FOR OFFICIAL USE			

KU	PS
Total	Marks

0300/29/01

NATIONAL 2012

WEDNESDAY, 23 MAY QUALIFICATIONS 9.00 AM - 10.30 AM

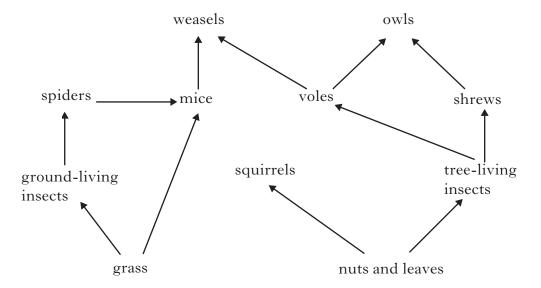
BIOLOGY STANDARD GRADE General Level

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	er Number of seat
1 All questions should be attempted.	
2 The questions may be answered in any order burspaces provided in this answer book, and must be well.	
3 Rough work, if any should be necessary, as well a book. Additional spaces for answers and for rough book. Rough work should be scored through when	h 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.	e this book to the Invigilator. If you do





			MAR	GIN
1	The diagram below shows the feeding relationships between some organisms	Marks	KU	PS
1.	The diagram below shows the feeding relationships between some organisms			
	in a woodland ecosystem.			



(<i>a</i>)	What name	is	given	to	this	type	of	diagram	1?
--------------	-----------	----	-------	----	------	------	----	---------	----

(b) The arrows in the diagram show the direction of energy flow in the ecosystem.

(i) Grass is a producer.

What form of energy do producers use to make food?

(ii) Name the process by which producers make food.

(c) (i) Using information from the diagram, name **three** organisms which are **not** eaten by other animals.

(ii) Omnivores eat both plants and animals.

Name the omnivore shown in the diagram.

(d) State what is meant by the term consumer.

1 1

1

1

1

 $[0300/29/01] \hspace{3.1cm} \textit{Page two}$

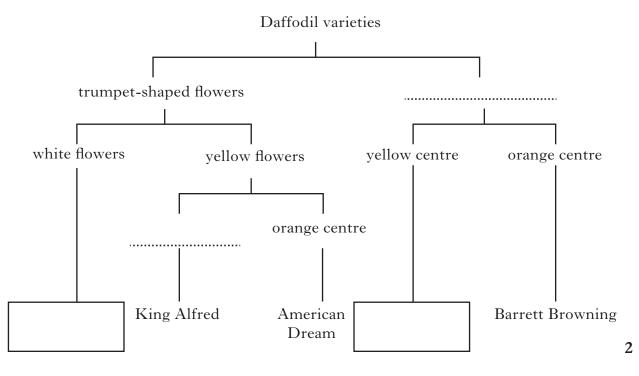
2. Some features of five varieties of daffodils are shown in the table below.

 \mathcal{N}

<i>Iarks</i>	KU	PS

Variety	Flower shape	Flower colour	Centre colour
American Dream	trumpet	yellow	orange
Mount Hood	trumpet	white	white
Ice Follies cup		white	yellow
King Alfred trumpet		yellow	yellow
Barrett Browning cup		white	orange

(a) Use the information in the table to complete the key below by writing the correct feature on each dotted line and the correct names in the empty boxes.



(b) Give **three** features of the American Dream daffodils.

(c) Describe one difference between Ice Follies and Barrett Browning daffodils.

1

1

[0300/29/01] Page three [Turn over

DO NOT WRITE IN THIS

					7.5	MAR	GIN
3.	(a)	of po		n sources of pollution and examples e from each source of pollution to its		KU	PS
		Mair	source of pollution	Example of pollutant			
			Domestic	Sulphur dioxide			
			Industry	Fertiliser run-off			
			Agricultural	Household waste	1		
	(b)	Untı	eated sewage was released by a	accident into a river.			
		(i)	Explain why the release of sevin the number of micro-organ	wage into the river caused an increase isms present.			
					1		
		(ii)	State the effect of the increase oxygen available to other orga	d numbers of micro-organisms on the			
			Tick (✓) the correct box.				
			Increase				
			Decrease				
			Stay the same		1		
		(iii)	Name a disease which may be	spread by untreated sewage.			
					1		

4.	The	e diag	ram below represents a wind-pollinated flower.	Willians	KU	PS
		st	igma stamen			
	(a)	Use belov				
		(i)	Produces pollen			
		(ii)	Produces female sex cells	1		
	(b)	Nam	ne the other most common method of pollination from one flower to her.			
				1		
	(c)	(i)	Name the part of a flower which develops into a seed.			
				1		
		(ii)	What process must take place in the ovary before the seeds and fruit can develop?			
				1		
			[Turn over			

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5. The moisture content of soil can be measured using a meter of the type shown below. The scale goes from 1 (driest) to 10 (wettest).

The following table gives information about watering some different plant species.



Plant species	Ideal moisture reading	How often soil moisture should be checked
African violet	3	**
Azalea	8 ***	
Begonia	7	***
Fuchsia	7	***
Orchid	1	**
Poinsettia	1	*
Rubber plant	4	*

* once a week

** every 4/5 days

*** every 3 days

(a) How often should the soil moisture of a Begonia be checked?

1

(b) Which of the plant species needs the most water?

1

(c) The table below gives actual moisture readings for two plants.

Compare these readings with the ideal moisture readings and decide if each plant needs watered.

Complete the table.

Plant species	Actual moisture reading	Does the plant need watered?
Poinsettia	3	
Orchid	1	

DO NOT WRITE IN THIS MARGIN

				MAR	
5.	(co	ntinued)	Marks	KU	PS
	(<i>d</i>)	Each of the plants belongs to a particular species.			
		Which of the following describes what is meant by the term species?			
		Tick (\checkmark) the correct box.			
		A species is a group of organisms which			
		contain identical genetic material			
		have the same phenotype			
		share the same habitat			
		breed together to produce fertile offspring.	1		
		[Turn over			

1

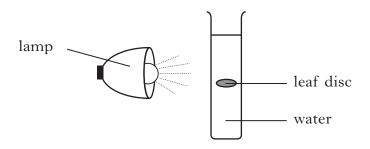
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6. (a) An investigation into photosynthesis was carried out using the apparatus shown in the diagram below.



After the lamp was switched on, the leaf disc floated to the surface because oxygen gas was produced in the leaf. The time taken for this to happen was measured.

The experiment was repeated six times and the results are shown in the table below.

Experiment	1	2	3	4	5	6
Time for disc to reach surface (seconds)	18	17	12	15	12	16

(i) Calculate the average time for the leaf discs to reach the surface.

Space for calculation

_____seconds

(ii) 1 State **one** feature of the leaf disc which must be kept the same

for each experiment.

2 State **one** other feature, not relating to the leaf disc, which must be kept the same for each experiment.

(iii) Describe how this method could be used to investigate the effect of light intensity on the rate of photosynthesis.

DO NOT WRITE IN THIS MARGIN

6.	(continued)					Marks	KU	
								Г

(b) Name the green coloured chemical, present in plants, which is needed for photosynthesis.

1

(c) Decide whether each of the following statements is TRUE or FALSE.
 If the statement is TRUE, tick (✓) the True box. If the statement is FALSE, tick the False box and write the correct word or phrase in the

Correction box to replace the word or phrase <u>underlined</u> in the statement.

Statement	True	False	Correction
Repeating an investigation several times improves the <u>reliability</u> of the results.			
To calculate <u>a percentage</u> , add up all the values and divide the total by the number of values.			
A control experiment is set up to prove that the result is caused by changing two of the possible variables.			

3

[Turn over

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2

1

1

7.	(a)	Complete the following sentences about food and digestion by underlining
		the correct option in each bracket.

Food provides animals with energy for processes such as diffusion cell division.

During digestion,
$$\begin{cases} large \\ small \end{cases}$$
 particles of food are $\begin{cases} built up \\ broken down \end{cases}$

to allow them to be absorbed into the bloodstream.

(b) The list below contains names of parts of the digestive system.

stomach small intestine rectum large intestine oesophagus pancreas

Use names from the list to answer the following questions.

(i) Where are products of digestion absorbed into the bloodstream?

(ii) Where is water absorbed into the bloodstream from waste material?

(c) The following chart gives information about cholesterol in the blood.

Average cholesterol concentration in the blood (mmol/l)

2

2

20-29

30-39

40-49

Age (years)

_				7.4	DO N WRI IN T MAR	ITE 'HIS GIN
7.	(c)		tinued) What happens to the average cholesterol concentration in the blood	Marks	KU	PS
		(1)	as age increases?			
				1		
		(ii)	What conclusion can be drawn about average cholesterol concentration in males compared to females?			
				1		
		(iii)	Predict the average cholesterol concentration of females aged 50–59 years if males of that age had an average concentration of 6·8 mmol/l.			
			mmol/l	1		
			[Turn over			

			MAR	KGIN
8. (a) Th	ne following diagrams represent human sex cells.	Marks	KU	PS
5 micrometr	100 micrometres	;		
	Cell A Cell B			
(i) Name cells A and B.			
	Cell A Cell B	1		
(i	i) Give one feature of cell A which makes it different from cell B.			
		_ 1		
(ii	i) Name the organ which produces cell A.			
		1		
(<i>b</i>) 1 f	The diagram below represents the female reproductive system. Oviduct Ovary Vagina			
In	which of the named structures would the following take place?			
(i) Fertilisation			
		1		
(i	i) Development of a fetus	_		
		1		

7	M	'n	v	b	c
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9.	Rhe	eumato	id arthritis is a disease	which damages jo	oints in the body.		KU	PS
			liagram shows a sequend arthritis.	nce of events lead	ling to the development of			
	rigger mulu		Environmental factors	Gen facto				
Re	espon		Production of neutrophil enzymes	breako	oduction of lown enzymes			
Sy	mpto		Inflammation of blood vessels	Inflammation of joint	Erosion of bone and cartilage			
	(a)		two factors trigger the		heumatoid arthritis?	1		
	(b)				tis caused by the action of	1		
						2		
	(c)		at two ways do white brilage?	olood cells contri	bute to the erosion of bone			
						1		
					[Turn over			

		Marks	KU	PS
•	Read the following passage and use the information to answer the questions.			
	Twins			
	Multiple births have been on the rise with increasing numbers of twins being born. There are several reasons for this, including the growing use of fertility drugs and the fact that more older women are having babies. Between 1996 and 2006 there was a 182% increase in multiple births in women aged 35 and over. About 1·25% of births from natural conception results in twins, but this increases to 25% if fertility drugs are used.			
	Twins can be identical or non-identical. An ultrasound scan can help to determine which is the case. If the babies develop together in a single sac with no separating membrane, or share one placenta, they are likely to be identical. Identical twins will always be the same sex because they carry the same genetic information. However, the only sure way to tell if twins are identical is to have a DNA test.			
	The chance of having identical twins is about 1 in 250 births. The chance of having non-identical twins varies according to whether there is a history of non-identical twins in the mother's family. If there is, she is more likely to have them. About 33% of all twins born are identical. They are formed when one egg is fertilised by one sperm and then the zygote divides into two halves which develop separately. Non-identical twins form when two eggs are fertilised by two different sperm.			
	(a) Give two reasons for the increase in the number of twins being born.1			
	2	2		
	(b) Give two pieces of evidence from an ultrasound scan that would suggest that twins are identical.			
	1			
	2	1		
	(c) What is the only sure way to tell whether or not twins are identical?			
		1		

DO NOT WRITE IN THIS MARGIN

		KU	PS
How do identical twins form?			
	1		
What percentage of all twins are non-identical ?			
	1		
Which parent's family history has more influence on the chance of having non-identical twins?	all twins are non-identical ? 1 ly history has more influence on the chance of having		
	1		
[Turn over			
•	What percentage of all twins are non-identical ? Which parent's family history has more influence on the chance of having non-identical twins?	What percentage of all twins are non-identical? Which parent's family history has more influence on the chance of having non-identical twins?	What percentage of all twins are non-identical? Which parent's family history has more influence on the chance of having non-identical twins?

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Marks

11.	(a)	<u>Underline</u>	one	option	in	each	set	of	brackets	to	complete	the	followi	ng
		sentences c	correc	ctly.					<i>t</i> .	,				

The basic units of living organisms are \text{tissues cells organs}. Most of them can

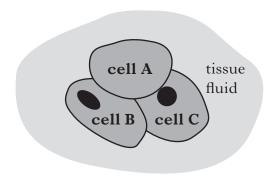
only be seen using a microscope. When examining them they can be

stained with, for example, iodine to \begin{cases} \text{make them divide make them clearer magnify them} \end{cases}.

2

(b) Dissolved substances move from areas of high concentration to areas of lower concentration by the process of diffusion.

The following diagram represents three cells surrounded by tissue fluid.



The table below shows the relative concentrations of glucose, oxygen and carbon dioxide in the cells and tissue fluid.

	Relative concentrations of substance				
	glucose	oxygen	carbon dioxide		
Cell A	medium	medium	medium		
Cell B	high	high	low		
Cell C	low	low	high		
Tissue fluid	high	high	low		

(i) Which substance would diffuse from cell A to the tissue fluid?

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1.	(b)	(continued)	Marks	KU	PS
		(ii) From which of the following would cell A gain oxygen by diffusion?Tick (✓) the correct boxes.			
		Cell B Cell C tissue fluid	1		
		(iii) Into which of the following would glucose diffuse from cell B?Tick (✓) the correct boxes.			
		Cell A Cell C tissue fluid	1		
	(c)	Which cell structure controls the movement of substances into and out of cells?			
			1		
	(<i>d</i>)	What name is given to the special case of diffusion of water into or out of cells?			
			1		
		[Turn over			

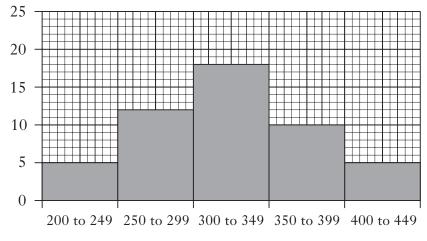
Marks

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12. A piece of onion skin was examined using a microscope and the lengths of 50 cells were measured.

The bar chart below shows the number of cells of different lengths which were found.





Length of cell (micrometres)

(a) Which range of cell lengths contained the most cells?

From ______ to _____ micrometres

1

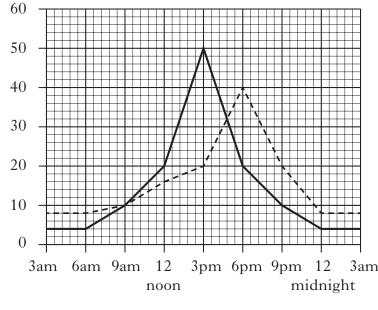
(b) What percentage of cells had a length of 350 micrometres or more? Space for calculation

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MAR	GIN

13. (a) The following graph shows the rate of water gain and water loss by a plant during a 24 hour period in summer.

> gain water loss

Rate of water gain or loss (g/min)



Time of day

(i) How long after the time of maximum water loss did the plant show its maximum water gain?

Space for calculation

hours

1

(ii) At what time in the morning did the rate of water gain exactly balance the rate of water loss?

1

- (b) Plants gain water through their roots and lose it from their leaves.
 - (i) Name the plant tissue which transports water from the roots to the leaves.

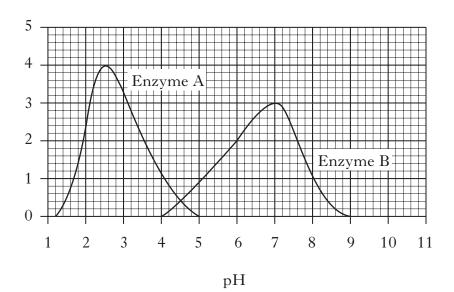
(ii) Name the pores in plant leaves through which water vapour is lost.

1

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14. (a) The following graph shows the relationship between pH and the rate of activity of two different enzymes.

Rate of enzyme activity (units)



(i) Identify the enzyme which is likely to be pepsin and give a reason for your answer.

Enzyme _____

Reason

(ii) Use information from the graph to answer the following questions.

1 Between which pH values are both enzymes active?

Between _____ and ____

2 How many times greater is the rate of activity of enzyme B at pH 7 than at pH 8?

Space for calculation

____ times

(b) Name **one** enzyme, other than pepsin, which is involved in the chemical breakdown of a substance.

1

1

1

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14.

ned)	Marks	KU	PS
Enzymes are biological catalysts. Describe what is meant by the term <i>catalyst</i> .			
	. 1		
Name the type of chemical substance from which enzymes are made.	1		
[Turn over			
	Enzymes are biological catalysts. Describe what is meant by the term <i>catalyst</i> . Name the type of chemical substance from which enzymes are made.	Enzymes are biological catalysts. Describe what is meant by the term <i>catalyst</i> . 1 Name the type of chemical substance from which enzymes are made.	Enzymes are biological catalysts. Describe what is meant by the term <i>catalyst</i> . Name the type of chemical substance from which enzymes are made. 1

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L	V.	u	1	к	s

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15. (a) (i) The skeleton is used for the attachment of muscles for support and movement.

(ii) One type of joint found in the body is a hinge joint.
How many planes of movement are allowed by a hinge joint?

1

(iii) Give an example of a hinge joint in the body.

Give **one other** function of the skeleton.

(b) The following table gives information about tissue damage among athletes.

Tissue	Injuries (%)
skin	8
muscle	33
tendon	5
ligament	50
cartilage	2
bone	2

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15. (b) (continued)

Marks

1

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1

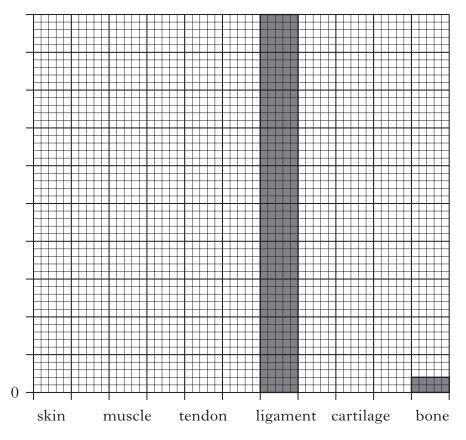
Use the information to complete the bar chart below by:

(i) labelling the vertical axis;

(ii) adding a scale to the vertical axis;

(iii) completing the missing bars.

(An additional grid, if required, will be found on Page twenty-nine.)



Tissue

(iv) 50% of the injuries were to ligaments.

What is the function of ligaments?

1

[Turn over

1

1

	lood vessel	Function		
	vein			
	artery			
	all	lows exchange of materials with tissues	2	
(c) The co	ncentration of sul	n of red blood cells?	1	
table be	elow.			
	Substance	Concentration		
		(g per 100 ml)		
	sugars	(g per 100 ml) 0·1		
	sugars salts	<u> </u>		
		0.1		
	salts	0.1		
	salts	0·1 0·8 6·4		

(ii) A man has 3 litres of blood plasma (1 litre = $1000 \,\mathrm{ml}$).

proteins

Calculate the total mass of proteins present in his blood.

Space for calculation

salts

_____ g

17.	(a)	(i)	Calla aos	ntain aa	ets of chrom	2000			Marks	KU	PS
17.	(a)	(1)					ach of the f	following cells.			
			State the	e mumb	er or sets p	resent in ea	ich of the f	ollowing cens.			
			1 Body	y cells _		_					
			2 Sex	cells _					1		
		(::)	XX 71 4	1	:		11 £				
		(11)	w nat ge	enerai n	ame is give	n to the sex	cells of ar	nimals and plants?			
									1		
	(b)				f a child is can be either			of sex chromosomes.			
		One	sex chro	mosome	e is found in	n each sex	cell.				
					ett square b	elow to sh	ow the inl	neritance of the sex			
		chro	mosomes	3.							
					ſ						
						Female S	Sex Cells				
						X					
				ľ							
			M Se	ale	X	XX					
				ells			XY				
							211		1		
	(c)						-	out if the baby has ugh the wall of the			
								round the baby.			
		(i)	What is	this tes	t called?						
		(1)	vviiat 18	11110 1110	c carred;						
									1		
		(ii)	Name o	ne cond	dition whic	h can be de	etected by	this method.			
						1					
									1		
								FT			
								[Turn over			

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18. The table below shows the production of alcohol for use as an alternative fuel from 1998 to 2008.

Year	Alcohol production (megalitres)
1998	4 000
2000	6 500
2002	11 000
2004	12 000
2006	13 500
2008	17 500

- (a) On the grid below, complete a line graph by:
 - (i) labelling the vertical axis;

1

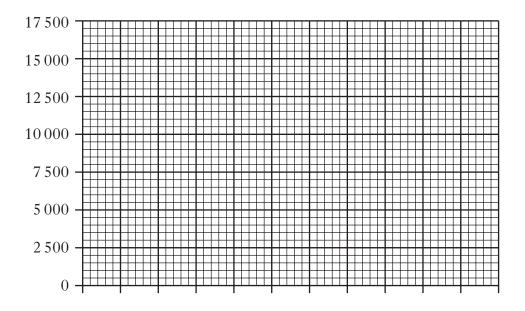
(ii) adding an appropriate scale to the horizontal axis;

1

(iii) plotting the graph.

1

(An additional grid, if required, will be found on Page twenty-nine.)



Year

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18.

(continued)	Marks	KU	PS
 (b) During which period was there the greatest increase in production. Tick (✓) the correct box. 	,		15
1998 – 2000			
2000 – 2002			
2002 – 2004			
2004 – 2006			
2006 – 2008	1		
(c) What was the percentage increase in production from 1998 to 2004? Space for calculation			
	1		
[Turn over for Question 19 on Page twenty-eight			

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Marks

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19. ((a)	Yeast is a	micro-	organism	which	carries	out ferm	entation
	(α)	1 Cust 15 a	1111010	OI Sullioni	***111011	carres	out itili	CII CU CI OII

(i)	Complete the following sentence by underlining the correct word in
	each bracket.

Yeast is a
$$\begin{cases} single-\\ multi- \end{cases}$$
 celled $\begin{cases} bacterium\\ fungus \end{cases}$.

(ii) Alcohol is a fermentation fuel.

Name **one** other fuel that is produced by fermentation.

(iii) What advantage is there in using fuels produced by fermentation instead of using fossil fuels?

(b) Bacteria can be genetically engineered to produce proteins that are important to humans.

Give **one** example of a protein that can be made in this way and state what it is used for.

Protein _____

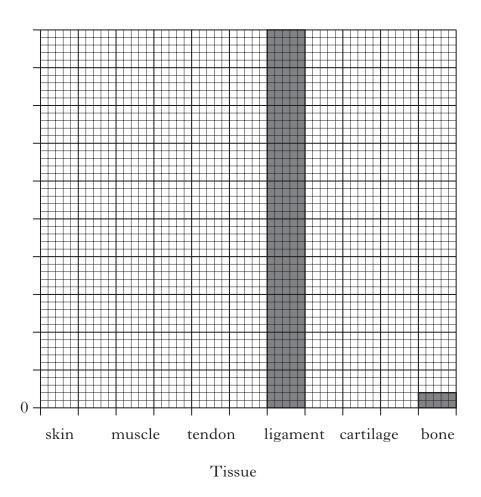
Use _____

[END OF QUESTION PAPER]

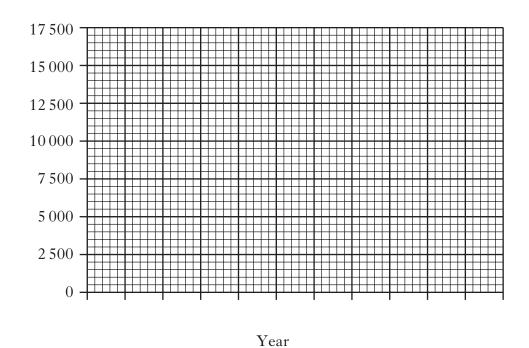
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SPACE FOR ANSWERS AND FOR ROUGH WORKING

ADDITIONAL GRID FOR QUESTION 15(b)



ADDITIONAL GRID FOR QUESTION 18(a)



SPACE FOR ANSWERS AND FOR ROUGH WORKING

DO NOT WRITE IN THIS MARGIN KU PS



