FOR OFFICIAL USE			



	KU	PS
Total Mark		

3700/31/01

NATIONAL 2012

MONDAY, 30 APRIL QUALIFICATIONS 1.00 PM - 2.30 PM

SCIENCE STANDARD GRADE Credit 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 Answer as many questions as you can.	
2 Read the whole of each question carefully before yo	ou answer it.
3 Write your answers in the spaces provided. Showir	ng working may help in some questions.
4 Before leaving the examination room you must giv not, you may lose all the marks for this paper.	re this book to the Invigilator. If you do

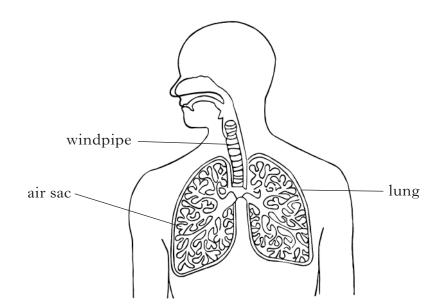




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1. The diagram below shows part of the respiratory system.



(a) Circle the correct words to complete the following sentences.

		bone
(i)	The windpipe is kept open by rings of	fibre
		cartilage

(ii) The windpipe divides into two bronchioles

(<i>b</i>)	Name the type of blood vessel which surrounds the air sacs.

(c) Describe the self-cleaning mechanism of the lungs.

[3700/31/01]

DO NOT WRITE IN THIS

(a)	(i)	Give one re atmosphere is	•	exide concentration in the		
					1	
((ii)	to increasing	mples of environmental ch carbon dioxide concentrati	-		
		2			2	
ŀ	harm	upper layer of Iful solar radia e this gas.	_	gas which protects us from		
•	•••••				1	
Burn	ning j				1	
			ce gases that are harmful to		1	
		plastics produ	ce gases that are harmful to	humans.	1	
	plete	plastics produ	ce gases that are harmful to		1	
Com	plete	plastics produ	ce gases that are harmful to ow. Harmful gas produced	humans. Effect of harmful gas on	1	
Plas	stic	plastics produ	Harmful gas produced when plastic burns	Effect of harmful gas on the human body damages the brain and	1	
Plas	stic	plastics produce the table belo	Harmful gas produced when plastic burns hydrogen cyanide	Effect of harmful gas on the human body damages the brain and nervous system stops blood from	1	
Plas po	stic	plastics produce the table belo	Harmful gas produced when plastic burns	Effect of harmful gas on the human body damages the brain and nervous system stops blood from	3	

KU PS

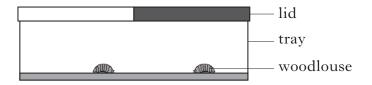
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/VI	ai	RS	. 1

2

4. An investigation was carried out to find out how light affects where woodlice are found.

Two woodlice were placed in a tray with a plastic lid. Half of the lid was black to keep out light. The other half was clear to let in light.

After 1 minute the number of woodlice in each half of the tray was recorded.



Results

Number of woodlice in light	Number of woodlice in dark
1	1

The investigation was **fair** but could be improved to make the results more reliable.

Suggest two improvements.

1	
1	

2

				Marks	MAF	Т
The	boxes below descri	be some properties of	materials.		KU	
1		2	3			
	ports a heavy load	allows heat to pass	allows electricity to			
	vithout breaking	through	pass through			
4		5	6			
	bends without	catches fire easily	resists damage by			
	snapping		impact			
Whi	ich box describes					
(a)	flammability?	Box number .		1		
(b)	thermal conductivit	by? Box number .		1		
(c)	flexibility?	Box number .		1		
(d)	hardness?	Box number .		1		
			ſTur	n over		
			[141			

<i>Aarks</i>	KU	PS

6. Use the information in the passage below to answer the questions.

Lactose intolerance is the inability to digest lactose, the main sugar in milk. Normally, the cells that line the small intestine produce an enzyme called lactase. Lactase digests the milk sugar by breaking it down into simple substances, such as glucose, that can be absorbed into the blood. If the small intestine is not producing lactase, the body cannot digest lactose. This leads to symptoms of lactose intolerance, such as nausea and diarrhoea. Many people with lactose intolerance also suffer from bloating, which is a build up of gas in the intestine caused by the action of bacteria on undigested lactose.

Most babies produce high levels of lactase, enabling the digestion of milk. After the age of 2 years, the body begins to produce less lactase. In some individuals, the body fails to produce enough lactase, leading to the development of lactose intolerance in older children and adults.

The most common diagnostic tests for this condition are known as the *lactose* tolerance test and the hydrogen breath test. Both tests involve giving the patient a drink with a high concentration of lactose. For the lactose tolerance test, blood samples are taken to measure the blood glucose level. This shows how well lactose is being digested. For the hydrogen breath test, breath samples are analysed at regular intervals. Raised levels of hydrogen indicate the presence of undigested lactose in the intestine.

These tests are not given to babies and very young children as the high lactose drink may cause diarrhoea and severe dehydration. Many doctors simply recommend changing the child's diet from dairy milk to a non-dairy

ernative, such as soya milk.		
State two symptoms of lactose intolerance.		
	1	
Why do most babies produce high levels of lactase?		
	1	
Why does lactose intolerance develop in some older children and adults?		
	1	
	rnative, such as soya milk. State two symptoms of lactose intolerance. Why do most babies produce high levels of lactase? Why does lactose intolerance develop in some older children and adults?	rnative, such as soya milk. State two symptoms of lactose intolerance.

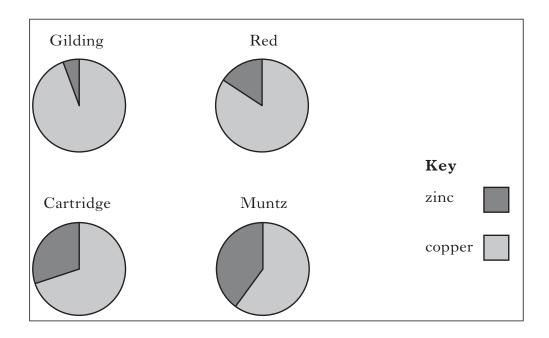
[3700/31/01] Page six

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			IN T MAR	CHIS GIN
6	(continued)	Marks	KU	PS
0.	(continued)			
	(d) Give one way in which the <i>lactose tolerance test</i> and the			

(co	ntinued)	Marks	KU	PS
(00)	iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii			
(<i>d</i>)	Give one way in which the <i>lactose tolerance test</i> and the <i>hydrogen breath test</i>			
	(i) are similar.			
		1		
	(ii) are different			
		1		
(e)	Explain why the diagnostic tests are not given to very young children.			
		1		
	[Turn over	ſ		

7. The pie charts below show the composition of different types of brass.



The table below shows some of the properties of the different types of brass.

Type of brass	Tensile strength (MPa)	Hardness (units)
Gilding	245	52
Red	280	64
Cartridge	357	72
Muntz	378	80

(a)	What conclusion can be drawn about the composition of brass and its
	hardness?

(b) Predict the tensile strength of brass which contains 75% copper.

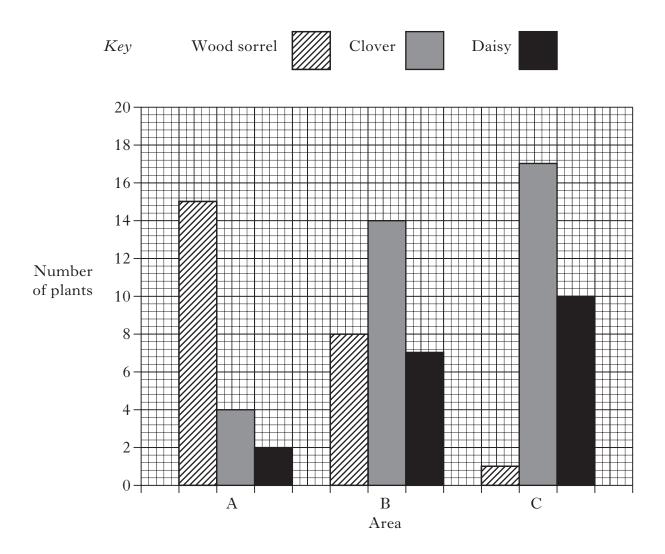
	MPa
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1

DO NOT WRITE IN THIS

Natural disasters can limit the growth in the number of organisms living in a habitat. (a) Give one other factor which can limit the growth in the number of organisms living in a habitat. (b) What word is used to describe the number of organisms of one type living in a habitat? (c) Use words from the boxes to answer the questions. I Use words from the boxes to answer the questions. I Use words from the boxes to answer the questions. I waterproofing galvanising spray painting pesticide treatment alloying Which method would be used to (a) protect the aluminium frame of a bicycle? (b) apply a thin layer of gold to electronic components? (c) protect walking boots? (d) cover a steel lamp post with a layer of zinc? [Turn over]	MARC						
organisms living in a habitat.	KU	Marks		wth in the number of	s can limit the gro		
(b) What word is used to describe the number of organisms of one type living in a habitat?		_	th in the number of	can limit the growt			(a)
living in a habitat?		1					
Use words from the boxes to answer the questions. anodising electroplating packaging waterproofing galvanising spray painting pesticide treatment alloying Which method would be used to (a) protect the aluminium frame of a bicycle?		_	ganisms of one type	oe the number of org			(b)
anodising electroplating packaging waterproofing galvanising spray painting pesticide treatment alloying Which method would be used to (a) protect the aluminium frame of a bicycle?		1					
galvanising spray painting pesticide treatment alloying Which method would be used to (a) protect the aluminium frame of a bicycle?				er the questions.	the boxes to answ	e words from	Use
Which method would be used to (a) protect the aluminium frame of a bicycle?			waterproofing	packaging	electroplating	anodising	
(a) protect the aluminium frame of a bicycle?			alloying	pesticide treatment	spray painting	galvanising	g
(c) protect walking boots? 1		_					(b)
(d) cover a steel lamp post with a layer of zinc? 1		1			king boots?	protect walk	(c)
		1			_		` /
				layer of zinc?	lamp post with a	cover a steel	(<i>d</i>)
[Turn over		1					
			[Turn over				

10. A group of students investigated the effect of light intensity on the numbers of wild plants in a woodland. They counted the numbers of wood sorrel, clover and daisies in areas A, B and C. For each area they recorded the light intensity. The results are shown in the bar graph and table below.



Area	Light intensity (units)
A	5
В	10
С	15

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1//	I_{α}	vb	c	Г
V	11.	IK.		

•	(co	ntinued)					Marks	KU	PS
	(a)	Draw two concluse the table.	ions using information	from	both the bar gra	ph and	l		
		1		•••••					
							2		
	(b)	What is the light is plants?	ntensity in the area wi	th the	e highest total nur	nber of			
			units				1		
	(c)	Predict the number intensity of 7 units.	er of wood sorrel plant	es in a	an area which has	a light			
							1		
•	Th€	e boxes below show	some gases.						
	1		2	3					
		oxygen	carbon monoxide		ozone				
	4		5	6					
		CFCs	oxides of nitrogen	S	ulphur dioxide				
	(a)	Which two boxes s	show a gas that causes a	icid ra	ain?				
		Boxes	and				2		
	(b)	Which box shows to a car engine?	the gas formed by income	mplet	te combustion of p	etrol in	L		
		Box					1		
					[Tu ₁	n over			

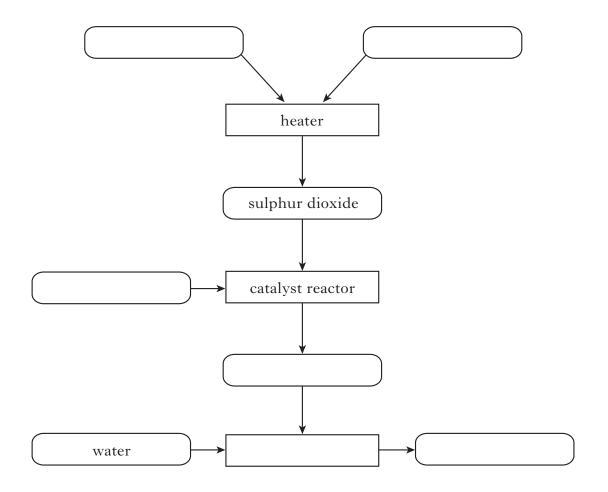
KU | PS

12. Read the information below and use it to complete the flow diagram.

The Manufacture of Sulphuric Acid

Iron pyrites and air are heated to form sulphur dioxide. The sulphur dioxide then reacts with oxygen in a catalyst reactor. The sulphur trioxide formed in this reaction passes into an absorber. Water is added to the absorber and the final product is sulphuric acid.

this shape shows a manufacturing stage this shape shows a chemical



Us	e words from the bo	exes to answer the ques	tions.	M	[arks	KU	PS
	oxidation	gravity survey	distillation				
	combustion	test drilling	mining				
(a)	Which process is u	used to separate crude o	oil into fractions?				
(b)	Which two proces	ses are used to detect o	il bearing rocks?		1		
		and			1		
	a factory making fer actors are made of sto	tilisers, the walls of the					
ste	el adds to the cost of	f how corrosion of the foregrating the factory.					
1 2					2		
			[Tt	ırn over			

KU	PS

15. The table below shows the percentage of men and women being treated for heart disease.

Age range	Percentage being treated for heart disease (%		
(years)	men	women	
45 – 54	3	1	
55 - 64	9	5	
65 - 74	17	11	
75 - 84	20	16	

(a) Draw **two** conclusions from the information in the table.

1

2

.....

(b) In a sample of 250 women aged 75–84 years, calculate how many are being treated for heart disease.

Space for working		

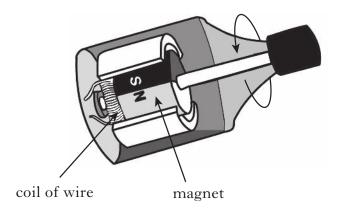
women

2

2

KU	PS

16. The diagram shows a simple electrical generator.



The magnet rotates beside a coil of wire and this produces an electrical current
The current can be increased by using more turns of wire in the coil.
Give two other ways in which the electrical current can be increased.

1	
2	

17. The following table shows the number of river pollution incidents reported to an Environmental Agency in one year.

Type of pollution incident	Number of reports
Oil spill	9
Farm waste	27
Industrial waste	16
Rubbish dumping	63
Discoloured water	65

What percentage of the total number of reports was about rubbish dumping?

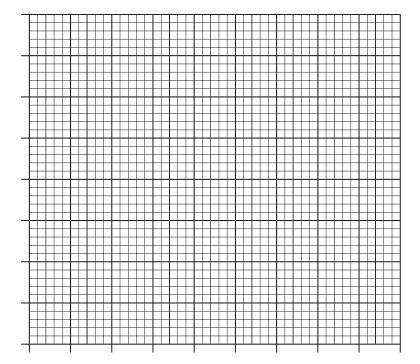
Space for working	

Answer%	2	

18. The table shows the oil production from three North Sea oilfields in the years 2004 and 2006.

Oilfield	Oil production (thousands of tonnes)		
	2004	2006	
Buchan Thistle Tartan	370 180 175	320 160 105	

(a) Construct a **single bar graph** to show all of this information. (Additional graph paper, if required, is provided on *Page twenty-five*.)



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(b) Calculate the percentage decrease in oil production in the Tartan oilfield between 2004 and 2006.

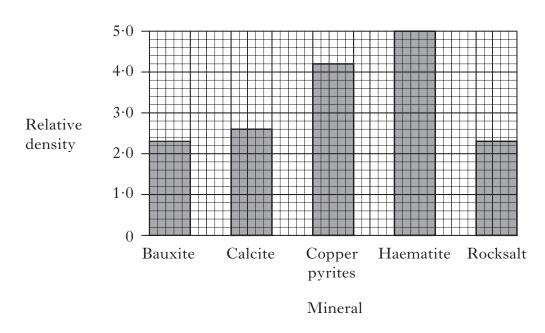
Space for working	

Answer%

19.	Wh	aich of the following statements correctly describes a heart attack?	Marks	KU	PS
	A.	The coronary vein is blocked and prevents carbon dioxide getting to the heart muscle.	;		
	В.	The coronary artery is blocked and prevents carbon dioxide getting to the heart muscle.	<u>;</u>		
	C.	The coronary vein is blocked and prevents oxygen getting to the heart muscle.	;		
	D.	The coronary artery is blocked and prevents oxygen getting to the heart muscle.	;		
	<u>Un</u>	derline the correct answer.	1		
20.	The	e diagram shows parts of human blood.			
		Red blood cells Platelets White blood cells			
	(a)	Name the chemical in red blood cells which carries oxygen.			
			1		
	(<i>b</i>)	What is the function of the platelets?			
			1		
	(c)	The treatment used to stimulate white blood cells to produce antibodies is			
		A hypothermia			
		B immunisation			
		C accumulation			
		D respiration.			
		<u>Underline</u> the correct answer.	1		
		[Turn over			

21. Some information about minerals found in the Earth's crust is given below.

Mineral	Supply in Earth's crust	Annual world production (million tonnes)	Hardness value	Reaction with acid
Bauxite	plentiful	80	2.0	no gas given off
Calcite	plentiful	1500	3.5	gas given off
Copper pyrites	limited	20	4.2	no gas given off
Haematite	plentiful	900	5.2	no gas given off
Rocksalt	plentiful	150	2.2	no gas given off



The **relative density** of a mineral is a measure of its density compared to water.

The **hardness** of a mineral is tested by scratching it.

A mineral with a higher hardness value can scratch any mineral with a lower hardness value.

Carbonate minerals react with acid to give off gas.

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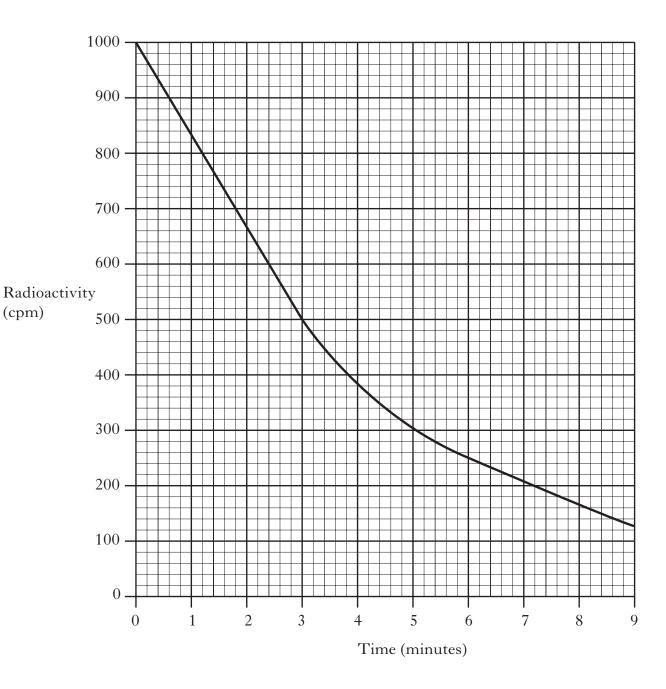
21.	(co	ntinued)	Marks	KU	PS
		e all of the information to answer the following questions.			
		What is the relative density of the mineral with a limited supply in the Earth's crust?			
			1		
	(b)	Which mineral is a carbonate?			
			1		
	(c)	A fingernail has a hardness value of 2.5.			
		List all the minerals that can be scratched by a fingernail.			
			1		
	(<i>d</i>)	What is the annual production of the mineral which has a relative density of 2.6 ?			
		million tonnes	1		
		[Turn over			

IN THIS MARGIN

Marks

KU PS

(a) The radioactivity of a sample of polonium-210 was measured and plotted on the graph shown.



What is the half-life of polonium-210?

..... minutes

1

(cpm)

Marks KU PS

22. (continued)

(b) The table gives information about three radioactive substances.

Radioactive Substance	Half-life
Bismuth-212	60.6 minutes
Radon-220	55·0 seconds
Lead-212	10·6 hours

Which	radioactive	e substance 1	must be s	stored for	r the long	gest tim	e befor	e it
become	es safe?							

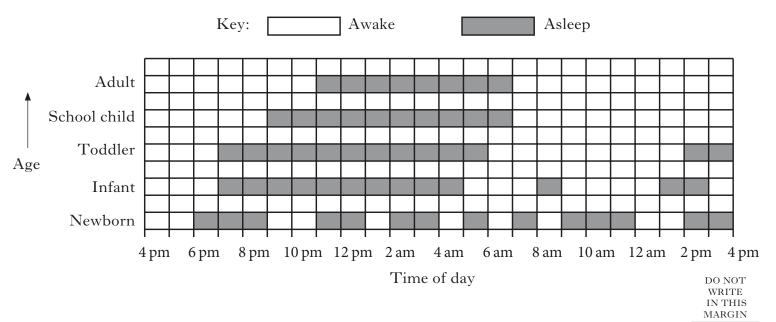
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1

[Turn over

23. As humans get older their sleep patterns change.

The chart below shows sleep patterns over a 24 hour period for five people.



(a)	Which person	Marks	KU	PS
	(i) has the longest continuous period of sleep?			
		1		
		. 1		
	(ii) sleeps for a total of 10 hours?			
		. 1		
(b)	Which two people are awake between 2 pm and 4 pm?			
	and	. 1		

(c) The infant has the same sleep pattern every day for one week.Calculate the total number of hours of sleep the infant gets in this week.

Space for working

Answer hours

KU

1

D

Underline the correct answer.

Food web A Food web B Grass snake Owl Grass snake Vole Shrew Fieldmouse Beetle Woodlice Cricket Beetle Earthworm Fungi Leaf litter Grass seeds Leaf litter Grass seeds (a) Which food web is more stable? Explain your answer 1 (b) What word is used to describe organisms, such as fungi, which help to break down natural waste? 1 (c) Which of the following statements correctly describes the levels of pesticide in a food chain? A A plant at the start of the food chain has the highest level of pesticide. В An animal that eats plants has the highest level of pesticide. C An animal at the end of the food chain has the highest level of pesticide.

[3700/31/01] Page twenty-three [Turn over

All the organisms in the food chain have the same level of pesticide.

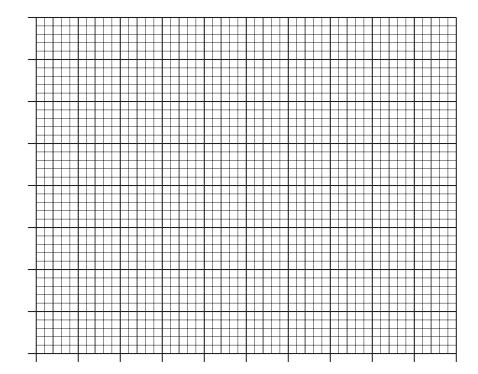
KU PS

25. The table below shows the mass of ammonia produced at different temperatures and pressures.

Pressure	Mass of ammonia (tonnes)		
(atm)	at 350 ° C	at 450 ° C	
50	600	300	
100	900	600	
150	1100	800	
200	1300	900	
250	1400	1000	

(a) Using the **same axes**, show the results as two **line** graphs. Label each line clearly.

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



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(b) Predict the mass of ammonia formed at a temperature of 400 °C and a pressure of 175 atm.

..... tonnes

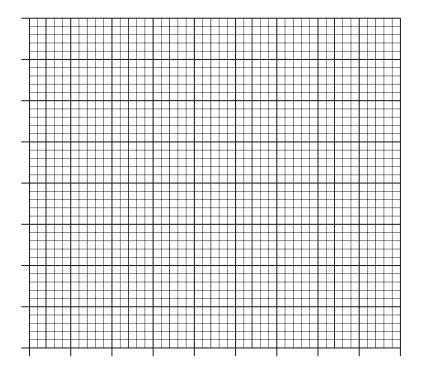
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 $[END\ OF\ QUESTION\ PAPER]$

Marks

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ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 18(a)



Marks

ks KU PS

ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 25(a)

