

FOR OFFICIAL USE

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KU	PS

Total Marks

0300/401

NATIONAL
QUALIFICATIONS
2009

THURSDAY, 28 MAY
9.00 AM – 10.30 AM

BIOLOGY
STANDARD GRADE
General Level

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

- 1 All questions should be attempted.
- 2 The questions may be answered in any order but all answers are to be written in the spaces provided in this answer book, and must be written clearly and legibly in ink.
- 3 Rough work, if any should be necessary, as well as the fair copy, is to be written in this book. Additional spaces for answers and for rough work will be found at the end of the book. Rough work should be scored through when the fair copy has been written.
- 4 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.

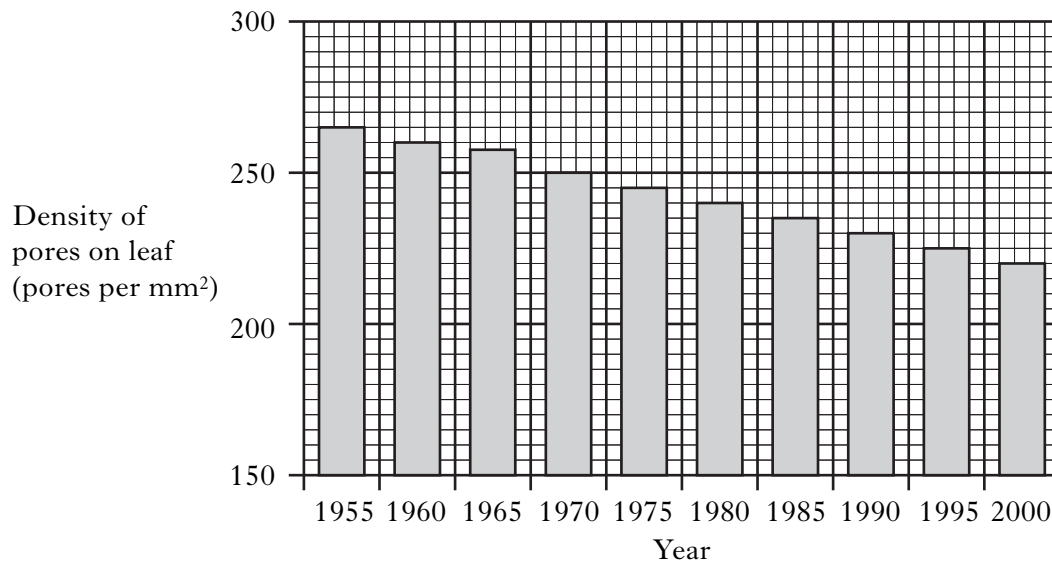


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1. (continued)

- (b) The density of pores on the leaves of a birch tree was recorded every five years. The results are shown in the graph.



- (i) What was the first year in which the density was found to be lower than 250 pores per mm²?

1

- (ii) Estimate the possible density of pores in 1997.

_____ pores per mm²

1

- (c) (i) What name is given to the pores on the surface of a leaf?

1

- (ii) Name the raw material required for photosynthesis which enters the leaf through the pores.

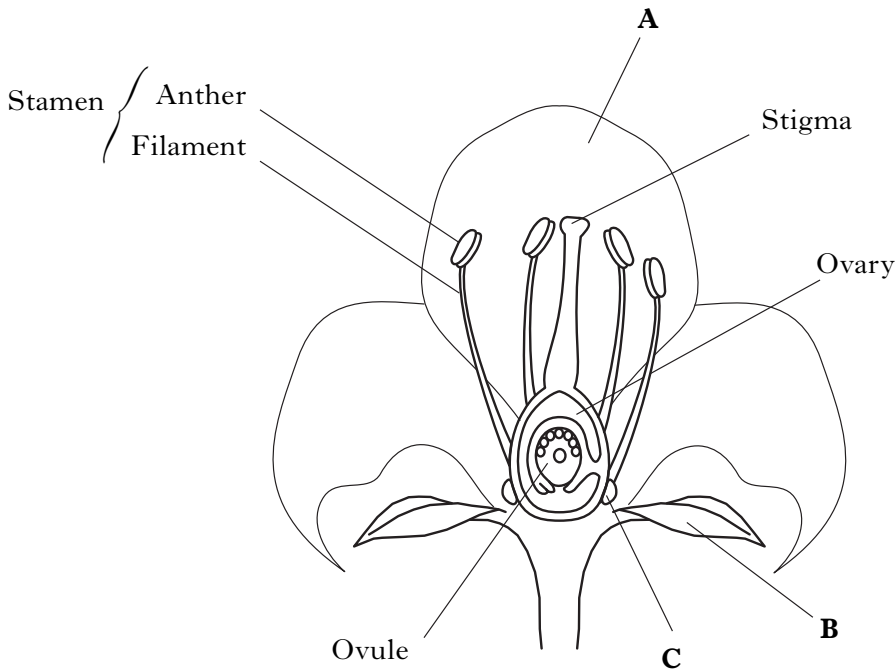
1

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Marks

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2. The diagram represents an insect-pollinated flower.



(a) Complete the following table to show the letter, name and function of parts **A**, **B** and **C**.

<i>Letter</i>	<i>Name</i>	<i>Function</i>
	sepal	protects the bud before opening
	petal	
C		produces and stores a sugary solution to attract insects

2

(b) Give a brief description of insect pollination.

2

(c) After fertilisation, which part of the flower develops into the fruit?

1

Marks

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1	
1	
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2	

4. (continued)

(c) Beetles living in the same area are in competition with the woodlice.

(i) What does the term “competition” mean?

1

(ii) What would be the effect on the number of woodlice if the number of beetles increases?

Give a reason for your answer.

Effect _____

Reason _____

1

(iii) What sampling technique could be used to estimate the number of woodlice in an area?

1

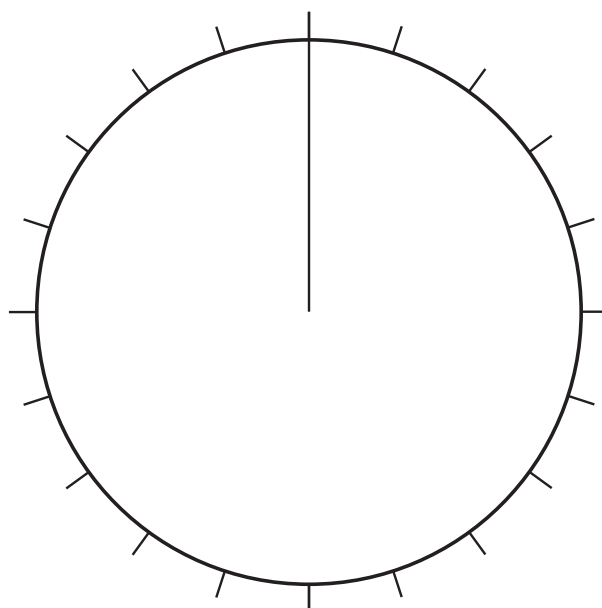
(d) Centipedes eat woodlice and other small animals.

Woodlice make up 10% of their diet and spiders account for 20%.

Beetles make up 10% of their diet and other insects make up 60%.

Present this information as a pie chart.

(An additional chart will be found, if needed, on *page twenty-nine*).



2

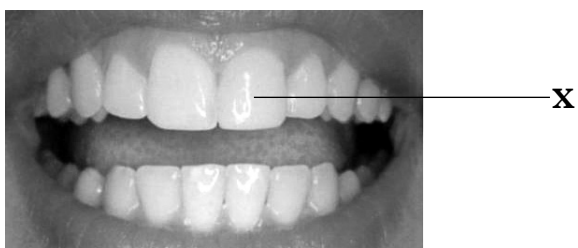
Marks

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5. (a) Animals use the energy from food for growth and repair.
Give **one** other way in which energy from food may be used by an animal.

1

- (b) Digestion begins in the mouth with the teeth physically breaking down food.
Name the type of tooth labelled **X** in the photograph of a human mouth.



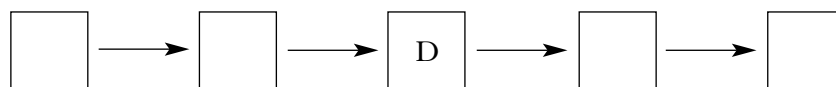
Name _____

1

- (c) (i) The following list gives parts of a mammal's digestive system.

- List**
- A large intestine
 - B stomach
 - C oesophagus
 - D small intestine
 - E anus

Using the letters from the list, arrange the parts into the order in which food would pass after leaving the mouth.



1

- (ii) Give one feature of the small intestine which makes it efficient at absorbing food.

1

<i>Marks</i>	KU	PS
1		
1		

5. (continued)

(d) Carbohydrates, proteins and fats in food are mixed with enzymes during digestion. What effect do the enzymes have on all of these substances?

(e) A man had an energy intake of 11550 kilojoules per day.
If 24% of this was supplied by fat, how many kilojoules would this represent?

Space for calculation.

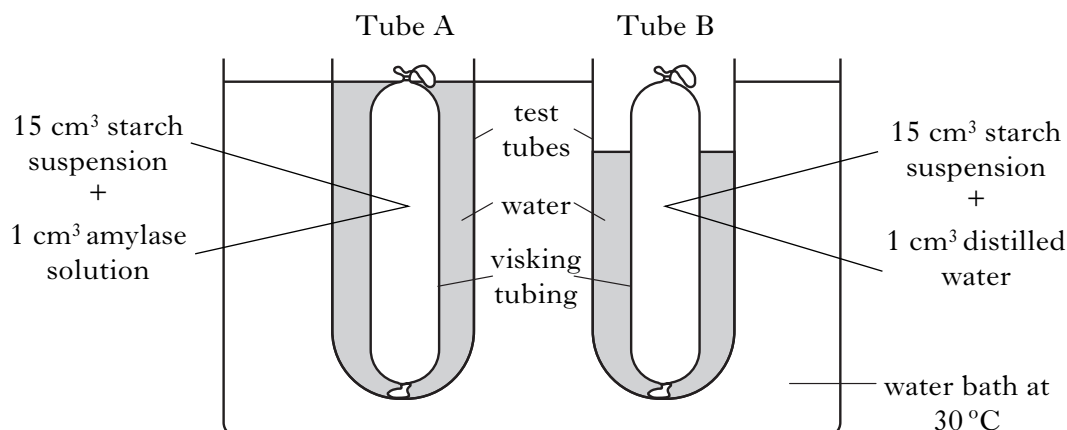
_____ kilojoules

[Turn over

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1	
1	
1	
1	

7. The diagram below refers to an investigation into the action of the enzyme amylase.



- (a) (i) Suggest one improvement to the way the investigation was set up to make it valid.

- (ii) State the purpose of the water bath.

- (b) The investigation was set up properly and the water in the test tubes surrounding the visking tubing was tested for starch and for sugar at the start and after one hour.

The following results were obtained.

	<i>Starch</i>		<i>Sugar</i>	
	Tube A	Tube B	Tube A	Tube B
At start	absent	absent	absent	absent
After one hour	absent	absent	present	absent

- (i) What was the source of the sugar found in tube A?

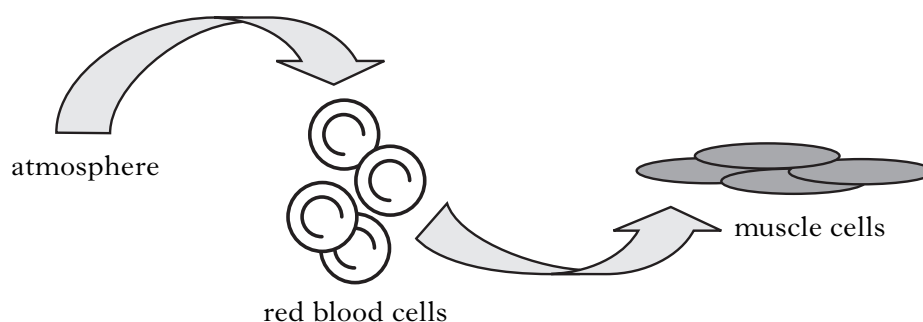
- (ii) Tube B provided evidence that the change was due to amylase and not to any other factor. What name is given to this part of the investigation?

[Turn over

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1	
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1	
1	

8. (a) The diagram represents the transfer of oxygen from the atmosphere to muscle cells.



From the diagram, state where the highest and the lowest concentrations of oxygen are found.

Highest concentration _____

Lowest concentration _____

- (b) (i) Name the process by which oxygen enters cells.

- (ii) What name is given to the special case of the movement of water into and out of cells?

- (c) Name the process by which muscle cells use oxygen to release energy from food.

<i>Marks</i>	KU	PS
1		
1		
1		
1		

10. (continued)

(b) Why are the adults in an elephant family group all females?

(c) (i) Why are elephants sometimes killed by poachers?

(ii) Elephant poaching is less of a problem in Asia than in Africa.
Suggest a reason for this.

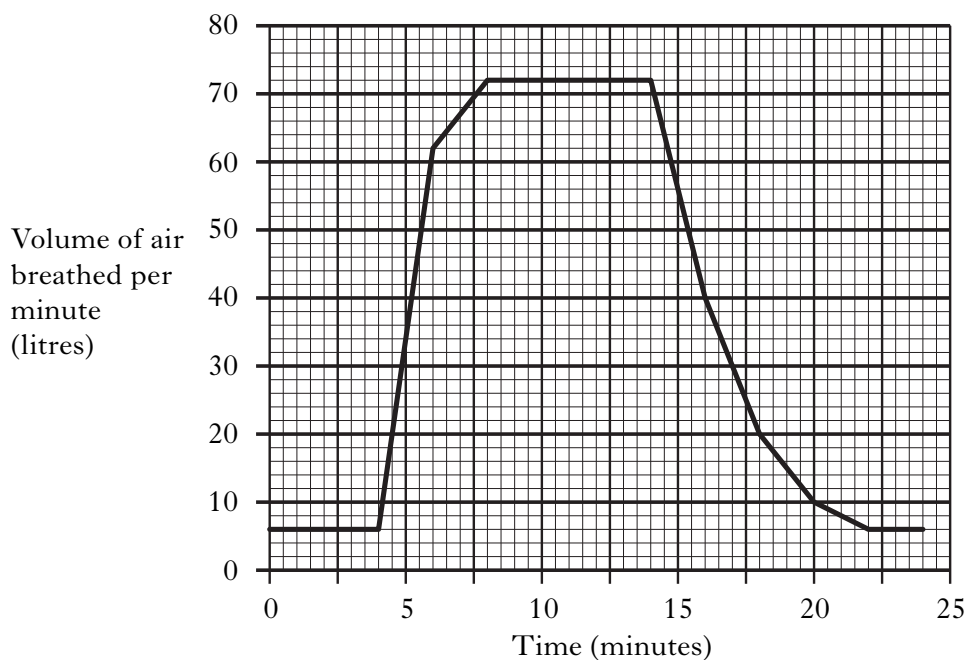
(d) Suggest a reason why the number of domesticated elephants may be decreasing.

[Turn over

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11. The graph shows the volume of air breathed per minute by a rugby player at rest, during 10 minutes of exercise and during his recovery time.



- (a) At what time did the rugby player begin to exercise?

_____ minutes

1

- (b) During the rest period before exercise, the player breathed 12 times per minute. Calculate the average volume of each breath.

Space for calculation.

_____ litres

1

- (c) Calculate the simplest whole number ratio of the highest volume breathed per minute to the lowest.

Space for calculation.

highest : lowest

_____ : _____

1

<i>Marks</i>	KU	PS
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11. (continued)

- (d) Recovery time is the time taken for the breathing rate to return to normal after exercise.

Calculate the recovery time for the rugby player.

Space for calculation.

_____ minutes

1

- (e) How would an investigation be carried out to find which of two people is the fitter, based on recovery times?

2

[Turn over

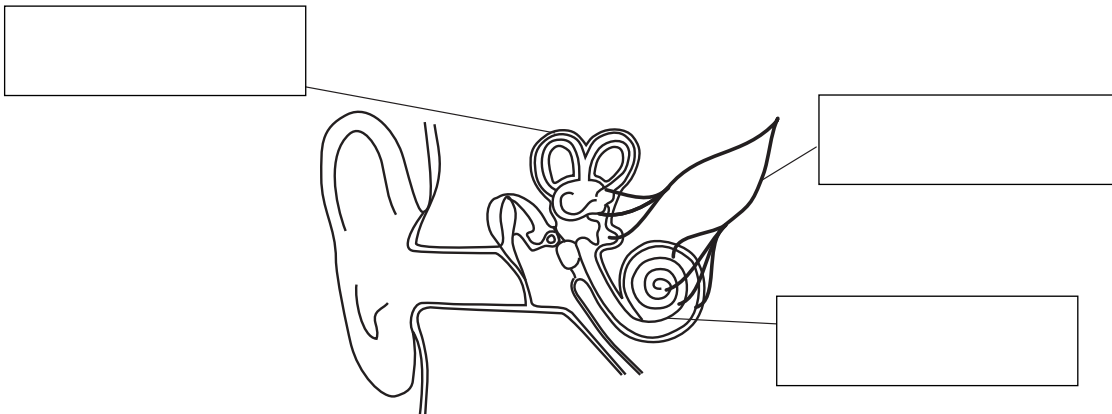
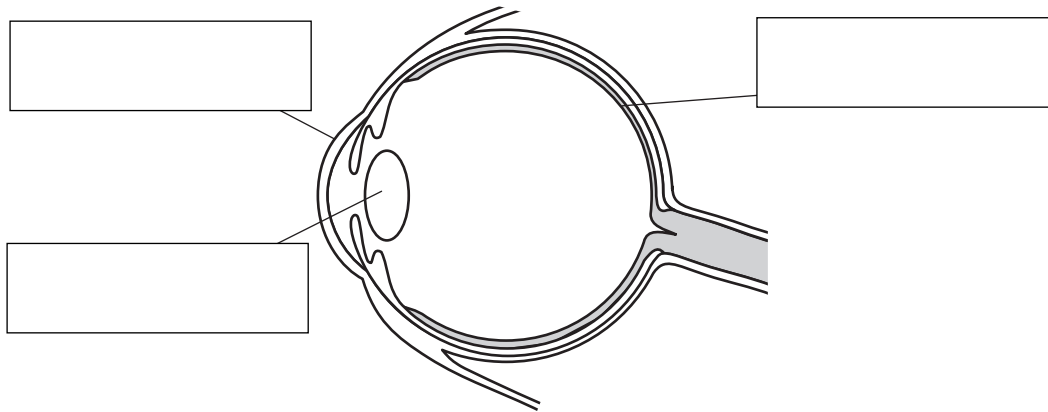
Marks

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14. (a) The diagrams below represent an eye and an ear.
Label the diagrams by entering the correct name in each box.
Choose the names from the list.

List

cochlea	cornea	lens
semi-circular canals	retina	auditory nerve



3

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17. Foresters planted a variety of native Scottish trees. Five years later, the heights of a sample of silver birch trees were measured.

The results are shown below.

Tree height (cm)	295	230	275	305
	260	195	250	220
	285	315	255	235

(a) (i) What is the average height of the silver birch trees in this sample?
Space for calculation.

_____ cm

1

(ii) What is the advantage of making the sample as large as possible?

1

(iii) Although the trees are all the same age and the same species, their heights are different. What term is used to describe the differences between members of the same species?

1

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1	
2	
1	
1	

17. (continued)

(b) Use the results of the sample to complete the bar chart by:

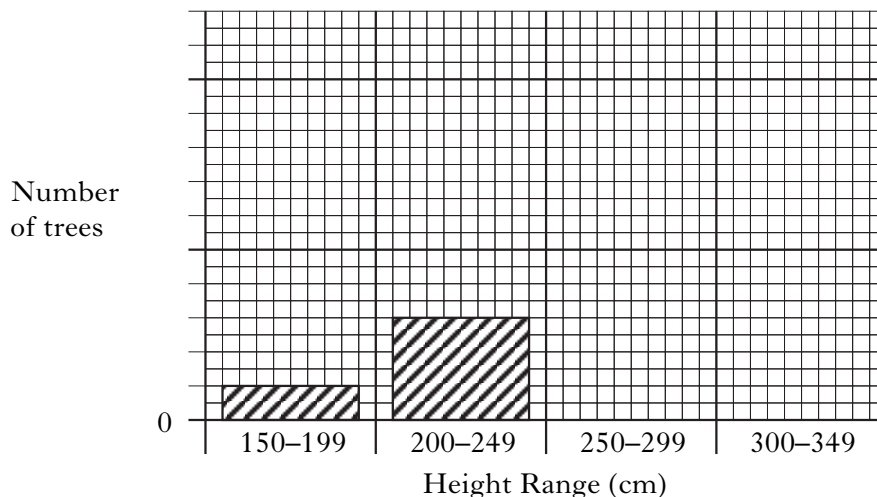
(i) adding a suitable scale to the vertical axis

1

(ii) completing the remaining bars.

2

(An additional chart will be found, if needed, on *page thirty*)



(c) (i) In total, 480 silver birch and 360 rowan trees were planted. Calculate the simple whole number ratio of silver birch to rowan trees planted.

Space for calculation.

_____ : _____
silver birch : rowan

1

(ii) After five years, 384 of the original silver birch trees were still alive. What percentage of the silver birch trees had survived?

Space for calculation.

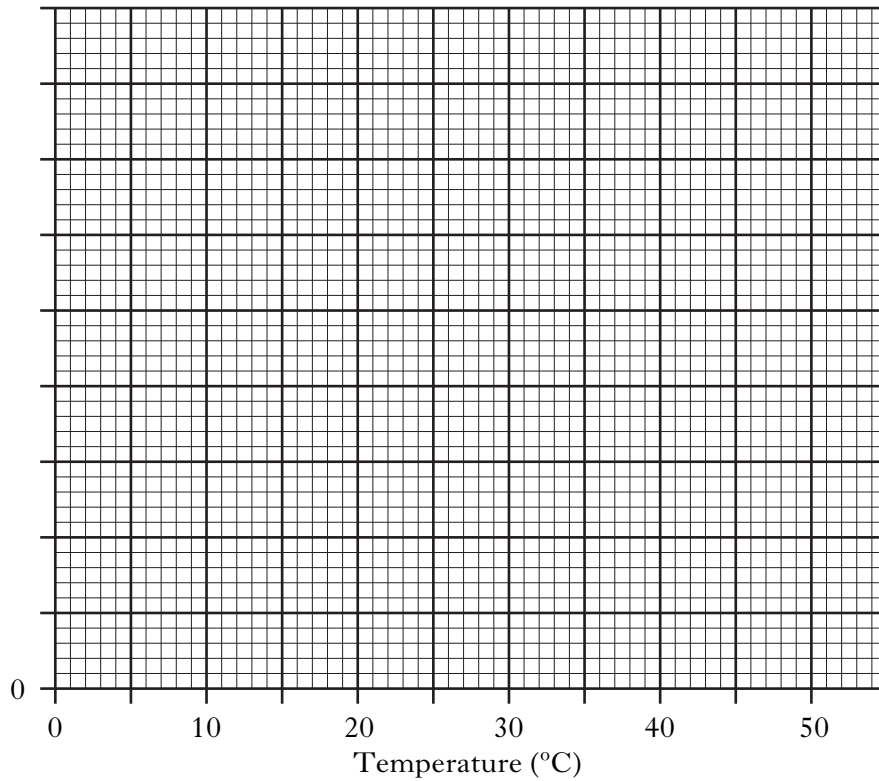
_____ %

1

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Marks	KU	PS
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18. (continued)



(b) At what temperature was the growth of the bacteria fastest?

_____ °C

1

(c) Predict the number of bacterial cells per mm³ if the experiment was repeated at 15 °C.

_____ bacterial cells per mm³

1

(d) Name the type of reproduction which leads to the increase in number of the bacteria.

1

(e) What is the purpose of stirring the liquid during the investigation?

1

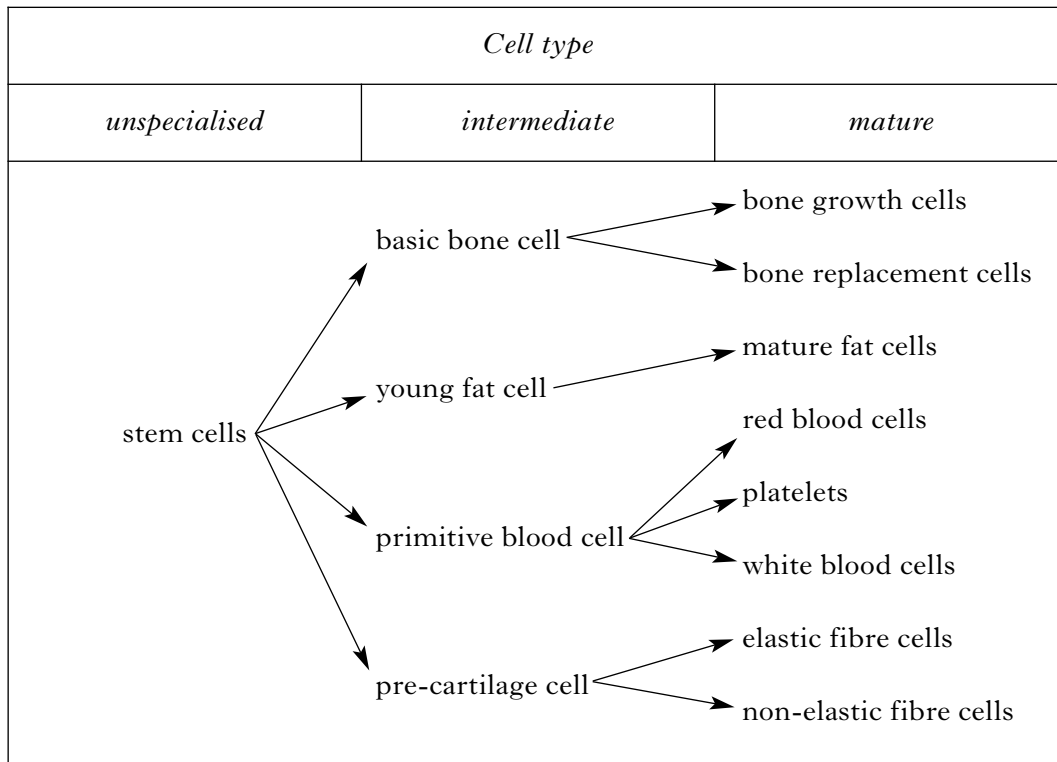
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19.		
(a)	1	
(b)	1	
(c)	1	

19. Stem cells are un specialised cells which can divide to make a wide range of other cell types in the body. The embryo contains the highest proportion of stem cells.

The chart shows how some specialised cell types are formed from stem cells.



- (a) Which intermediate cell can develop into the widest range of mature cell types?

- (b) Which type of intermediate cell forms both elastic and non-elastic fibres?

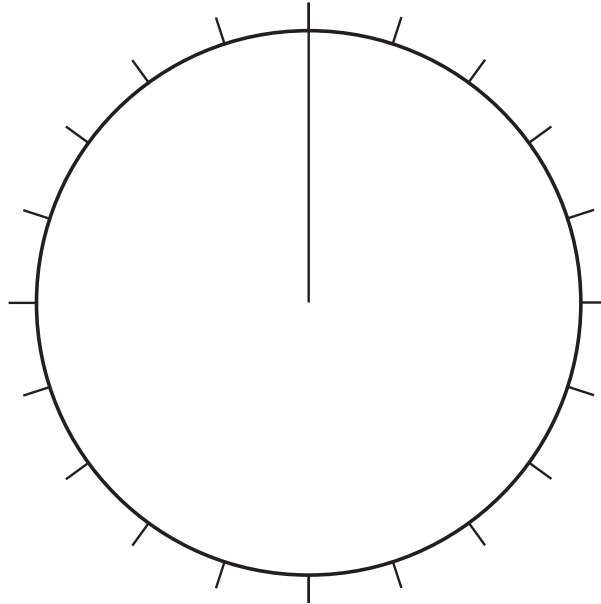
- (c) At which stage in an animal's development are stem cells most abundant?

[END OF QUESTION PAPER]

SPACE FOR ANSWERS
AND FOR ROUGH WORKING

KU	PS
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ADDITIONAL PIE CHART FOR QUESTION 4(d)



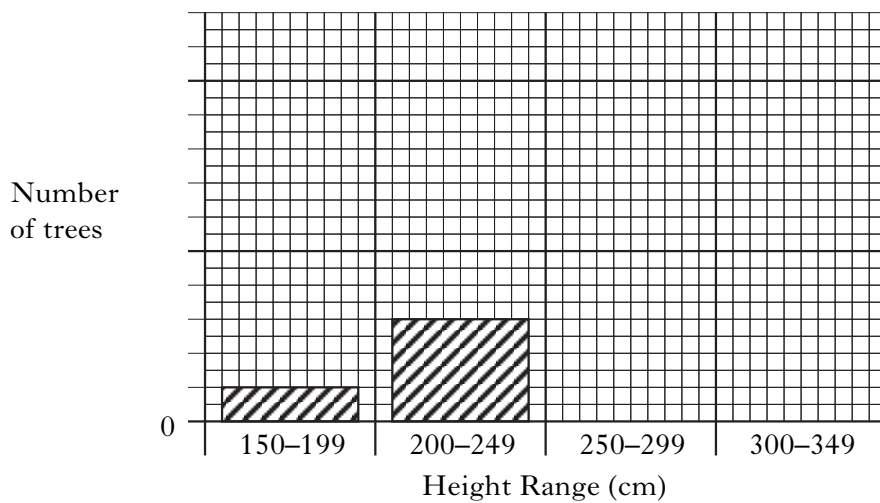
ADDITIONAL CHART FOR QUESTION 13(b)(i)

<i>Colour of bill spot</i>	<i>Number of pecks</i>									
	1	2	3	4	5	6	7	8	9	10
black										
blue										
red										
white										
no spot										

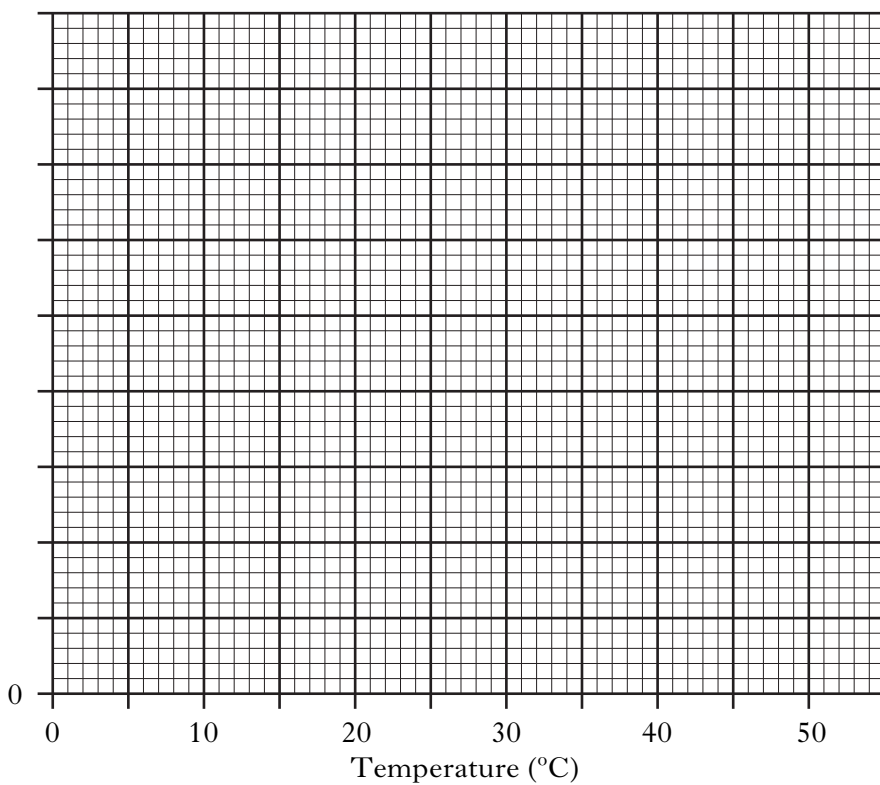
SPACE FOR ANSWERS
AND FOR ROUGH WORKING

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ADDITIONAL CHART FOR QUESTION 17(b)



ADDITIONAL GRAPH FOR QUESTION 18(a)



DO NOT
WRITE IN
THIS
MARGIN

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