJ.

Show your working.

(3)

total energy content = ... kJ

(iii) Person X has a job that involves a lot of exercise.

Person Y has an office job that involves very little exercise.

The energy requirement per day for person Y is 11000 kJ.

Discuss whether the energy content of this main meal is suitable for person X and for person Y.

(3)

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(b) A person has grapefruit and a cup of tea with milk and no sugar for a meal.

Explain why this meal on its own is not a balanced diet.

(4)

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(Total for Question 8 = 13 marks)

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9 Red-green colour blindness is a condition that affects a person's ability to tell the difference between red and green.

It is an inherited sex-linked condition.

Susan and John are married. They have a son.

- Susan's father is not colour blind
- Susan's mother is a carrier of red-green colour blindness
- Susan has three brothers, A, B and C
- brothers A and B are red-green colour blind
- brother C is not colour blind
- Susan's husband, John, is not colour blind

(a) Draw a pedigree to show the possible genotypes for all members of this family.

Use X^B for normal vision and X^b for red-green colour blindness.

(4)

(b) (i) Explain what is meant by the term carrier of red-green colour blindness.

(3)

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(ii) Susan and John have a daughter.

Determine the possible chances of their daughter being a carrier.

(2)

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(c) State the process that initially produced the red-green colour blindness allele.

(1)

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(Total for Question 9 = 10 marks)

TOTAL FOR PAPER = 120 MARKS

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