FOR OFFICIAL USE			

KU	PS

**Total Marks** 

### 0300/401

NATIONAL 2008

TUESDAY, 27 MAY QUALIFICATIONS 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 Scottish candidate number	Number of seat
1 All questions should be attempted.	
2 The questions may be answered in any order but spaces provided in this answer book, and must be wi	
3 Rough work, if any should be necessary, as well as book. Additional spaces for answers and for rough book. Rough work should be scored through when the	work will be found at the end of the
4 Before leaving the examination room you must give not, you may lose all the marks for this paper.	this book to the invigilator. If you do





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			Marks	KU	PS
<b>1.</b> (a	a) Th	e key gives information about some water plants growing in a pond.			
	1	Plant is fully submerged in water			
	2	Grows in deep water			
	3	Plant has roots in soil			
	4	Long and thin leaves			
	5	Resistant to frost			
	(i)	Use the key to identify the plant from the photograph and its description.			
		Photograph Description			
		The plant has its roots in the soil at the bottom of the pond and does not tolerate frost very well.			
		Name of plant	1		
	(ii)	Which plant grows submerged in deep water?			
			1		
	(iii)	Give <b>three</b> features that the Water lily and the Lotus have in common.  1			
		3	2		
[0300/4	401]	Page two			

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1. (	(continued)
1. (	conunuear

1	(h)	Use words from	the list to	complete the	following	sentences
١,	0	C SC WOLGS LIGHT	tile list to	compicte the	10110 WILLE	SCITTUTION.

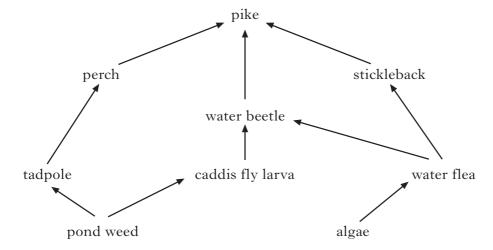
List population community habitat

A pond provides a \_\_\_\_\_ for a

\_\_\_\_\_ of many different types of organisms.

Plants of the same species form a \_\_\_\_\_\_.

(c) The food web shows the feeding relationships of some of the organisms in a pond.



(i) What do the arrows in the food web represent?

\_\_\_\_\_

(ii) A predator is an animal which hunts and kills other animals for food.

Give the names of **two** predators from the food web.

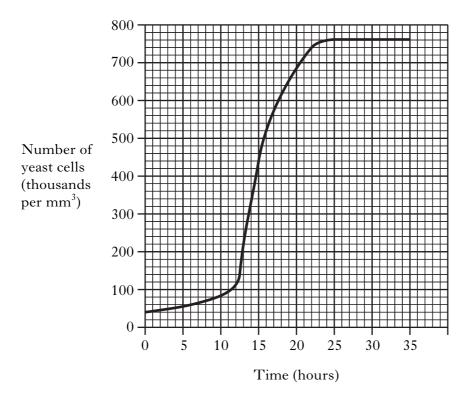
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[Turn over

[0300/401]

2. Yeast cells were grown and their numbers recorded over a 35 hour period. The results are shown on the graph.



(a) How many times greater was the maximum number of yeast cells compared to the number at the start?

Space for calculation.

\_\_\_\_\_ times greater

1

1

(b) In terms of birth rate and death rate, explain why the population of yeast increased during the first 20 hours.

(c) Name **two** factors which could limit the growth of the population of yeast cells after 20 hours.

2 \_\_\_\_\_

2

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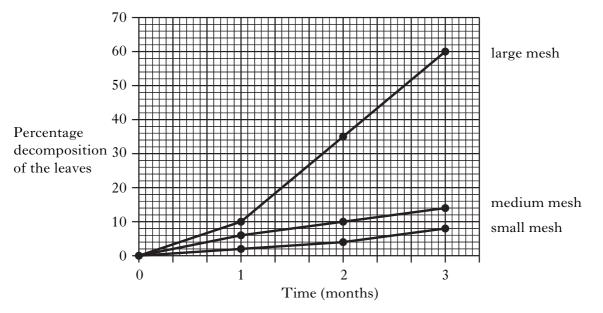
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**3.** The activity of soil organisms was investigated. Some leaves were placed in bags of different mesh sizes and buried in soil for three months.

Each bag was dug up at one month intervals and the percentage decomposition of the leaves recorded. The results are shown on the graph.



(a) After three months, what percentage of the leaves had decomposed in each bag?

Large mesh bag \_\_\_\_\_\_ %

Medium mesh bag \_\_\_\_\_\_ %

Small mesh bag \_\_\_\_\_\_ %

(b) Give **one** feature of the bags and **one** feature of the leaves which would have to be kept constant when setting up the investigation.

Bags \_\_\_\_\_

Logvos

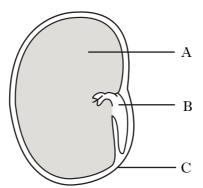
(c) Why was it necessary to wait for one month before collecting any results?

(d) Explain why it is important that leaves and other dead material decompose.

[0300/401] Page five [Turn over

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<i>Marks</i>	$  \mathbf{N} \mathbf{U}  $	

**4.** (a) The diagram shows the internal structure of a broad bean seed.



Which letter indicates the food store of the seed?

(b) From the list below, underline two factors needed for all seeds to germinate.

Listcarbon dioxide light water oxygen

1

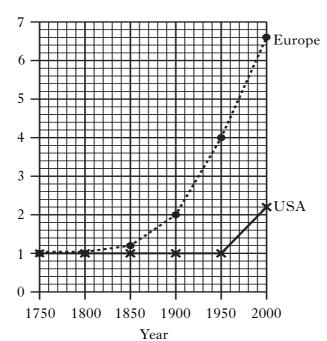
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[0300/401] Page six

(a)	Complete the word equation for photosynthesis.		
	raw materials light products energy		
-	+ +		
-		2	
	One of the products of photosynthesis may be converted into a storage carbohydrate in the plant. Name this storage carbohydrate.		
		1	
	Plants exchange gases with the air during photosynthesis.  Name the openings which allow gases to pass into and out of the leaf.		
		1	
	What substance in green leaves absorbs the light energy for photosynthesis?		
		1	
	[Turn over		

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**6.** The graph shows the average wheat yields in the USA and in Europe from 1750 to 2000.



(a) Describe the pattern of average wheat yield for the USA from 1750 to 2000.

(b) During which 50 year period was there the greatest increase in average wheat yield in Europe?

from \_\_\_\_\_ to \_\_\_\_

(c) Calculate the simple whole number ratio of average wheat yield in Europe to that in the USA in 2000.

Space for calculation.

 $\overline{\text{Europe}} : \overline{\text{USA}}$ 

1

2

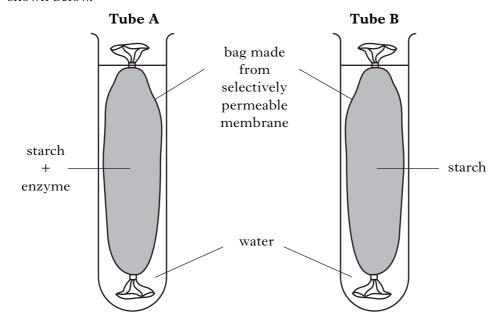
1

Average wheat yield (tonnes/hectare)

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**7.** An investigation into the effect of a digestive enzyme on starch was set up as shown below.



The water from the two tubes was tested for the presence of starch and sugar at the start of the investigation. All the results were negative.

After 20 minutes the water from Tube A gave a positive result for sugar. The other results were negative.

The same results were obtained after 40 minutes.

(a) Complete the following table of results for the investigation.

Time	Water in Tube A		Water in Tube B	
(minutes)	sugar	starch	sugar	starch
0	absent			
	present			

(b) (i) Explain why sugar was present in the water in Tube A.

(ii) By referring to the size of starch and sugar molecules explain why sugar was found in the water of Tube A.

1

2

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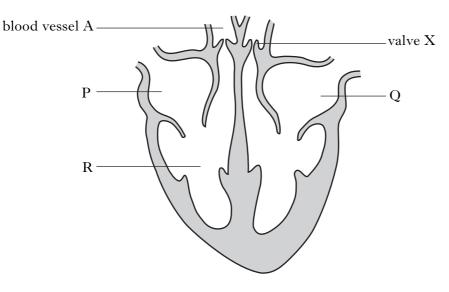
[0300/401]

Page nine

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**8.** (a) The diagram shows a section through the heart of a mammal.



(i)	Identify	chambers	Ρ,	Q	and	R
-----	----------	----------	----	---	-----	---

P \_\_\_\_\_

0

R

(ii) State the function of valve X and name the blood vessel in which it is found.

Function \_\_\_\_\_

Blood vessel \_\_\_\_\_

(iii) Which one of the following statements is correct for blood vessel A?  $Tick(\checkmark)$  the correct box

It is a vein carrying blood to the lungs

It is an artery carrying blood to the lungs

It is a vein carrying blood to the body

It is an artery carrying blood to the body

2

1

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[0300/401] Page ten

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8.	(co	ntinued)	Marks	KU	PS
	(b)	Blood is made of a liquid called plasma which contains red and white cells.			
		(i) What is the main function of the red blood cells?			
		(ii) State <b>one</b> function of plasma.	1		
	(c)	Name the blood vessel that carries oxygen to the heart muscle.	1		
			1		
		[Turn over			

Page eleven

[0300/401]

			TH Mar	HIS RGIN
		Marks	KU	PS
	pie chart shows the proportions of injuries resulting from different rts recorded at a sports injury clinic.  Football Rugby Tennis Squash  Which <b>one</b> of the following statements is correct?			
	$Tick(\checkmark)$ the correct box			
	More people were injured playing squash than tennis  More people were injured playing rugby than football  Fewer people were injured playing squash than rugby			
	Fewer people were injured playing football than tennis	1		
	Towar people were mjarea playing rootsan than termie	_		
( <i>b</i> )	Which sport resulted in 15% of the total injuries?			
		1		
(c)	The number of injuries from playing squash was 32.  How many injuries resulted from playing rugby?  Space for calculation.			
		1		
[0300/401	1] Page twelve			

			MAR	GIN
		Marks	KU	PS
<b>10.</b> ( <i>a</i>	Water regulation involves a balance of gains and losses.			
	Give <b>one</b> method of water gain and <b>one</b> method of water loss in a mammal.			
	Water gain			
	Water loss	1		
(l	The diagram shows the urinary system of a human.			
	Name structures W, X and Y on the diagram.			
	direction of blood flow W			
	X			
		2		
(4	) <u>Underline</u> <b>one</b> alternative in each bracket to make the sentence correct.			
	Kidneys produce urine by $\begin{cases} \text{filtration} \\ \text{absorption} \end{cases}$ of blood and the $\begin{cases} \text{osmosis} \\ \text{reabsorption} \end{cases}$			
	of useful substances such as $\begin{cases} glucose \\ oxygen \end{cases}$ .	2		
	(oxygen )			
(4	Other than water and salt, name a waste product that is removed from the body in the urine.			
		1		
	[Turn over			
[0300/	Page thirteen			

Marks

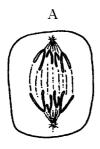
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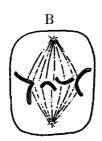
11. (a) Complete the table by entering the correct word for each description.

Description	Word
A substance used to make cell structures show up more clearly under a microscope.	
The movement of a substance from a high concentration to a lower concentration.	
Any substance which speeds up a reaction and is unchanged after the reaction.	
The structure which controls the movement of a substance into or out of a cell.	

3

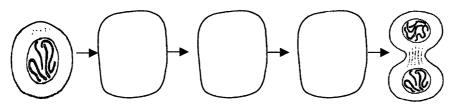
(b) Diagrams A, B and C represent stages of cell division.







Add the letters A, B and C to the empty cells below to show the correct order in which they occur.



1

What name is given to this process?

1

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**12.** Vaccinations are given to protect people from diseases caused by microorganisms.

The following table gives information about some vaccines.

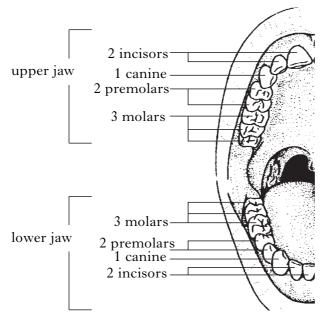
Vaccine	Time vaccine is effective (years)	Booster vaccine required within effective period	Method of vaccination
Hepatitis A	10	yes	injection
Hepatitis B	5	no	injection
Meningitis	5	no	injection
Polio	10	no	by mouth
Rabies	2	no	injection
Tetanus	10	no	injection
Typhoid	3	no	injection

<i>a</i> )	Which vaccine is effective for the shortest time?		
		1	
b)	Which vaccine requires a booster to be given within the effective period?		
		1	
c)	Which vaccine is effective for 10 years, is given by injection and does not require a booster to be given?		
		1	
<i>d</i> )	List all the information which can be obtained from the table about the meningitis vaccine.		
		1	

[0300/401] Page fifteen [Turn over

**13.** The dental formula of an animal describes the number of each type of tooth on the upper and lower jaw of one side of its mouth.

The diagram explains the dental formula for an adult human.



right side of mouth

Dental formula = incisors(I) $\frac{2}{2}$ , canine (C) $\frac{1}{1}$ , premolars(P) $\frac{2}{2}$ , molars (M) $\frac{3}{3}$  = 16

Total number of teeth =  $16 \times 2 = 32$ 

The table below gives the dental formulae for some animals.

Animal		Dente	Total number of teeth		
Dog	$I\frac{3}{3}$	$C\frac{1}{1}$	$P\frac{4}{4}$	$M\frac{2}{3}$	42
Sheep	$I\frac{0}{3}$	$C\frac{0}{1}$	$P\frac{3}{3}$	$M\frac{3}{3}$	32
Rabbit	$I\frac{2}{1}$	$C\frac{0}{0}$	$P\frac{3}{2}$	$M\frac{3}{3}$	

(a) (i) Complete the table to show the total number of teeth for a rabbit.

(ii) Which animal in the table has only 2 canine teeth?

1

1

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10							Marks	KU	PS
13.	(co	ntinued)							
	(b)	A puppy teeth ever	has a total nly distribu	of 12 incisted between	sor, 4 canine, 12 premola the upper and lower jaws	r and 0 molar			
		Complete	e the follow	ing dental fo	ormula for a puppy.				
		I ——	С	P	M		1		
						rm			
						[Turn over			

Page seventeen

[0300/401]

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				IVITAIN	CIIV
14.	Rea	d the following passage and answer the questions based on it.	Marks	KU	PS
	(suc	e term "raptor" refers to birds of prey. This group includes diurnal types h as hawks, eagles, falcons and vultures) which feed in daylight. It also udes nocturnal types (such as owls) which feed mostly at night.			
	leav Mar whi capt and	the the exception of the vultures, which feed on the leftovers other hunters to behind, all of the raptors use their feet to catch and kill their prey by falcons have an elongated middle toe which they wrap around the prey le still in flight. Hawks' feet have a ratchet-like mechanism to aid turing and holding their prey without too much exertion. Once the toes talons have tightened around the prey, they remain locked in place mout further effort.			
	fror are surv	tors are completely carnivorous, obtaining all of their required nutrients in their prey. The nutrients which normally come from vegetable matter often found in the stomachs of their prey. A lot of the water required for rival is also extracted from the prey. Raptors devour the prey entirely, argitating the indigestible matter in pellet form once or twice a day.			
	dead toot to t	of the raptors have hook-tipped beaks which are used for ripping the d prey. Falcons have a notch on each side of the upper beak forming a h-like projection, while some hawks have a more prominent hooked tip he beak, probably for a similar reason. Vultures have developed a much er, stronger beak for tearing the hides of dead animals and cracking their es.			
	(a)	Describe the main difference, mentioned in the passage, between hawks and owls.			
	(b)	Describe the feeding habits of vultures which make them different from other raptors.	1		
	(c)	Explain how raptors can obtain vitamins and minerals found only in plants, even though they are entirely carnivorous.	1		
			1		
	( <i>d</i> )	Describe <b>two</b> differences mentioned in the passage between falcons and hawks.			
		1 Falcons			
		Hawks			
		2 Falcons			
		Hawks	2		
[0300	)/40	1] Page eighteen			

15. (a) The table contains information about an experimental cross involving coat colour of mice. The original parents were both true breeding.

	Symbol	Phenotypes		
Parents		brown	×	white
First generation of offspring				
Second generation of offspring		75% brown		25% white

Complete the table to show:

the symbols used for each generation;

- the coat colour(s) of the first generation of offspring.

1

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(b) Decide if each of the following statements is **True** or **False** and tick (✓) the appropriate box.

If the statement is False, write the correct word in the Correction box to replace the word <u>underlined</u> in the statement.

Statement	True	False	Correction
Information about the forms of a gene in an individual is called the genotype.			
In the nucleus of a cell each gene is part of a <u>characteristic</u> .			
Cells which carry only one form of a gene to the offspring are called embryos.			

[Turn over

**16.** (a) An investigation of the effect of pH on the enzyme trypsin was carried out. Trypsin solution was added to cloudy suspensions of protein at different pH values.

The suspension became clear as the protein was digested.

The time taken for the suspension to become clear at each pH value is shown in the table.

pН	8.0	8.5	9.0	9.5	10.0	10.5
Time to clear (minutes)	9	4	7	15	30	50

(i) Use the results from the table to complete the line graph by:

1 labelling the vertical axis;

1

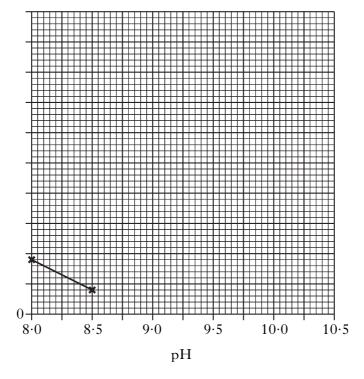
2 adding a scale for the vertical axis;

1

3 completing the graph.

1

(Additional graph paper, if required, will be found on page 27.)



(ii) Describe the effect of increasing the pH on the time for the suspension to clear.

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[0300/401]

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#### 16. (continued)

(b) Complete the following sentences by <u>underlining</u> the correct option in each bracket.

each bracket.	, ,		,	
	3		acidic	
Pepsin works best at pH (	7	which is	neutral	
	11		alkaline	

1

Catalase works best at pH  $\begin{pmatrix} 3 \\ 7 \\ 11 \end{pmatrix}$  which is  $\begin{pmatrix} \text{acidic} \\ \text{neutral} \\ \text{alkaline} \end{pmatrix}$ .

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(c) Name the substance from which all enzymes are made.

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17	(a)	Whatie	mount by	the term	"antibiotic"
1/.	(a)	what is i	meant by	tne term	antibiotic :

The table shows the results of treating an infection in cows with various antibiotics.

Antibiotic treatment	Number of cows treated	Number of cows cured	Percentage of cows cured
no antibiotic	2011	1450	72
Amoxicillin	56	48	86
Cephapirin	18	16	89
Cloxacillin	33	25	76
Erythromycin	8	6	75
Penicillin	25	17	68

(i)	Why is it better to use the percentages of cows cured rather than
	the actual numbers cured when drawing conclusions from the
	results?

The researchers stated that the results for erythromycin were not (ii) reliable. Why is this so?

Which antibiotic was the most successful treatment for this (iii) infection?

(iv) What conclusion can be drawn by comparing the results of the treatment with penicillin to the control group?

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#### 17. (b) (continued)

- (v) Use the information in the table to complete the bar chart to show the percentage of cows cured by:
  - 1 labelling the vertical axis;

1

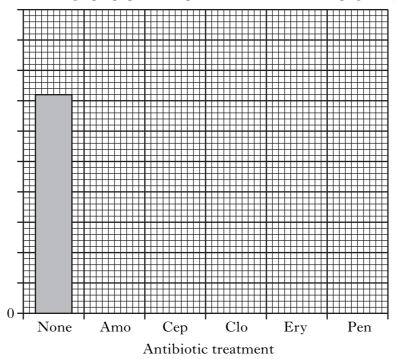
2 adding a scale to the vertical axis;

1

3 completing the bars.

1

(Additional graph paper, if required, will be found on page 27.)



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1					
2					

**18.** (a) When greenfly feed on cotton plants, they release a sticky mixture of sugars onto the leaves. This causes problems in the cotton industry. Researchers tested three wild yeasts to find a strain which could digest and remove the sugars without harming the cotton plants.

The results are shown on the chart below.

Percentage of sugar digested	20	Nesss					glucose glucose fructose melezitose cellobiose
	0	R		<u> </u>			
		K	Strain	of wild y	east	1	

(i) Which sugar was completely digested by all the strains of yeast?

(ii) By comparing the results of all three strains of yeast, which sugar

(iii) Which strain of yeast would be the most useful in solving the problem caused by the greenfly?

Give a reason for your answer.

was the least well digested?

Strain \_\_\_\_\_

Reason \_\_\_\_\_

(b) (i) What type of micro-organism is yeast?

(ii) Yeast is important in making bread and beer through the process of fermentation.

State why yeast is required in each case.

Bread \_\_\_\_\_

Beer

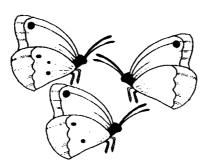
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18.	(00)	ntinu	ad).	Marks	KU	PS
10.	(c)		Name the type of micro-organism used in the manufacture of yoghurt from milk.			
		<i>(</i> ::)		1		
		(ii)	Explain why containers are sterilised before being used for making yoghurt.	1		
	( <i>d</i> )	Micr effec	ro-organisms carry out fermentation of the sugars in milk. What t does this have on the milk?	-		
				1		
			[Turn over			

Page twenty-five

[0300/401]

**19.** The meadow brown butterfly shows variation in wing pattern. There are different numbers of black spots on the underside of the hind wings.



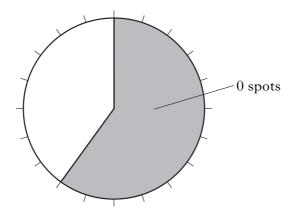
The table shows the number of wing spots in a Scottish population of the butterflies.

Number of spots on hind wing	0	1	2	3
Percentage of population	60	20	15	5

(a) (i) Is the variation in the number of spots on the hind wing continuous or discontinuous?

1

(ii) Use the table to complete the pie chart below.(An additional chart, if required, will be found on page 28.)



(b) It has been suggested that the variation in meadow brown butterflies could mean that they come from different species.

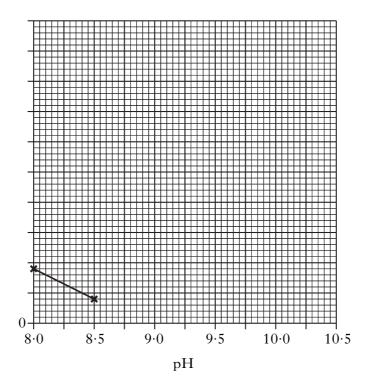
What evidence would be required to show that these butterflies all belong to the same species?

1

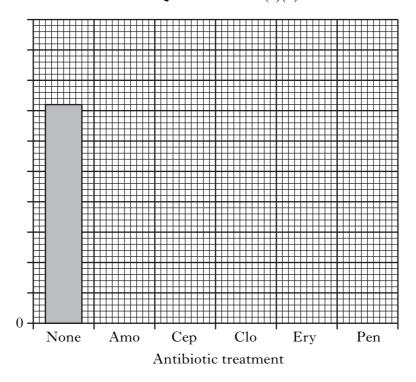
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[END OF QUESTION PAPER]

#### ADDITIONAL GRAPH PAPER FOR QUESTION 16(a)(i)



#### ADDITIONAL GRAPH PAPER FOR QUESTION 17(b)(v)



#### ADDITIONAL CHART FOR QUESTION 19(a)(ii)

