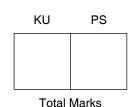
FOR OFFICIAL USE	 		



0300/401

NATIONAL QUALIFICATIONS 2011

MONDAY, 9 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 Scottish candidate number	er Number of seat
 All questions should be attempted. The questions may be answered in any order but 	t all answers are to be written in the

- 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.

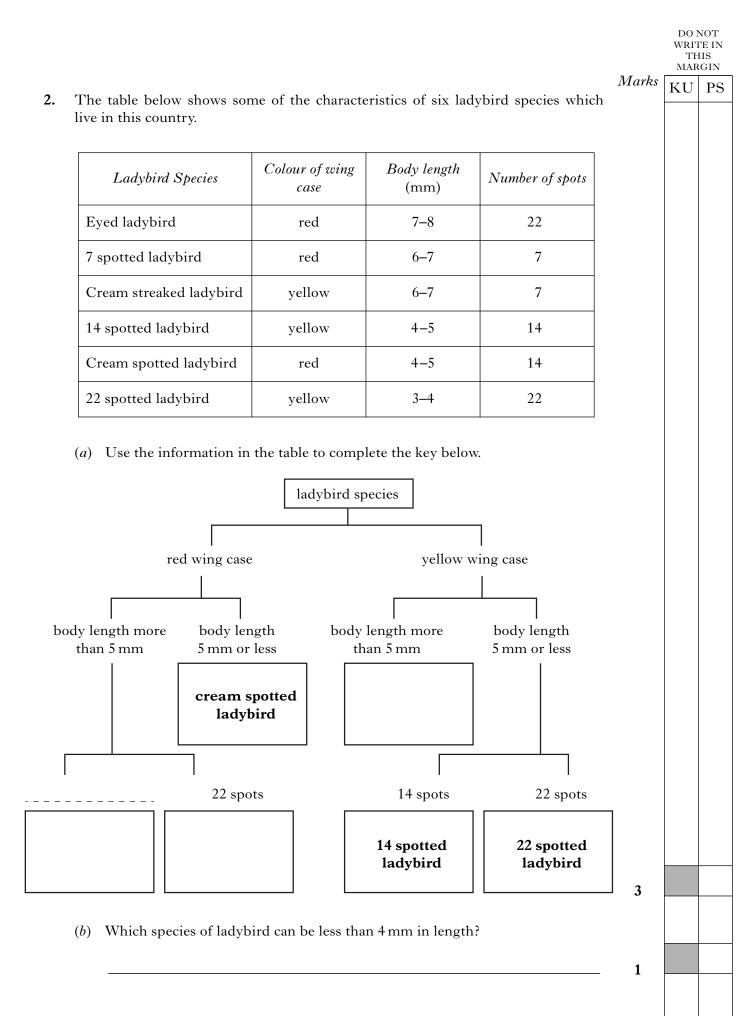




			Marks	TH MAR	GIN
(<i>a</i>)	The	diagram shows part of a food web in an ecosystem.		KU	PS
	sŗ	toads voles rabbits			
		insects plants			
		nformation from the diagram to answer the following questions.			
	(i)	What do the arrows represent?			
	(ii)	Which organisms are the producers?	1		
	(iii)	Name two animals that are not eaten by other organisms.	I		
		12	1		
	(iv)	Show a complete food chain from the diagram using the spaces below.			
		plants → toads →	1		
(<i>b</i>)	Nam	e one way in which energy can be lost from a food web.			
			1		

					DO WRI' TH MAH
tinued)				Marks	KU
	some terms related	to the biosphere.			
A	В	С	D		
community	competition	ecosystem	food supply		
E habitat	F	G	H		
habitat	light intensity	population	predation		
		C			
	he grid to identify th	ie correct term for e	each of the following	g:	
	of an abiotic factor; on between organism	ns which use the sa	me resources;		
	isms living in a part		,		
				3	
			[Turn ove	r	
			•		

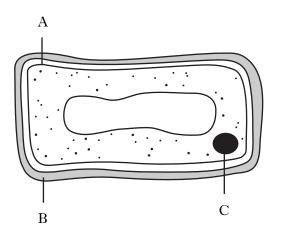
1.



			DO NOT WRITE IN THIS MARGIN	
(co	ntinued)	Marks	KU	\mathbf{PS}
(<i>c</i>)	What characteristic could be used to distinguish a "cream streaked ladybird" from a "7 spotted ladybird"?			
		1		
(<i>d</i>)	A student found a ladybird with a red wing case and a body length of 7 mm. What specific feature of its appearance allowed it to be identified as an "Eyed ladybird"?			
		1		
	[Turn over			

2.

3. (*a*) The diagram represents a section through a leaf cell.



Complete the table to show the name and function of the structures labelled.

Letter	Name of structure	Function
А	cell membrane	
В		gives shape and support
С	nucleus	

- (b) Name a structure, present in plant cells, which is absent from animal cells.
- (c) What name is given to chemicals which are used to make cell structures more visible under the microscope?

1

2

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Marks

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4. (a) Complete the table with the name of each type of tooth which is being described.

Description	Tooth type
Used by humans as cutting teeth when biting an apple	
Slide sideways in herbivores such as sheep for grinding grass	
Overlap in carnivores such as dogs for slicing meat	

(b) Connect the parts of the alimentary canal in the two lists to show the direction in which the contents are moved.

The first two links, showing movement from the mouth to the oesophagus and the oesophagus to the stomach, have been done for you.

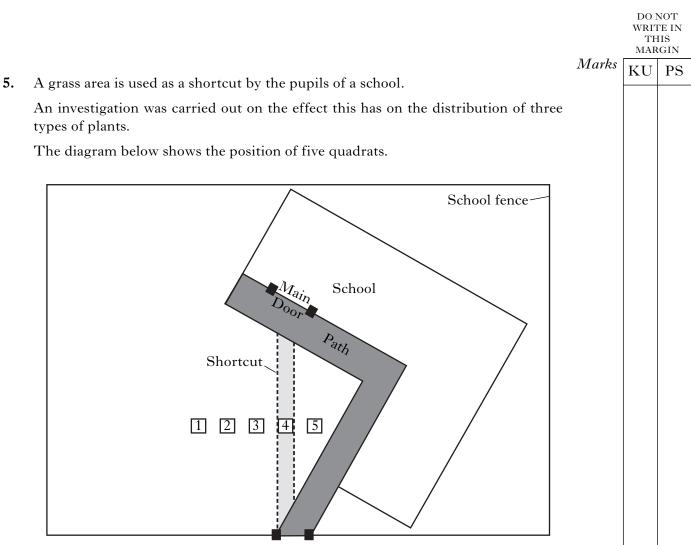
List 1	List 2
Moving from	Moving to
mouth	large intestine
large intestine	oesophagus
oesophagus	rectum
small intestine	small intestine
stomach	stomach

(c) Give **two** ways in which the small intestine is adapted for its function.

2	2

[Turn over

1_____



Gate
Oate

The number of plants found in each quadrat is shown in the table below.

Quadrat	Number of plants				
number	Daisies	Plantains	Buttercups		
1	30	23	18		
2	10	22	8		
3	8	20	9		
4	3	23	1		
5	65	21	24		

(a) Calculate the average number of buttercups found per quadrat.Space for calculation

				DO I WRIT TH MAR	TE IN IIS
5.	(continued)	ntinued)	Marks	KU	PS
	(<i>b</i>)	Use information from the table to describe the effect of using the shortcut on the distribution of daisies and of plantains.			
		Daisies			
			1		
		Plantains			
			1		
	(<i>c</i>)	The investigation was repeated several times at different points across the shortcut. Give a reason for this.			
			1		

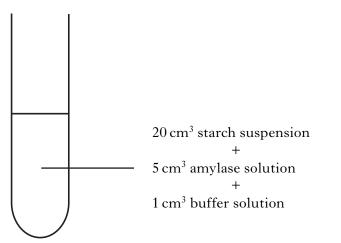
[Turn over

6. (a) Enzymes are described as "biological catalysts". What is the meaning of the term "catalyst"? (b) Name the substance from which enzymes are made. (c) Name an enzyme involved in a synthesis reaction. (c) Name an enzyme involved in a synthesis reaction. (c) Name an enzyme involved in a synthesis reaction. (c) Name an enzyme involved in a synthesis reaction. (c) Name an enzyme involved in a synthesis reaction.

DO NOT

(d) The enzyme amylase breaks down starch to maltose. An investigation was carried out to see how this reaction was affected by pH.

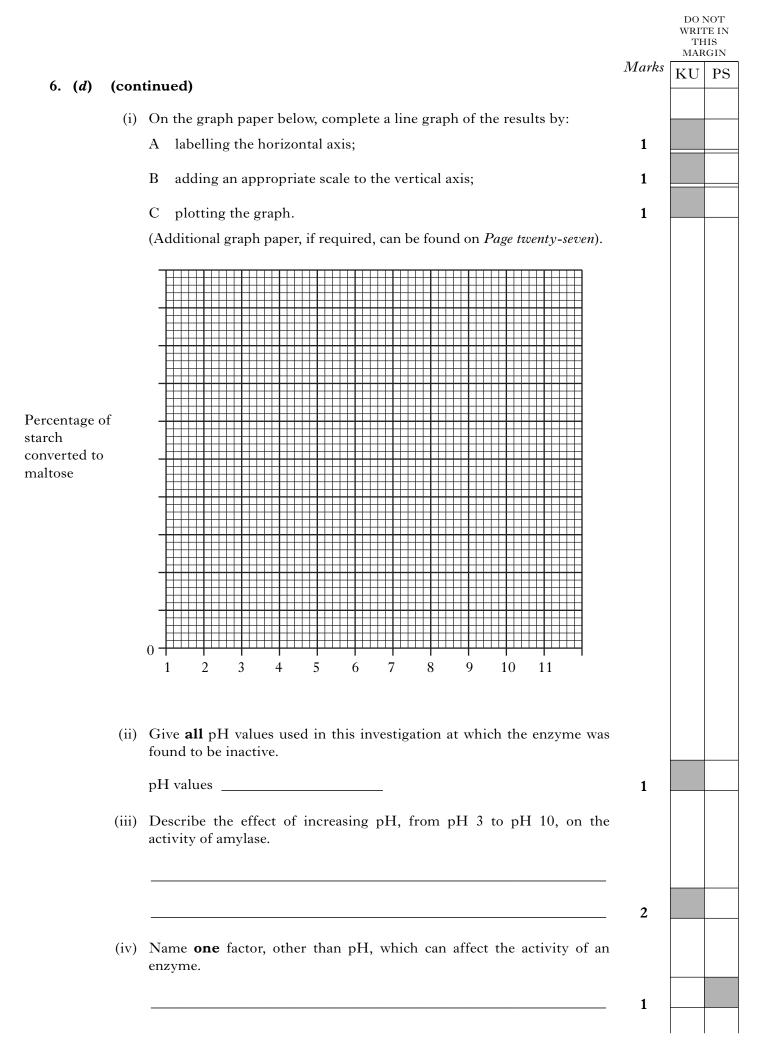
Nine test-tubes were set up with the contents as shown in the diagram. Each contained a different buffer solution which controlled the pH.



The contents of the tubes were monitored to see what percentage of starch had been converted to maltose in 20 minutes.

The results are shown in the table below.

pH of solution	Percentage of starch converted to maltose
3	0
4	10
5	64
6	100
7	46
8	24
9	6
10	0
11	0



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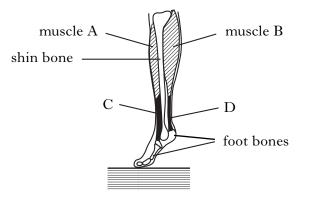
7. (a) Bone is made up of two main components. One of these, flexible protein fibres, is removed by roasting. A weighed piece of dry bone was roasted for 30 minutes and then reweighed. The results are shown below.

Mass of bone before roasting	Mass of bone after roasting
(g)	(g)
125	80

(i) What percentage of the bone was made of protein fibres?Space for calculation

%

- (ii) How could the results of this investigation have been made more reliable?
- (iii) In addition to protein fibres, what is the other main component of bone?
- (b) The skeleton supports the body and provides a framework for muscle attachment. Give **one** other function of the skeleton.
- (c) The following diagram represents the lower leg of a person on tiptoe.



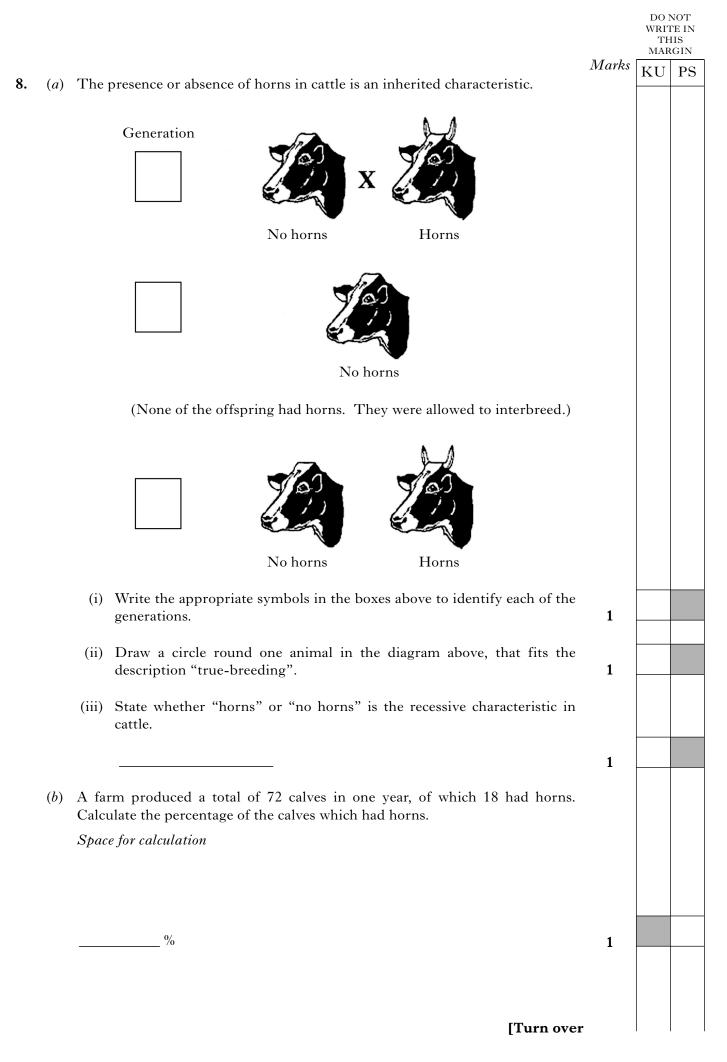
(i) Use a letter from the diagram to identify the structure which must contract to achieve this position.

Letter ____

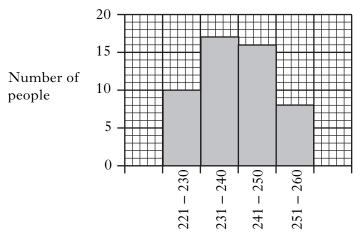
(ii) What type of structure is represented by the letter C in this diagram?

Page twelve

1



9. (*a*) The length of the right foot was measured in a number of people. The results are shown in the histogram below.



Length of right foot (mm)

(i) Complete the table using information from the histogram.

Length of right foot (mm)	Number of people
221 – 230	
231 - 240	
241 - 250	
251 - 260	

- (ii) What was the total number of people in the sample?Space for calculation
- (iii) What is the maximum range of foot lengths which this sample represents?

From _____ to ____ mm

1

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KU

Marks

(continued) 9.

(b) Foot length in humans shows "continuous variation." Give **one** example of a characteristic which shows discontinuous variation.

(<i>c</i>)	The table below describes different groups of animals. Put a tick (\checkmark) in the
	box(es) next to the description(s) which allow the animals in that group to be
	identified as being of the same species.

Description	
A group of animals with similar appearances which live in an isolated habitat.	
A group of animals which show variation and can breed to produce fertile offspring.	
A group of animals which look similar and which can mate with each other.	

Discontinuous _____

[Turn over

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DO NOT WRITE IN THIS MARGIN Marks KU PS 10. Read the following passage and answer the questions based on it. Fight for your Life! Adapted from Biological Sciences Review, September 2005 Every day there is a battle inside our bodies between invading micro-organisms and our immune system. Bacteria are present inside and out. Most are harmless but others are pathogens which cause disease. Infectious diseases are a major killer in developing countries. Vaccination programmes, public health improvements and increasing the availability of antibiotics are required to overcome them. However, there is a growing problem of resistance to antibiotics demonstrated by the "superbug" MRSA. The first thing a micro-organism does is to find its way into a cell in the body. Cells of the immune system have to recognise that this has happened and make the appropriate response. The first cells on the scene are neutrophils. They engulf bacteria and kill them with enzymes. The next cells to arrive are macrophages which have a variety of specialised killing mechanisms. Dendritic cells are also involved. They are able to recognise pathogens and stimulate other immune cells to react. Fortunately, our immune system has a memory. This means that when we encounter a micro-organism for the second time, a much faster response is triggered that rapidly wipes out the pathogen. Our immune system is very powerful, giving us the best chance to win the battle with these invaders. Sometimes this system breaks down and immune cells wrongly target and destroy our own body cells. This causes conditions such as rheumatoid arthritis and multiple sclerosis. (a) What name is given to micro-organisms such as bacteria which cause disease? 1 (b) Give three actions which are needed by developing countries to overcome infectious diseases. 1 2_____ 3_____ 2 (c) Why is MRSA a growing problem? 1 (d) Name **three** types of immune cells involved in a response to an attack by invading micro-organisms. 1_____ 2 3 1

10.	(co	ntinued)	Marks	DO I WRIT TH MAR	TE IN IIS	
	(<i>e</i>)	Why is the response of the immune system faster the second time a type of micro-organism invades?				
			1			
	(<i>f</i>)	What causes conditions such as rheumatoid arthritis?				
			1			
		[Turn over				

DO NOT WRITE IN THIS MARGIN

Marks KU PS

2

1

- (a) The heart is formed from four chambers. The upper chambers are the left atrium and the right atrium. The wall of the right atrium has an average thickness of 2 mm. The left atrium wall is on average 3 mm thick. The lower chamber on the left side, the left ventricle, has walls on average 18 mm thick, compared to 4.5 mm in the right ventricle.
 - (i) Use this information to complete the following table.

Heart chamber	Average wall thickness (mm)
	18

(ii) Express the ratio of the average wall thickness of the right ventricle to that of the left ventricle as a simple, whole number ratio.

Space for calculation

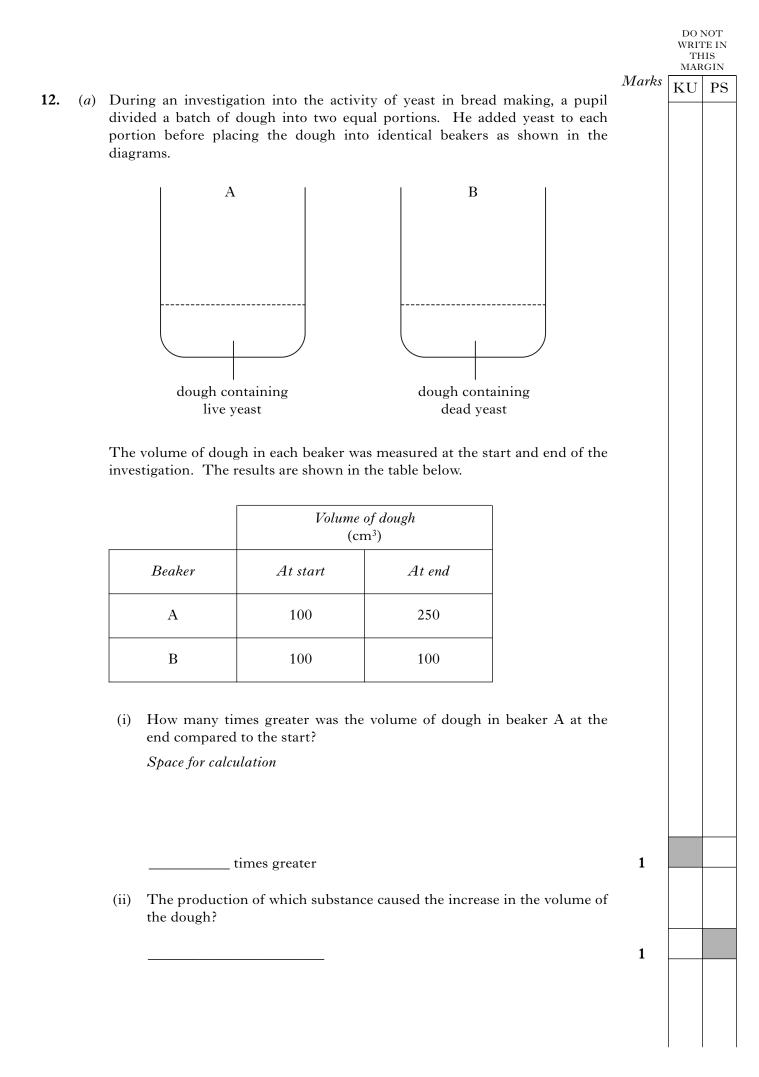
right ventricle left ventricle

(b) Decide if each of the statements about the heart and surrounding blood vessels is True or False and tick (✓) the appropriate box.

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

Statement	True	False	Correction
Blood goes from the right atrium to the <u>left atrium</u>			
Blood from the <u>body</u> enters the right atrium			
The heart muscle obtains its blood supply from the <u>vena cava</u>			

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1.	(co	ntinu	ed)	Marks	KU	PS
	(c)		diagram below represents a human heart.			
			E C			
		(i)	Select two letters which indicate where valves are found.			
			Letters and	1		
		(ii)	What is the function of valves in the circulatory system?			
	(<i>d</i>)	Bloo type	d flows round the body in three different types of blood vessel. In which of blood vessel can a pulse be easily detected?	1		
				1		
			[Turn over			



12.	(a)	(con	tinued)	Marks	do i wri7 th Mar KU	ΓΕ IN HIS
		(iii)	Give two factors, not already mentioned, which would need to be kept constant during this investigation.			
			1			
			2	2		
		(iv)	What was the purpose of setting up control beaker B?			
				1		
	(<i>b</i>)	Wha	t type of micro-organism is yeast?			
				1		
	(<i>c</i>)	Give doug	one use of yeast in a manufacturing process, other than the raising of h.			
				1		
	(<i>d</i>)		eria are used to sour milk in the manufacturing of yoghurt. e the process carried out by the bacteria which causes the milk to sour.			
		1 14111	e die process carried out by the bacteria which causes the fillik to soul.			

[Turn over

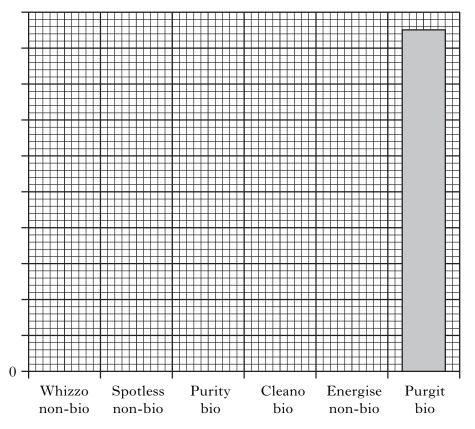
13. (*a*) In an investigation into the effectiveness of different detergents, six pieces of cloth were washed. Each of the cloths had identical stains and all variables other than the detergent were kept the same. After washing, the percentage of the stain which had been removed was calculated.

The results are shown in the table.

Name of detergent	Type of detergent	Stain removed (%)
Whizzo	Non-biological	50
Spotless	Non-biological	40
Purity	Biological	75
Cleano	Biological	80
Energise	Non-biological	65
Purgit	Biological	95

- (i) Use the information from the table to complete the bar chart showing the detergents and their percentage of stain removed by:
 - A adding a scale to the vertical axis;
 - B adding a label to the vertical axis;
 - C completing the bars.

(Additional graph paper, if required, can be found on Page twenty-eight.)



Name and type of detergent

1

1

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13. (a) (continued)

- (ii) Give **two** conclusions which can be drawn from the results.
 - 1_____ 2____
- (b) Complete the following sentence by <u>underlining</u> the correct word in each bracket.

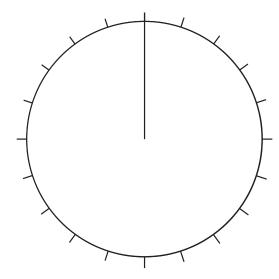
Biological detergents contain	enzymes	produced by { chromosomes bacteria	chromosomes	
	genes			

(c) A manufacturer uses genetic engineering techniques to make a variety of products. The table below shows each product as a percentage of their total production in 2010.

Product	Percentage of total production
Antibiotics	30
Insulin	40
Detergents	20
Antifreeze	10

(i) Use the information in the table to complete the pie chart.

(An additional chart, if required, can be found on Page twenty-eight.)



(ii) What is transferred into bacterial cells during genetic engineering?

2

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Page twenty-three

KU

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14. Salmon migrate from the sea into rivers to breed. The number of salmon coming into a river can be estimated by capturing them in a sampling trap. The number of salmon captured and the average flow rate of a river were recorded in July each year over a five year period. The results are shown in the table below.

July values	Year					
	2004	2005	2006	2007	2008	
Average flow rate of river (cubic metres/second)	14	10	8	45	12	
Number of salmon captured	16	6	2	36	12	

- (a) (i) What evidence is there that a high flow rate is stimulating the salmon to come into the river?
 - (ii) In 2007, the July capture represented 4% of the total capture for the year. How many salmon in total were captured that year?

Space for calculation

(iii) If the average July flow rate of the river for a particular year had been 13 cubic metres/second, predict how many salmon would have been captured that July.

(b) What name is given to the type of behaviour which occurs at regular intervals, for example, annual migration?

1

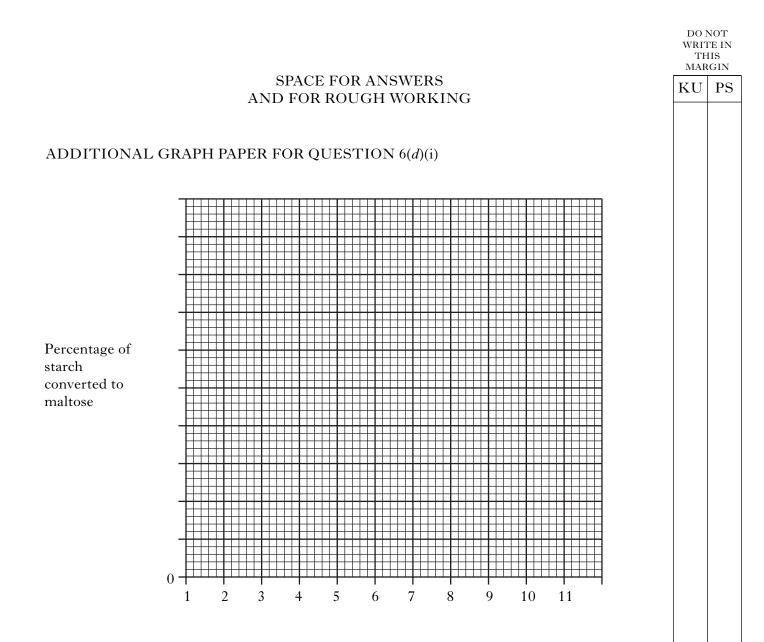
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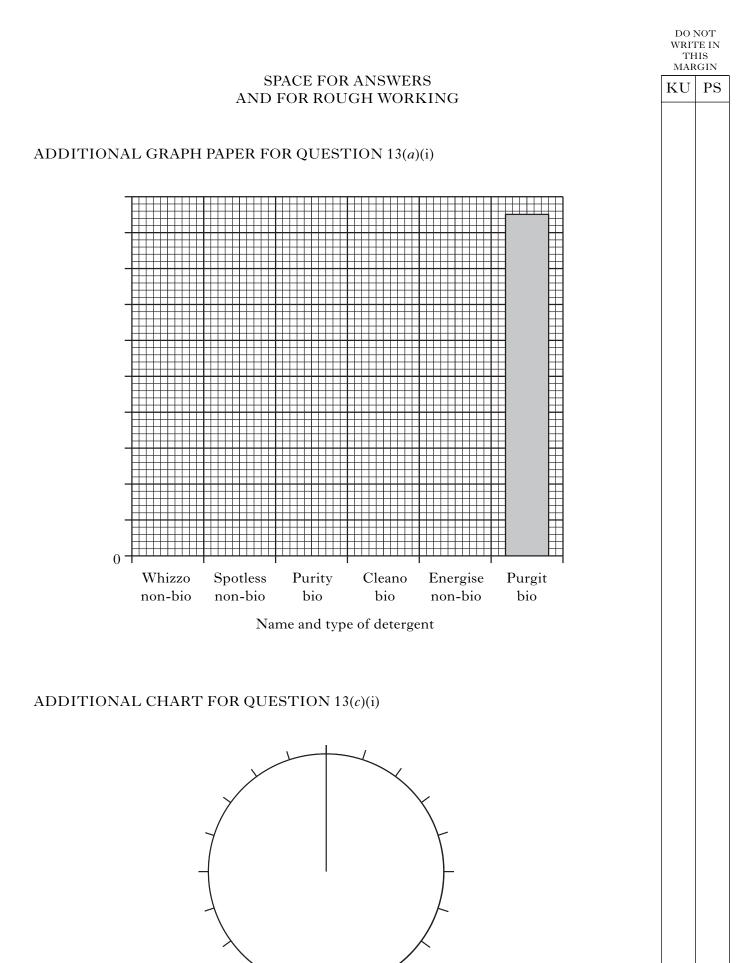
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14.	(con	tinu	ed)	Marks	KU	PS
	(<i>c</i>)	(i)	In salmon farming, eggs and sperm extracted from adult fish are mixed together in shallow trays.			
			What process in the life cycle of the fish will take place at this stage?			
				1		
		(ii)	What is the source of food for the young fish before they hatch?			
				1		

[Turn over for Question 15 on Page twenty-six

			DO N WRIT TH MAR	TE IN IIS
15. (<i>a</i>)	Photosynthesis is the process by which plants make food.	Marks	KU	PS
J. (<i>u</i>)	Complete the word equation for photosynthesis.			
	water + + energy glucose +	1		
<i>(b)</i>	Name the substance, found in a plant cell, which converts light energy to chemical energy.			
		1		
(c)	Instead of using the glucose produced straight away, it can be converted into a storage carbohydrate.			
	Name this carbohydrate.			
		1		
(<i>d</i>)	Glucose is transported to the roots of the plant from the leaves.			
	(i) Suggest a reason why the roots of the plant cannot make glucose.			
		1		
	(ii) Name the tissue which transports glucose.			
		1		
(<i>e</i>)	(i) Name the tissue which transports water through plants.			
		1		
	(ii) Name the structures in the leaf through which we ten use our is last	-		
	(ii) Name the structures in the leaf through which water vapour is lost.			
		1		
	[END OF QUESTION PAPER]			





SPACE FOR ANSWERS AND FOR ROUGH WORKING

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SPACE FOR ANSWERS AND FOR ROUGH WORKING

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ACKNOWLEDGEMENTS

Question 10—Passage is adapted from "Fight for your life" by J McDermott and R Grencis, taken from *Biological Sciences Review, Volume 18, Number 1, September 2005.* Reproduced by kind permission of Philip Allan Updates.

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