Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

ADVANCED SUBSIDIARY GCE

F211

BIOLOGY

Cells, Exchange and Transport

TUESDAY 25 MAY 2010: Morning
DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper

OCR SUPPLIED MATERIALS:

Insert (inserted)

OTHER MATERIALS REQUIRED:

Electronic calculator
Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

DC (KN/SW) MEP60423 30586/3

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **Answer ALL the questions.**
- **Write your answer to each question in the space provided, however additional paper may be used if necessary.**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **The total number of marks for this paper is 60.**
- **You may use an electronic calculator.**
- **You are advised to show all the steps in any calculations.**

Where you see this icon you will be awarded marks for the quality of written communication in your answer.

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QUESTION 1 STARTS ON PAGE 4

Answer ALL the questions.

1 (a) Fig. 1.1 is a diagram of a bacterium as seen under an electron microscope.

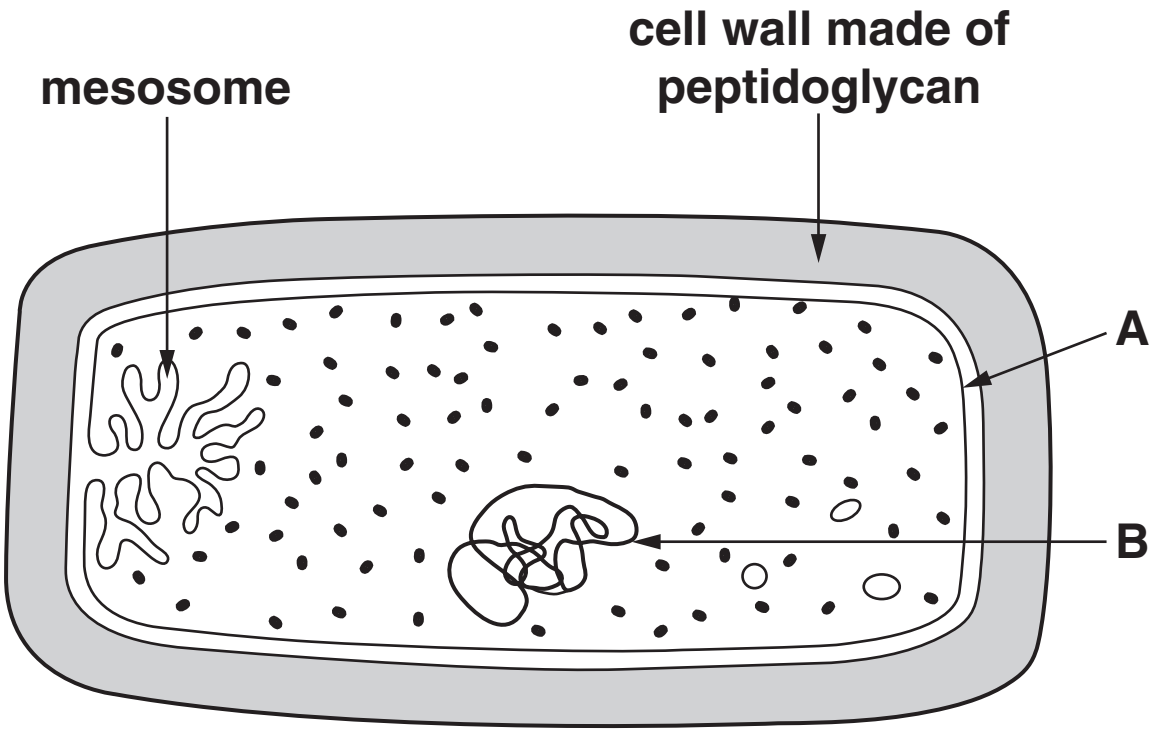

Fig. 1.1

(i) Name the structures labelled A and B.

A _____

B _____ **[2]**

(ii) It has been suggested that the mesosome has the same role as mitochondria in eukaryotic cells.

Suggest the role of the mesosome in prokaryotic cells, such as bacteria.

_____ **[1]**

(iii) Eukaryotic cells, such as *Euglena*, contain membrane-bound organelles. Each organelle has a specific function in the cell.

State the <u>PROCESS</u> that is carried out in each of the organelles listed below.

ribosome _____

chloroplast _____ **[2]**

(b) Explain why a single-celled organism, such as *Euglena*, does <u>NOT</u> need a specialised area to carry out gaseous exchange.

_____

_____

_____

_____

_____ **[2]**

(c) The mammalian gas exchange system contains a variety of types of cells and tissues.

Complete Table 1.1, on the opposite page, stating the function of each of the cells and tissues. The first row has been completed for you.

[4]

Table 1.1

cell / tissue	function
squamous epithelium	to provide a thin surface for a short diffusion distance
elastic tissue	
ciliated epithelium	
goblet cells	
smooth muscle	

[Total: 11]

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2 Fig. 2.1, ON THE INSERT, is a photomicrograph of a blood smear. The smear has been stained.

(a) State TWO reasons why the blood smear has been stained.

_____

_____

_____

_____

_____

_____ **[2]**

(b) Suggest ONE detail that would be made visible if the micrograph were taken using:

(i) a scanning electron microscope

_____

(ii) a transmission electron microscope.

_____ **[2]**

(c) The red colouration of the red blood cells is caused by the pigment haemoglobin. The main function of haemoglobin is to transport oxygen in the form of oxyhaemoglobin.

Fig. 2.2 shows the dissociation curves of adult oxyhaemoglobin (curve A) and fetal oxyhaemoglobin (curve F).

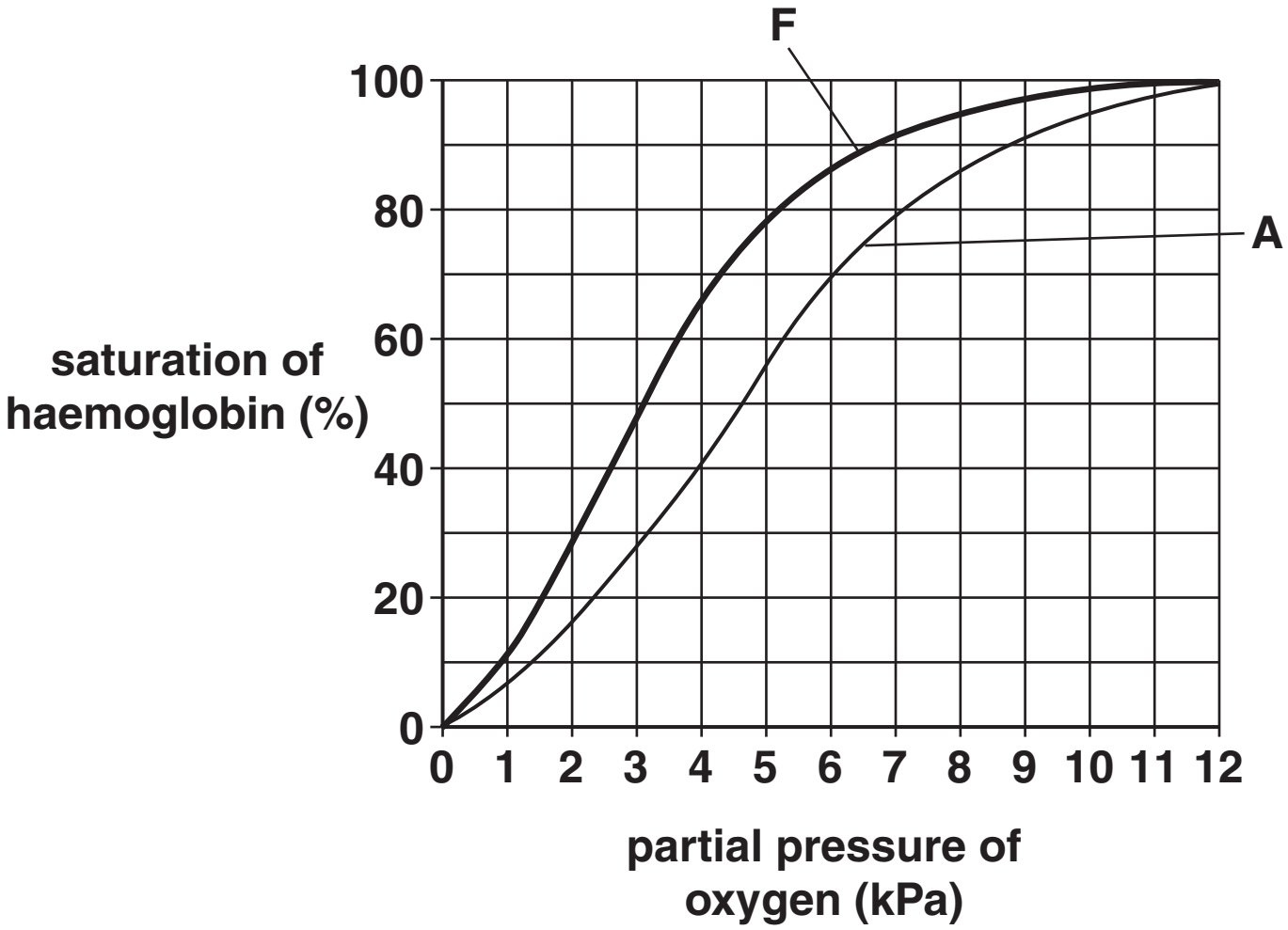

Fig. 2.2

Explain why the curve for fetal oxyhaemoglobin is to the left of the curve for adult oxyhaemoglobin.

In your answer you should use appropriate technical terms, spelt correctly.

_____

_____

_____

_____

_____

_____

_____

_____

_____ **[4]**

(d) In high partial pressures of carbon dioxide, the oxyhaemoglobin dissociation curve undergoes a change known as the Bohr shift.

(i) <u>DRAW A CURVE ON Fig. 2.2</u> to show the effect of the Bohr shift. [2]

QUESTION (d)(ii) STARTS ON PAGE 12

(ii) Outline the benefits of the Bohr shift to actively respiring tissue.

_____

_____

_____

_____

_____ **[2]**

[Total: 12]

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QUESTION 3 STARTS ON PAGE 14

3 A student carried out an investigation involving uptake of the stain methylene blue by yeast cells.

The investigation involved adding methylene blue to a suspension of yeast cells. Samples of the stained yeast cells were heated to different temperatures.

The student then observed the cells at high power under a light microscope.

The results are shown in Table 3.1.

Table 3.1

temperature (°C)	cells observed stained blue (%)	colour of solution surrounding cells
10	98	colourless
20	96	colourless
30	97	colourless
40	96	colourless
50	73	colourless
60	12	light blue
70	2	blue
80	0	blue

(a) (i) Yeast cells take up methylene blue by active transport.

Using <u>ONLY</u> the information provided in Table 3.1, outline the evidence that supports this statement.

_____

_____

_____

_____

_____ **[2]**

(ii) Suggest why some cells did <u>NOT</u> stain blue at 20 °C.

_____

_____ **[1]**

(b) (i) Suggest <u>ONE</u> change that occurred to the plasma (cell surface) membranes of the yeast cells at temperatures above 60 °C.

_____

_____

_____ **[1]**

(ii) Explain why the stained yeast cells lost their colour at higher temperatures.

_____

_____

_____

_____

_____ **[2]**

(c) The student concluded that yeast cells are killed between 50 °C and 70 °C.

Suggest <u>ONE</u> way in which the student could have improved the <u>ACCURACY</u> of this experiment and <u>ONE</u> way in which he could have improved the <u>RELIABILITY</u>.

accuracy _____

_____

_____

reliability _____

_____

_____ **[2]**

(d) The student placed a small sample of the yeast suspension on a microscope slide and observed it under high power.

Fig. 3.1 shows a simplified drawing of what the student observed.

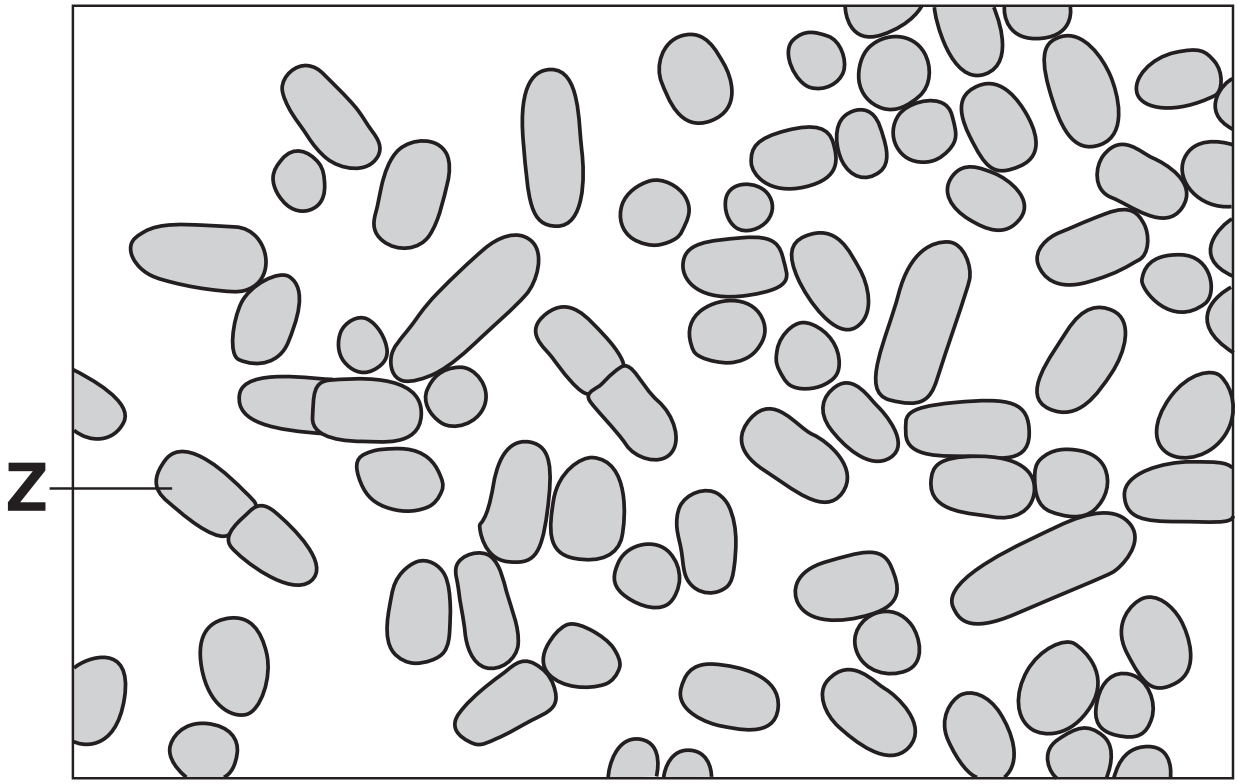

Fig. 3.1

Cell Z is undergoing a process called *budding*.

Outline the process of budding in yeast.

_____

_____

_____

_____

_____ **[2]**

[Total: 10]

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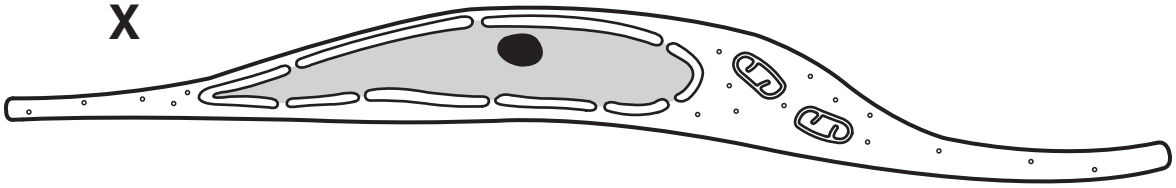
QUESTION 4 STARTS ON PAGE 20

4 Fig. 4.1 shows diagrams of two different types of cells, X and Y.

The cells are NOT drawn to scale.

X



Y

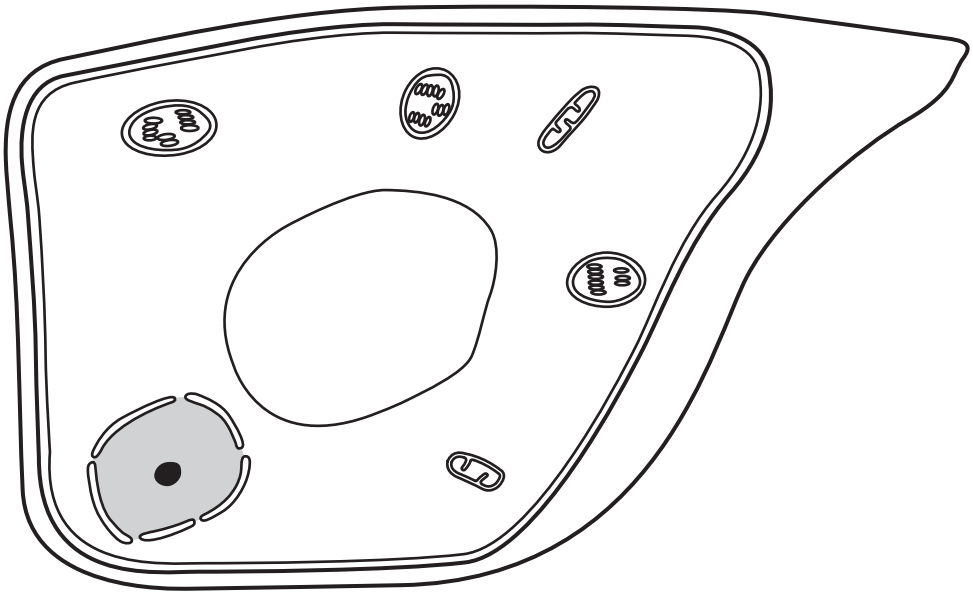


Fig. 4.1

(a) (i) State, using ONLY THE INFORMATION IN Fig. 4.1, two DIFFERENCES between plant cells and animal cells.

1 _____

_____

2 _____

_____ **[2]**

(ii) Cell Y is a guard cell.

State, using ONLY THE INFORMATION IN Fig. 4.1, one adaptation of this cell and explain how the adaptation allows the cell to carry out its function.

adaptation _____

explanation _____

_____

_____ **[2]**

QUESTION 4(b)(i) STARTS ON PAGE 22

(b) Fig. 4.2 shows drawings of the six chromosomes inside an animal cell viewed during late prophase of mitosis.

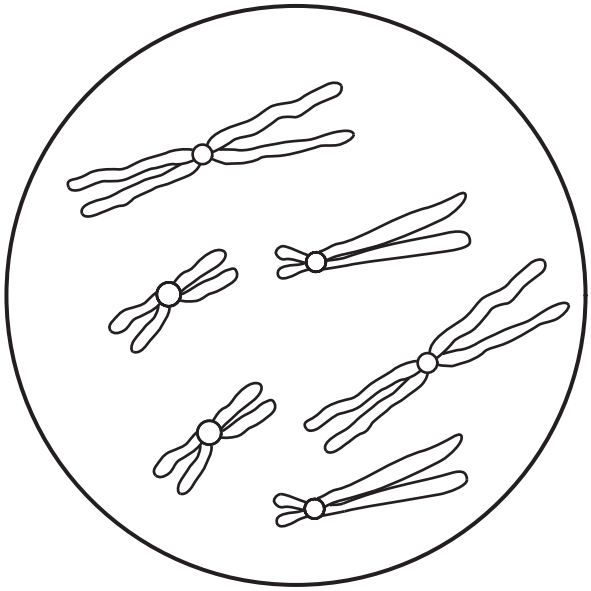
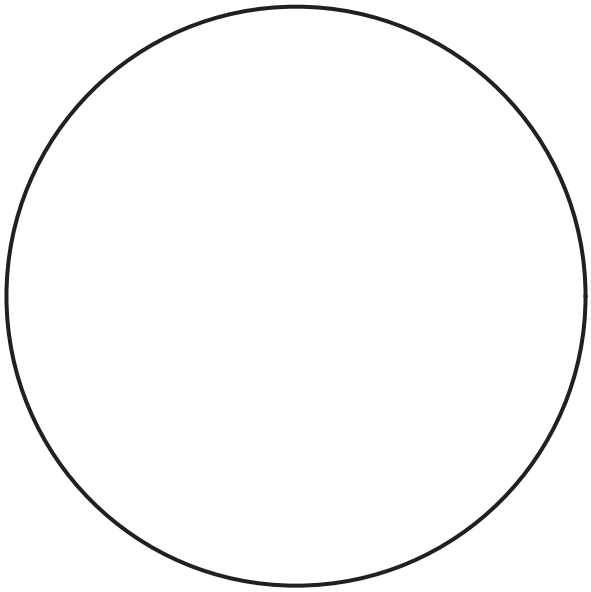


Fig. 4.2

(i) Identify <u>ONE PAIR</u> of *homologous chromosomes* in Fig. 4.2 by drawing around each chromosome in the pair <u>ON THE DIAGRAM</u>. [1]

(ii) The nucleus of a sperm cell is produced by <u>MEIOSIS</u>.

Draw a diagram in the space below to represent the chromosomes that are present in the nucleus of a sperm cell from <u>THE SAME ANIMAL</u>.



[2]

[Total: 7]

5 Fig. 5.1, opposite, shows the possible pathways taken by water across the root of a plant.

(a) (i) Name the process by which water enters cell Q from the soil.

_____ **[1]**

(ii) Pathway 1 is known as the vacuolar pathway, as the water passes into and through the cell vacuoles.

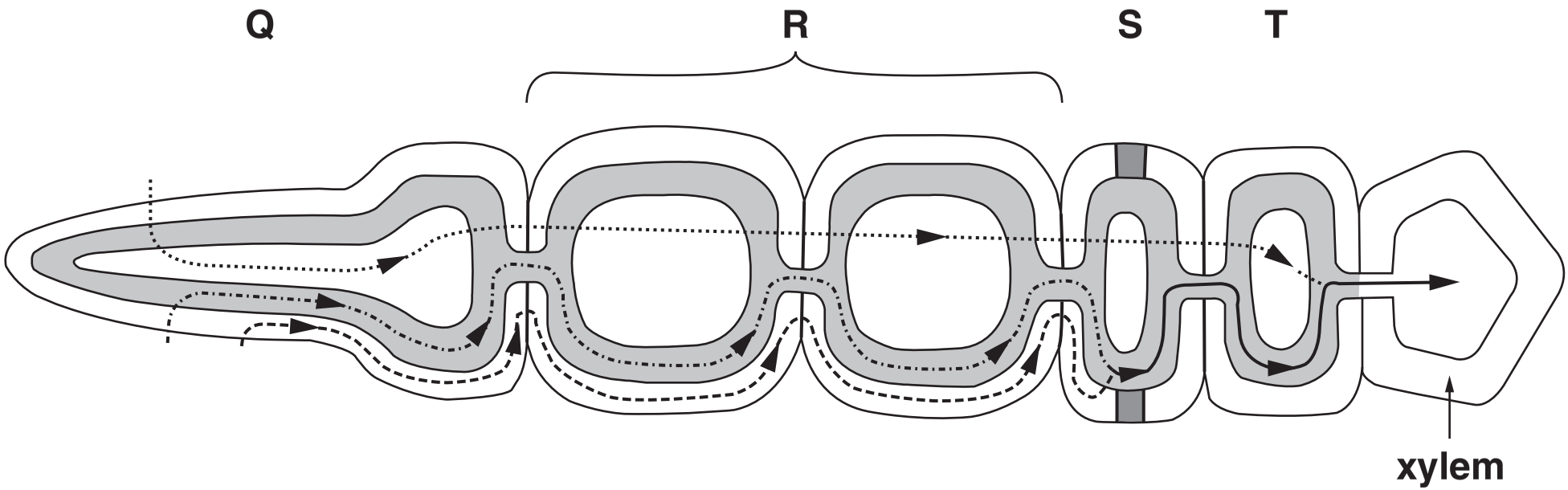
Name pathway 2 and pathway 3.

pathway 2 _____

pathway 3 _____ **[2]**

(iii) State which letter, Q, R, S or T, on Fig. 5.1, represents the endodermis.

_____ **[1]**



Key:

pathway 1

pathway 2

pathway 3

common pathways

Fig. 5.1

(b) Describe <u>AND</u> explain how water is moved up the xylem from the roots to the leaves.

In your answer you should use appropriate technical terms, spelt correctly.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ **[5]**

(c) Table 5.1 shows a comparison of xylem vessels and phloem sieve tube elements.

Complete the table. The first row has been done for you.

Table 5.1

feature	xylem vessel	phloem sieve tube element
cells living or dead	dead	living
bordered pits present or absent		
lignin present or absent		
substances transported		
direction of transport		

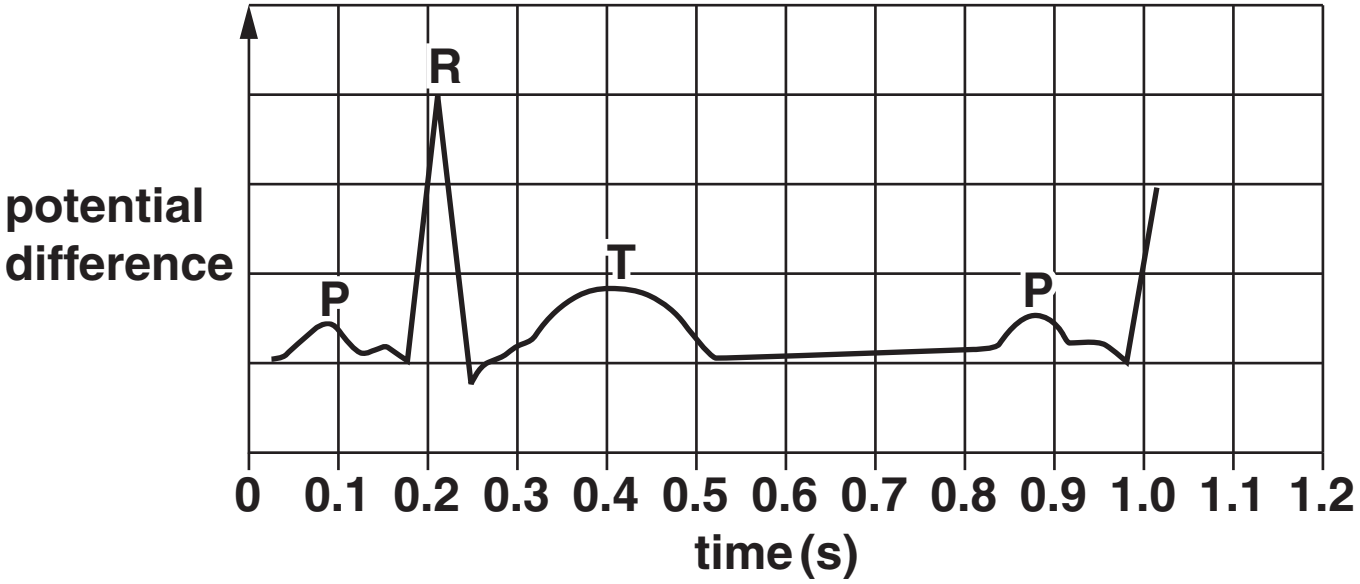
[4]

[Total: 13]

6 Fig. 6.1 shows two electrocardiogram (ECG) traces.

- **Trace A is a normal trace.**
- **Trace B is a trace from a heart after treatment with the drug digitalis.**

Trace A – an electrocardiogram from a normal heart



Trace B – an electrocardiogram from a heart after treatment with digitalis

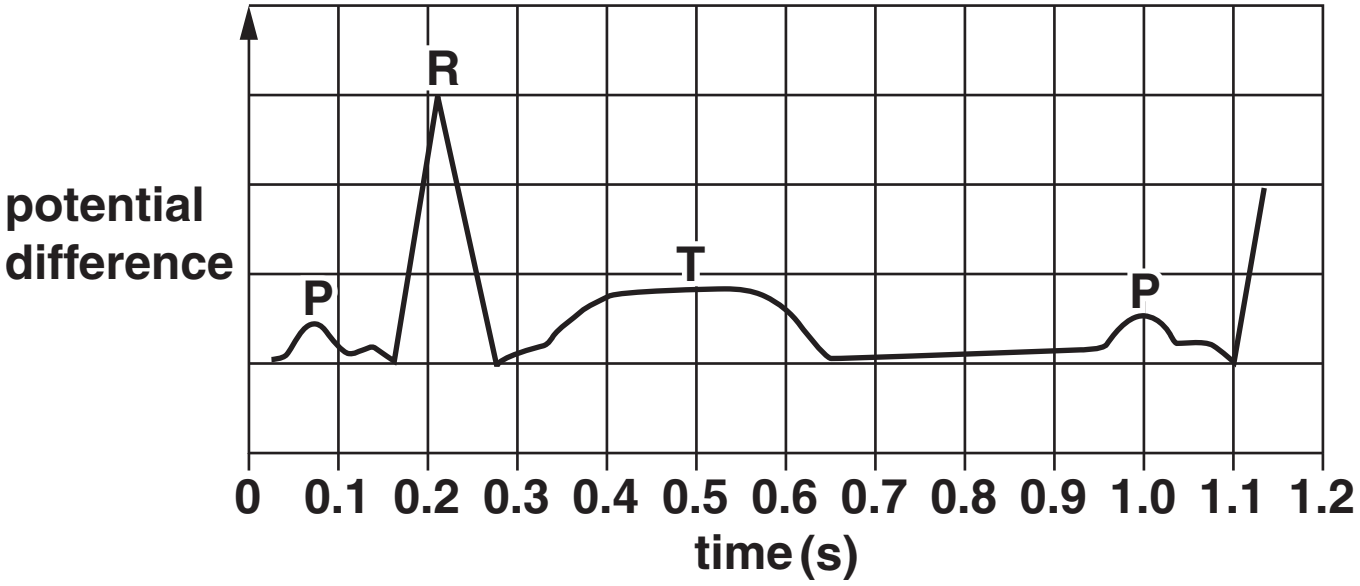


Fig. 6.1

(a) Calculate the heart rate using the information in Trace A.

Show your working.

Answer = _____ beats per minute [2]

(b) Using the information in Fig. 6.1, state <u>TWO</u> effects of digitalis on the activity of the heart.

1 _____

_____

2 _____

_____ **[2]**

QUESTION 6(c) STARTS ON PAGE 30

(c) Describe the roles of the sinoatrial node (SAN) AND the atrioventricular node (AVN) in coordinating the cardiac cycle.

_____

_____

_____

_____

_____

_____

_____ **[3]**

[Total: 7]

END OF QUESTION PAPER

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