



KUO CHUAN PRESBYTERIAN SECONDARY SCHOOL

2022 END OF YEAR EXAMINATION

Secondary 2 Express/SBB

NAME

CLASS

REG. NO

LOWER SECONDARY SCIENCE

13 October 2022

2 hours

Additional Materials: Multiple Choice Answer Sheet

Setter: Mrs Cheong Hwee Leng

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on all the work you hand in.

This paper consists of 3 sections.

Section A consists of 30 multiple-choice questions.

Answer **all** questions.

For each question, choose the most appropriate answer and shade the letter corresponding to the answer in soft 2B pencil on the separate Multiple Choice Answer Sheet.

Section B consists of 7 structured questions.

Answer **all** questions in dark blue or black pen in the space provided on the Question Paper.

Section C consists of 4 free response questions.

Answer any **three** questions in dark blue or black pen in the space provided on the Question Paper.

The number of marks is given in brackets [] at the end of each question or part question.

A copy of the Periodic Table is printed on page 28.

<u>For Examiner's Use</u>	
Section A	/ 30
Section B	/ 40
Section C	/ 30
Total	/100

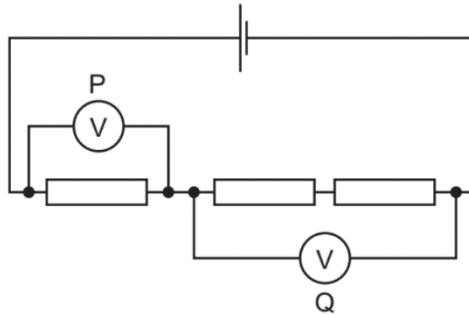
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Parent's signature/ Date

This document consists of **28** printed pages, including the cover page.

[Turn over

Section A (30 marks)*Answer **ALL** questions in this section.**Shade the letter corresponding to the answer in soft 2B pencil on the separate Multiple Choice Answer Sheet.*

- 1 Three identical resistors are joined in series to a cell.



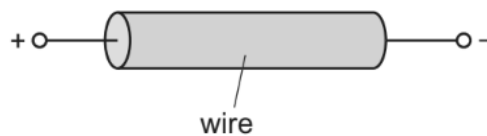
Voltmeter **Q** reads 8.0 V.

What is the reading on voltmeter **P** and the potential difference of the cell?

	reading on P / V	potential difference of cell / V
A	4.0	8.0
B	4.0	12.0
C	8.0	8.0
D	8.0	12.0

- 2 A current flows through a metal wire when a potential difference is applied across its ends.

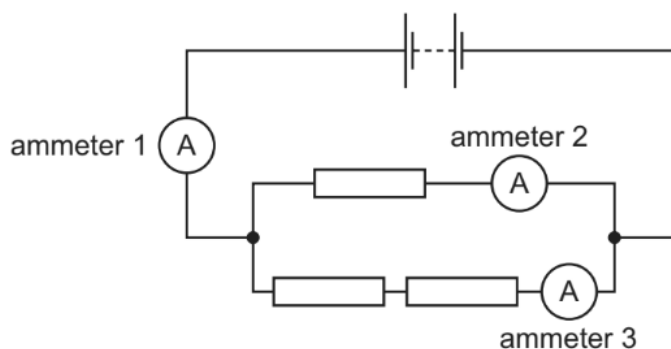
The diagram below shows which ends of it are connected to the positive and negative terminals of a dry cell.



What charges flow in the wire in what direction?

- A** negatively charged electrons flow from left to right
- B** negatively charged electrons flow from right to left
- C** positively charged protons flow from left to right
- D** positively charged protons flow from right to left

- 3 The diagram shows three identical resistors, three ammeters and a battery, connected in a circuit.



What is the order of the readings on the ammeters from smallest to largest?

	smallest	intermediate	largest
A	ammeter 1	ammeter 2	ammeter 3
B	ammeter 1	ammeter 3	ammeter 2
C	ammeter 2	ammeter 3	ammeter 1
D	ammeter 3	ammeter 2	ammeter 1

- 4 What is a possible result of replacing the fuse in an electrical appliance with one of a higher rating?
- A** Less current will flow through the appliance and will not cause overheating.
B More current will flow through the appliance and will cause overheating.
C More protection is provided against a short circuit occurring.
D The fuse is more likely to melt.
- 5 Automated external defibrillators (AEDs) are used to provide immediate help to those suffering from cardiac arrest in public places. An AED sends an electric shock to the heart through electrode pads placed on the chest in order to revive the heart.

Which of the following is **not** to be followed when using the AED?

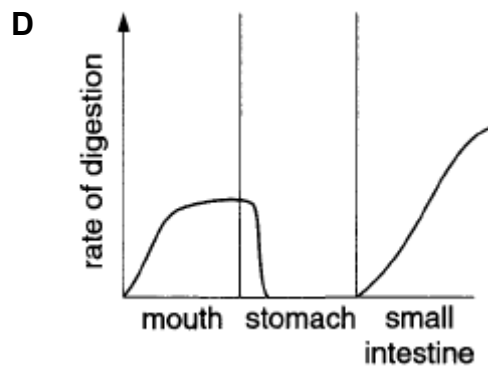
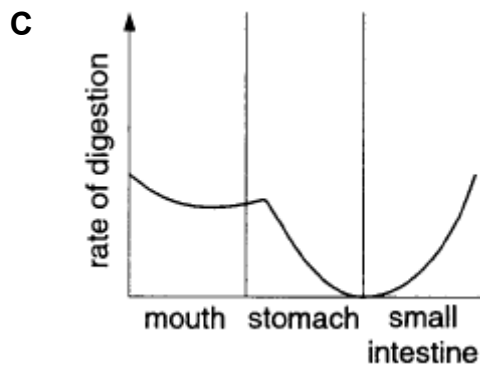
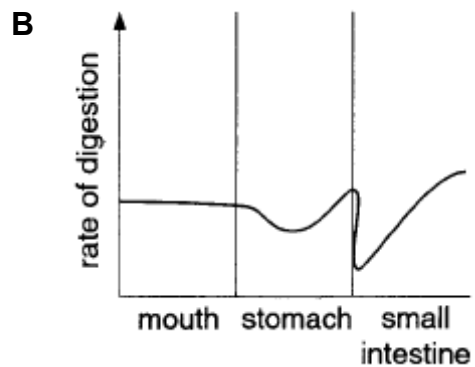
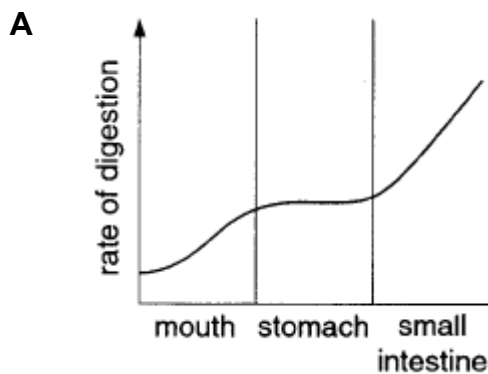
- A** Ensure nobody is touching the cardiac arrest victim while administering the electric shock.
B If the cardiac arrest victim is wearing a metallic necklace, move it aside of the neck.
C Wipe the body of the cardiac arrest victim of any sweat.
D Wrap the chest of the cardiac arrest victim with a piece of wet cloth for better conduction of electricity through his body.
- 6 Which organ is **not** part of the alimentary canal?
- A** colon
B liver
C oesophagus
D stomach

- 7 Excess gastric juices produced in the stomach may cause indigestion and gastric pains. These can be relieved by taking antacids.

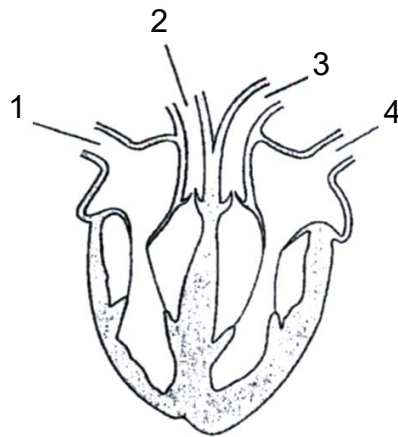
Which row correctly shows the chemical substances found in the stomach and antacid?

	chemical substance in the stomach	chemical substance in the antacid
A	hydrochloric acid	calcium carbonate
B	hydrochloric acid	calcium nitrate
C	sulfuric acid	calcium sulfate
D	sulfuric acid	calcium hydroxide

- 8 Which graph shows the rate of digestion of starch in the three parts of the alimentary canal?



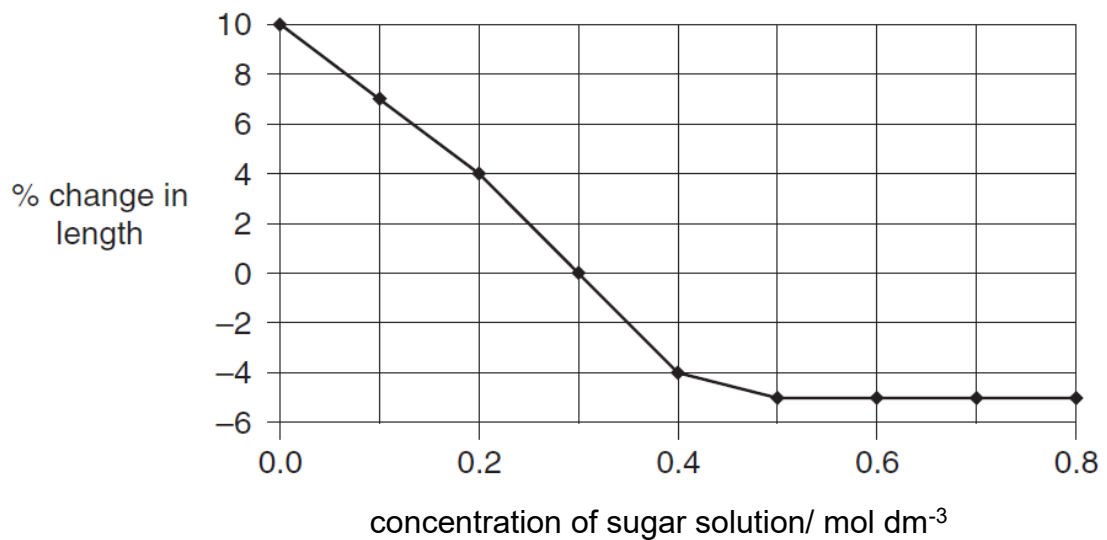
- 9 The diagram shows a cross section of a human heart.



Which of the following correctly matches the blood vessel to its function?

	carries oxygenated blood	transports blood to the lungs
A	1	4
B	2	1
C	3	2
D	4	3

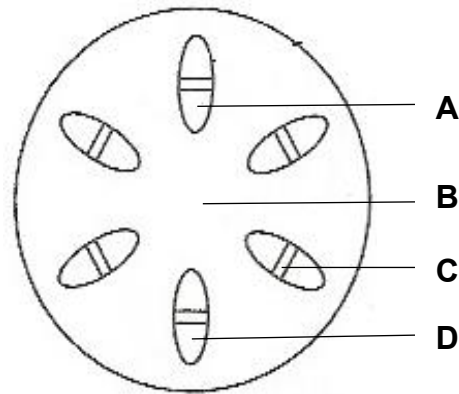
- 10 Cylinders of potato tissue were placed in different concentrations of a sugar solution. The graph shows the percentage change in length of the cylinders of potato tissue.



Which solution has the same water concentration as the potato tissue?

- A** 0.0 mol dm⁻³
- B** 0.2 mol dm⁻³
- C** 0.3 mol dm⁻³
- D** 0.5 mol dm⁻³

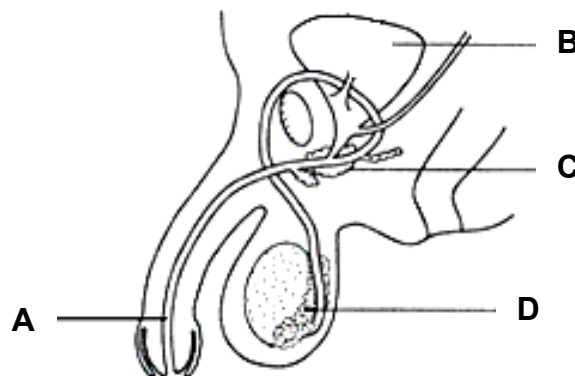
- 11 The following diagram shows a cross section of a stem. Which part carries dissolved mineral salts?



- 12 Which of the following statements about vasectomy is **not** correct?

- A A man cannot produce sperms anymore.
- B A man is still susceptible to STIs after the vasectomy.
- C A man is unable to have children after vasectomy.
- D It requires a man to undergo a surgical procedure.

- 13 Which of the following labelled parts is **not** part of the male reproductive system?



- 14 Which contraceptive method reduces the risk of transmitting syphilis and gonorrhea?

- A chemical spermicide gel
- B condom
- C intra-uterine device
- D ligation

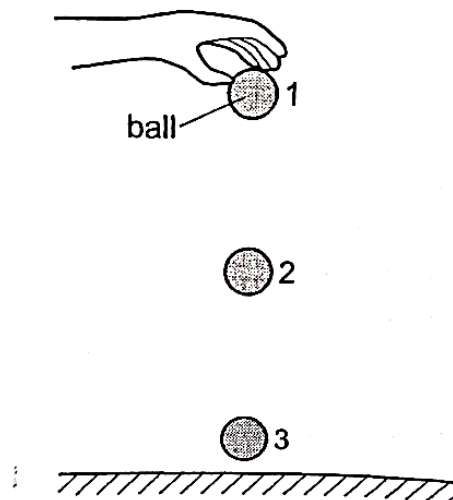
- 15 Which part of the female reproductive system is most likely to be affected by contraceptive pills?

A fallopian tube
 B ovary
 C uterus
 D vagina

- 16 A girl uses 1 joule of energy to climb up a step. Which of the following correctly states the work done by the girl on herself and on the step?

	work done on the girl/J	work done on the step/J
A	0	0
B	0	1
C	1	0
D	1	1

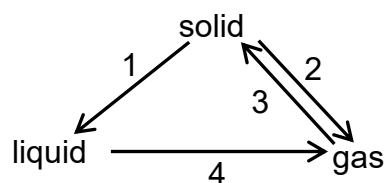
- 17 A ball is dropped from a height as shown.



Ignoring the effects of air resistance, the total energy is

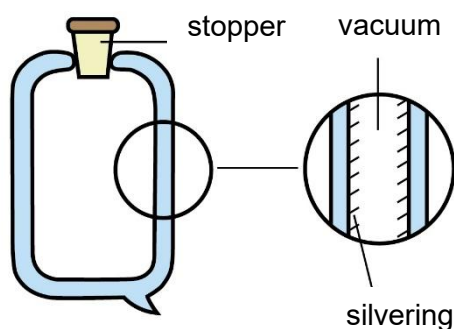
- A greatest at point 1.
 B greatest at point 2.
 C greatest at point 3.
 D the same at all points.
- 18 What would be an undesirable effect on the environment of building a hydroelectric power station?
- A construction of the dam requires many non-renewable resources
 B destruction of forests and wildlife by building the dam
 C produces tremendous amount of air pollutants
 D uses large amount of potable (undrinkable) water

- 19 The diagram shows some changes between three different physical states of matter.



Which of the changes involves absorbing thermal energy from the surroundings?

- A 1 and 2 only
 B 1 and 3 only
 C 2 and 4 only
 D 1, 2 and 4 only
- 20 The diagram below shows the inside of a hot water flask.



Which form of heat transfer do the following parts in a vacuum flask prevent / reduce?

	silvering	stopper	vacuum
A	conduction	conduction and convection	conduction and convection
B	conduction	conduction and convection	radiation
C	radiation	conduction and convection	conduction and convection
D	radiation	conduction and convection	radiation

- 21 Which of the following examples does **not** illustrate a physical change of matter?
- A Alcohol solvent vapourises from its bottle when it is left open.
 B Sugar cubes turn black when they are heated strongly.
 C Table salt forms a salt solution when mixed with water.
 D Wax melts when heated.

- 22** The table shows the information about two indicators.

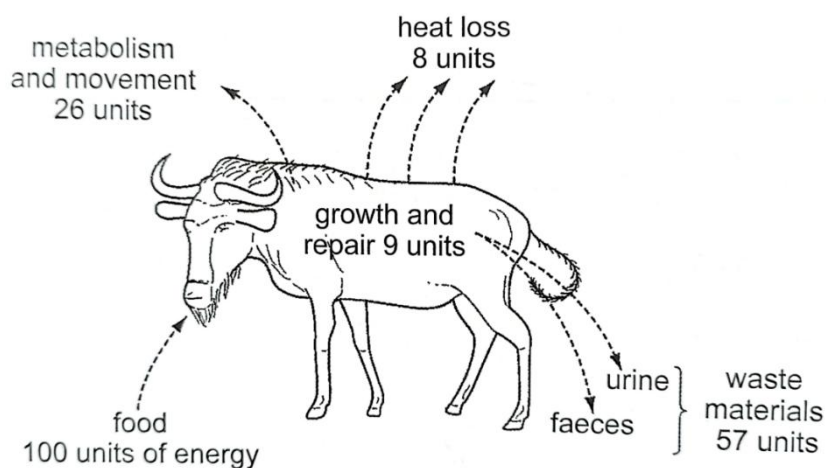
indicator	colour change from low to high pH values	pH at which colour change takes place
phenolphthalein	colourless → pink	9.0
methyl orange	red → yellow	4.0

Equal volumes of the two indicators were mixed to form a new indicator **X**.

Which colour would be observed if **X** was added to a mixture of equal volumes of sodium hydroxide solution and sulfuric acid?

- A** colourless
- B** orange
- C** pink
- D** yellow

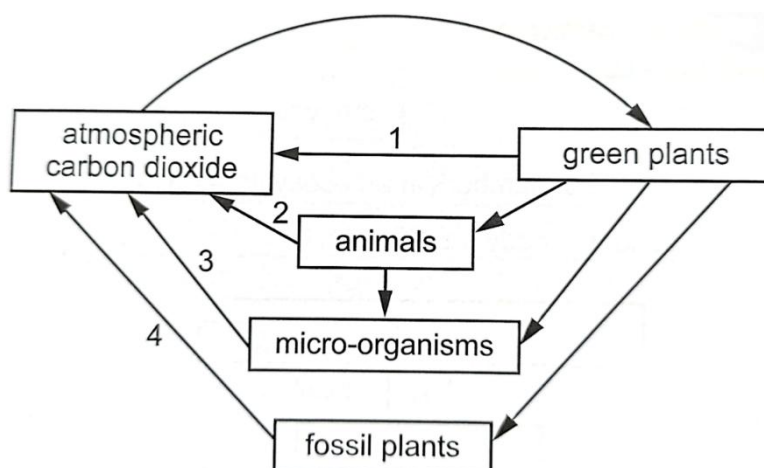
- 23** The diagram below shows how energy from food is used by an animal.



What percentage of this energy is available to consumers and decomposers?

- A** 9
- B** 34
- C** 66
- D** 91

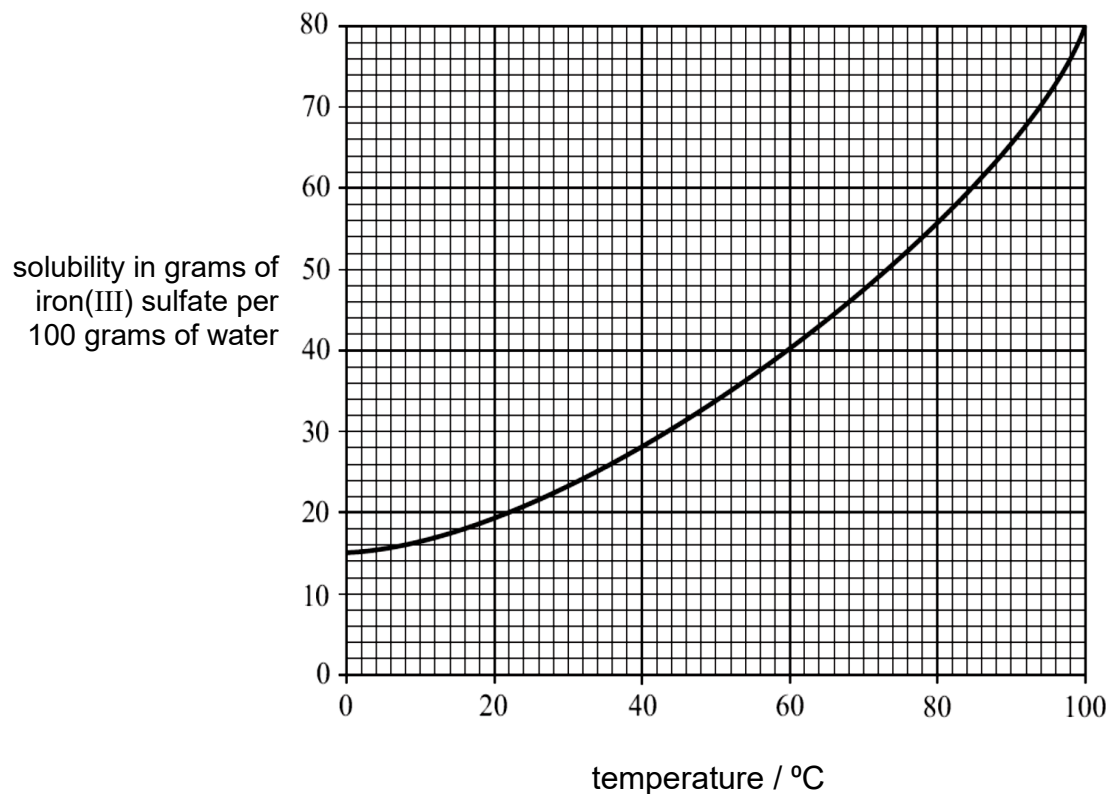
- 24** The diagram represents the carbon cycle. The arrows represent different processes that occur in the carbon cycle.



Which of the numbered arrows show where respiration takes place?

- A** 1, 2, 3 and 4
 - B** 1, 2 and 3 only
 - C** 1 and 4 only
 - D** 2 and 3 only
- 25** What determines the position of an element in the Periodic Table?
- A** the number of electron shells
 - B** the number of neutrons
 - C** the number of protons
 - D** the number of protons and neutrons in the nucleus

Refer to the graph below and answer questions 26 and 27.



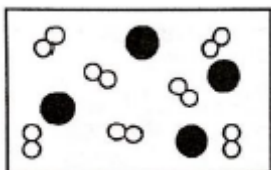
- 26** How many grams of solid iron(III) sulfate can dissolve in 500 g of water to produce a saturated solution at 50 °C?
- A** 32
B 34
C 160
D 170
- 27** What is the mass of iron(III) sulfate crystals obtained when 100 cm³ of its saturated solution is cooled from 100 °C to 40 °C?
- A** 48
B 52
C 56
D 60
- 28** Which of the following statements is true?
- A** All atoms are electrically neutral.
B All atoms contain electrons in the nucleus.
C Elements in the same period contain the same number of valence electrons.
D There are more neutrons than protons for all elements.

- 29** How many elements and atoms are there in 3 molecules of the compound ethanol, $\text{C}_2\text{H}_5\text{OH}$?

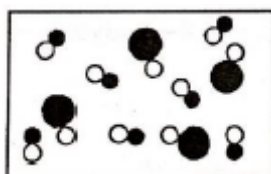
	elements	atoms
A	2	7
B	3	9
C	3	27
D	4	9

- 30** Which of the following represents a mixture of compounds?

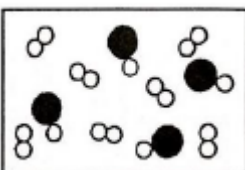
A



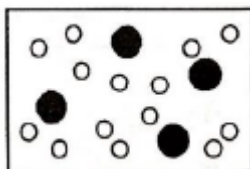
B



C



D



Section B (40 marks)

*Answer **ALL** questions in this section.*

Show your working and write your answers in the space provided.

- 1 (a)** In the box below, draw a circuit diagram, using the following description:
- A power source connected to two light bulbs in parallel.
 - One ammeter measuring the total current in the circuit.
 - One voltmeter measuring the potential difference of one bulb.



[4]

- (b)** In the circuit diagram drawn in **(a)**, include a switch that would be able to control the lighting of both light bulbs. [1]

- (c)** The two bulbs in **(a)** were then connected in series instead of in parallel. State what happens to the total resistance in the circuit when the bulbs are connected in series instead of in parallel.

..... [1]

- (d)** Suggest how the circuit should be modified so that the brightness of the bulb can be controlled.

.....

..... [1]

[Total:7]

- 2 Fig. 2.1 shows a Visking tubing containing starch solution and amylase being left in a boiling tube of hot water for a few hours. It is known that heat destroys enzymes.

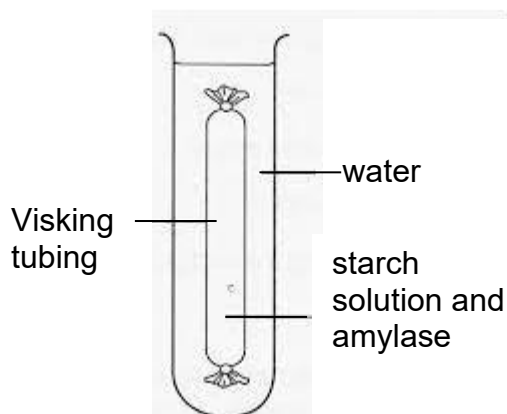


Fig. 2.1

A sample of the Visking tubing contents and the water in the boiling tube were tested with iodine and Benedict's solution.

When simple sugars are present, Benedict's solution changes from blue to orange-red.

- (a) Predict the observations of the tests with iodine and Benedict's solution by completing Table 2.2.

Table 2.2

	test with iodine	test with Benedict's solution
Visking tubing contents		
water in boiling tube		

[2]

- (b) Explain the observations in (a).

.....

.....

.....

..... [4]

- (c) (i) State the part of the digestive system that this experimental set-up models.

..... [1]

- (ii) State the process that this experimental set-up models.

..... [1]

[Total:8]

- 3 Fig. 3.1 shows two men repairing a roof using a crawler-board.

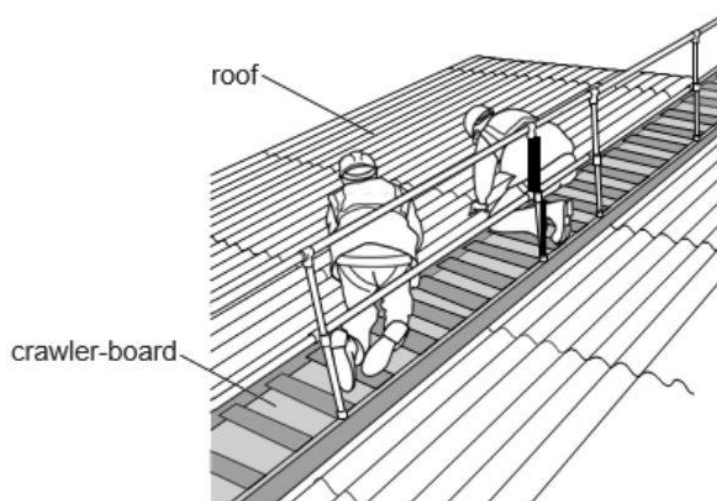


Fig. 3.1

- (a) Using the concept of pressure, explain why the use of the crawler-board prevents the men from falling through the roof.

.....

 [2]

- (b) The crawler-board has a mass of 40 kg. The total mass of the two men is 160 kg. The area of the crawler-board in contact with the roof is 0.80 m^2 .

- (i) Given that the gravitational field strength on Earth is 10 N/kg , calculate the total weight of the crawler-board and the two men.

total weight [2]

- (ii) Calculate the pressure on the roof when the men are on the crawler-board.

pressure [1]

[Total:5]

[Turn over

- 4 A student found a crushed, empty plastic bottle in the refrigerator, still capped at its opening. She then placed the crushed bottle on the dining table and Fig. 4.1 shows her observation after 1 hour.

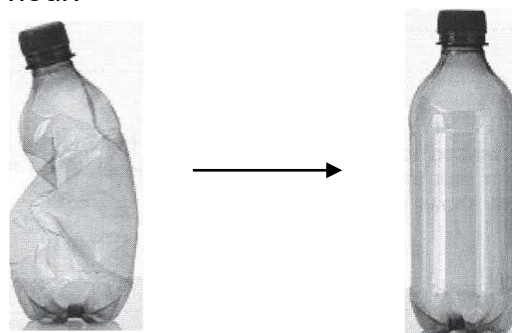


Fig. 4.1

- (a) Use the Kinetic Particle Theory to explain her observation.

.....
.....
..... [3]

- (b) Suggest how the mass of the bottle might be affected after one hour on the dining table.

..... [1]

- (c) Explain your answer in (b).

.....
..... [1]

[Total: 5]

- 5 An experiment was carried out to investigate the speed at which copper(II) carbonate reacts with hydrochloric acid as shown in Fig. 5.1. A conical flask containing the copper(II) carbonate crystals and excess hydrochloric acid was placed on top of an electronic mass balance.

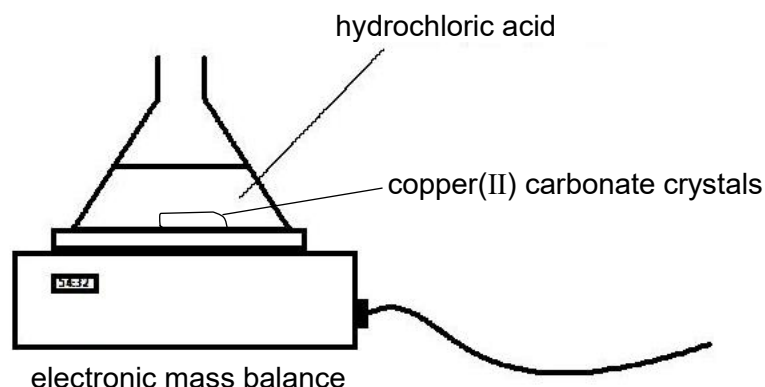


Fig. 5.1

The mass of the flask and the contents are recorded in Table 5.1.

Table 5.1

time/ min	0	1	2	3	4	5	6	7
mass of flask and its contents/ g	90.4	89.3	88.5	88.0	87.8	87.8	87.8	87.8
total loss in mass/ g	0	1.1	1.9					

- (a) Complete the missing information in **Table 5.1**. [1]
- (b) Write the word equation that describes the reaction that took place in the conical flask.
 [1]
- (c) Explain the loss in mass of the flask and its contents as time passes.

 [1]
- (d) State the time at which the chemical reaction stopped.
 [1]

[Total:4]

- 6 (a)** A student peels some tissue from an onion. She then places some of the onion tissue in water and some in concentrated sugar solution. After a few minutes, she looks at the cells from each sample of onion tissue under a microscope. She compares these with cells from tissue freshly peeled from the onion and draws diagram of these cells as shown.

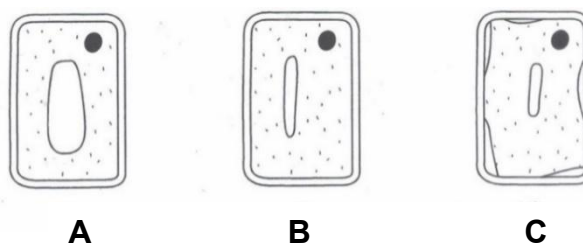


Fig. 6.1

- (i)** Complete the table to match each diagram with the correct sample.

sample of onion tissue	diagram A , B or C
freshly peeled from onions	
placed in water	
placed in concentrated sugar solution	

[1]

- (ii)** Explain the changes that took place in the cell in **Fig. 6.1A**.

.....

 [2]

- (b)** In the plant, some cells carry out specific functions. Draw a plant cell that is specialised for the absorption of water from the soil, and name it.

[2]

- (c)** The plant cell you have drawn in **(b)** has a different shape from a normal plant cell. Explain how its shape helps in the absorption of water.

.....
 [1]
 [Total:6]

- 7 (a) Fig. 7.1 shows a cross-section of a banana fruit.

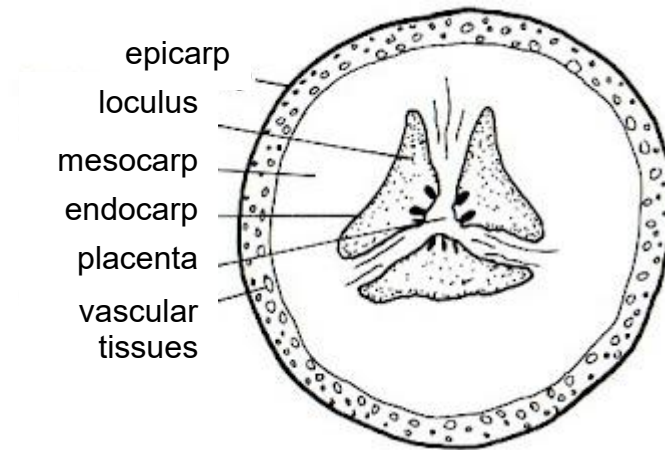


Fig. 7.1

The banana skin is made up of vascular tissues, which are complex tissues that consist of more than one type of tissue, and are involved in the transport of substances.

- (i) Suggest the two types of tissue that make up the vascular tissues.

..... [2]

- (ii) Describe two differences between the two types of tissue identified in (i).

.....

 [2]

- (b) Bananas have flat “strings” that exist between the skin and the fruit itself. These strings are actually phloem bundles. Suggest the function of these “strings” in bananas.

.....
 [1]

[Total:5]

– End of Section B –

Name: _____ ()

Class: _____

For Examiner's Use			
Q ____		Q ____	
Q ____		Total	

Section C (30 marks)

Answer any **three** questions in this section and write the question number that you have attempted on the top right hand corner of this page.

Each question carries **10 marks**.

Show your working and write your answers in the space provided.

- 8 Fig. 8.1 shows a heater connected to a 12 V battery.

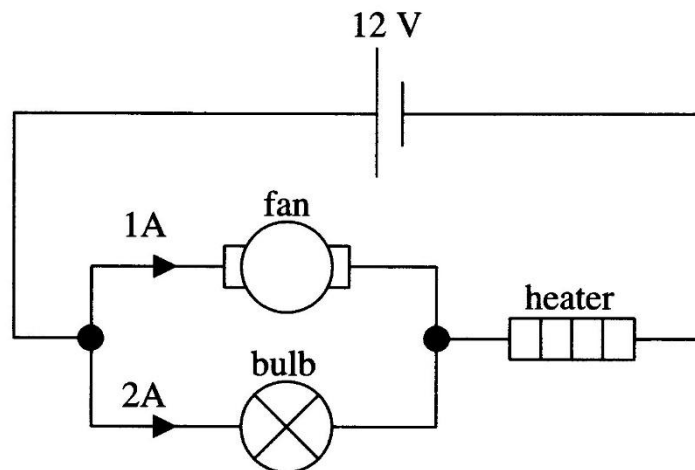


Fig. 8.1

- (a) The fan has a potential difference of 6 V across it and a current of 1A flowing through it. The bulb has a current of 2A flowing through it.

- (i) Calculate the resistance of the bulb.

resistance [1]

- (ii) Calculate the potential difference across the heater.

potential difference [1]

- (iii) Calculate the resistance of the heater.

resistance [1]

- (b) Table 8.2 below shows the electricity consumption in a day at a particular house.

Table 8.2

appliance	power / W	amount of time used per day / hr	energy used per day / kWh
air-conditioner	2000	8	X
television	150	Y	0.225
computer	Z	1.5	0.375

- (i) Find the unknown values, X, Y and Z.

X =

Y =

Z = [3]

- (ii) The cost of 1 kWh is \$0.30. Calculate the total cost of using electricity in one week.

cost = [2]

- (iii) Explain the use of a fuse in an electrical plug.

.....

..... [2]

[Total:10]

- 9 (a) Identify an active digestive enzyme in the human mouth, its substrate and the resultant product(s).

.....
 [2]

- (b) Fig. 9.1 shows the amount of nutrient **X** as it pass through the human alimentary canal. Organs A, B, C and D are parts of the alimentary canal.

amount of nutrient **X**

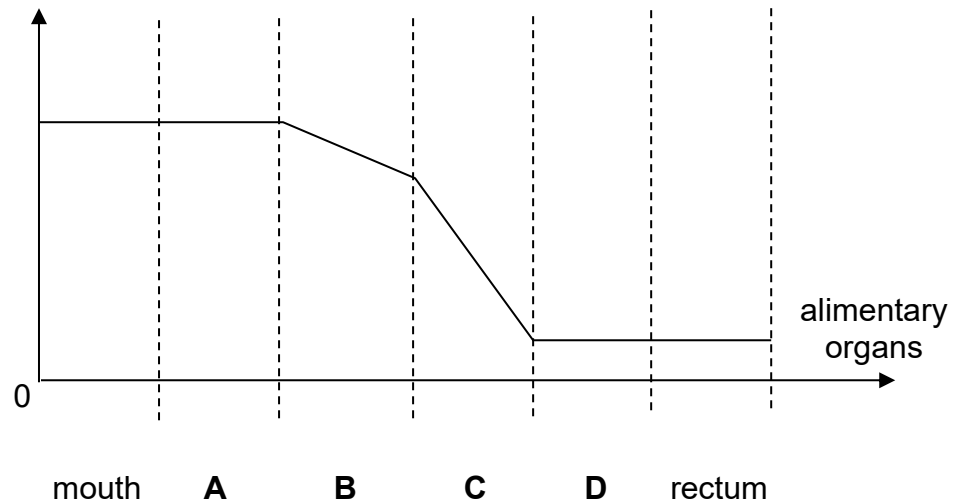


Fig. 9.1

- (i) Name organs **A**, **B**, **C** and **D**.

A: **B:**
C: **D:** [2]

- (ii) From Fig. 9.1, state the identity of nutrient **X**.

..... [1]

- (iii) Explain why amount of nutrient **X** decreases further in organ **C**.

.....

 [2]

- (iv) Suggest why the amount of nutrient **X** is above zero in the rectum.

.....
 [1]

(c) Describe the role of liver in digestion.

.....

.....

..... [2]

[Total:10]

- 10** Fig. 10.1 shows the mean heart rate of groups of mice at different ages. Each group was given a different treatment each day. Group **A** was given electric shocks to the heart. Group **B** was injected with a drug which blocks nerve impulses to the heart muscles.

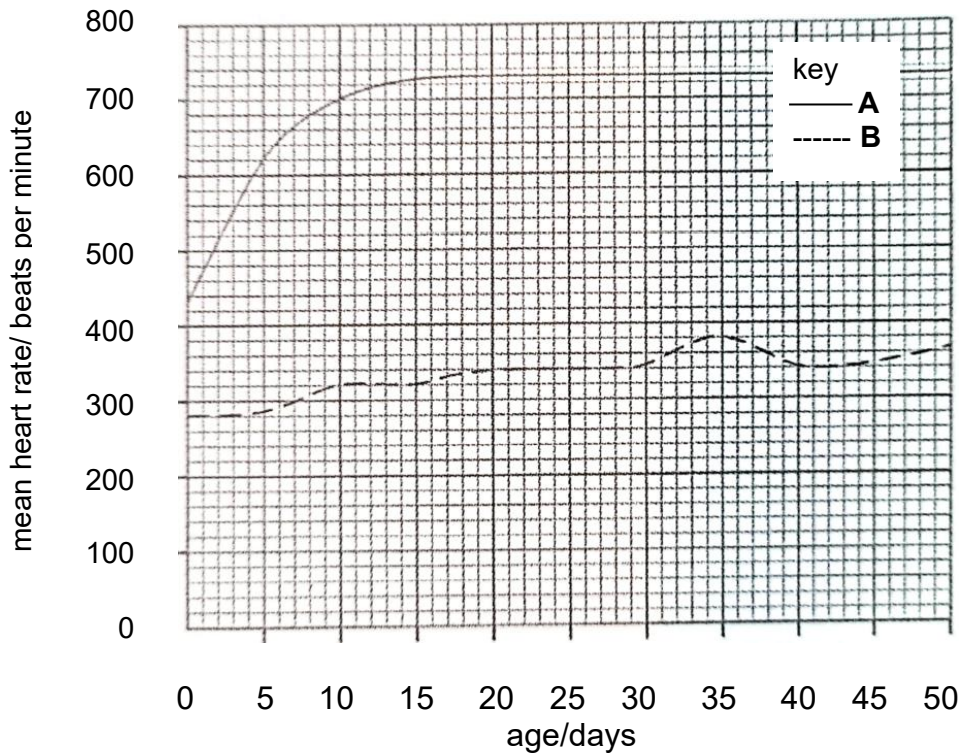


Fig. 10.1

Table 10.2 shows the mean heart rate for another group of rats, Group **C**, which was not given any treatment.

Table 10.2

	age/days										
	0	5	10	15	20	25	30	35	40	45	50
mean heart rate/ beats per minute	300	390	430	460	480	500	510	520	490	470	460

- (a) (i) Plot the data and draw a smooth line for Group **C** on **Fig. 10.1**. [2]
- (ii) State the difference in the mean heart rates of the rats in Group **A** and those in Group **B** at day 25.

.....

..... [1]

- (iii) Using data from **Fig. 10.1**, describe two differences in the mean heart rates of the rats in Group **C** and those in Group **B**.

.....

.....

.....

.....

..... [3]

- (b) Substances are transported into and out of plant cells by diffusion and osmosis.

- (i) Explain how oxygen and carbon dioxide are exchanged between the leaf and the air.

.....

.....

.....

.....

..... [2]

- (ii) Describe how mineral salts are absorbed by the roots and transported up the plant.

.....

.....

.....

.....

..... [2]

[Total:10]

- 11 (a) The graph below illustrates the thickness of Susan's uterine lining during the month of September 2019 (30 days). Her menstruation started on the 3rd in that month.

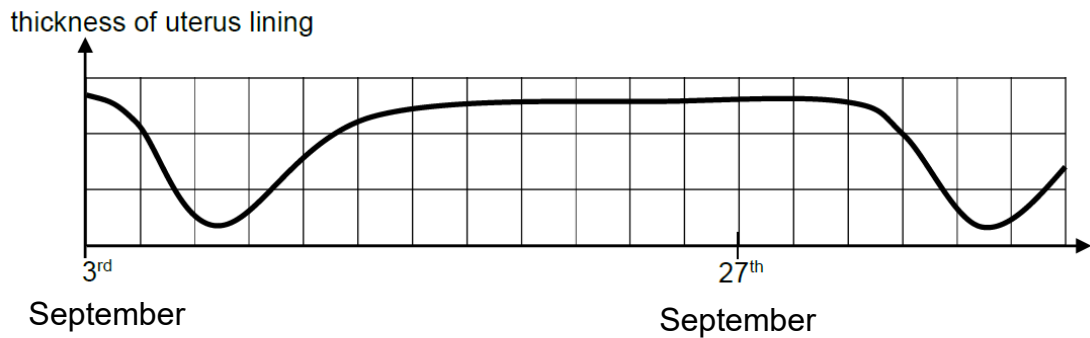


Fig. 11.1

- (i) Define menstruation.

.....
 [1]

- (ii) State the period of dates during which Susan menstruated.

..... [1]

- (iii) State the date on which her next menstruation was expected to start.

..... [1]

- (iv) Explain why if Susan were to have sexual intercourse with her husband on 26th Sept, she is **not** likely to become pregnant.

.....
 [1]

- (v) Comment on the reliability of the contraception method described in (iv).

.....
 [1]

- (b) Explain how fitting of an intra-uterine device (IUD) would prevent a woman from becoming pregnant.

.....
 [1]

- (c) Describe a permanent birth control method for the woman to prevent pregnancy. Explain how pregnancy is prevented in this method.

.....
.....
..... [2]

- (d) Explain why abortion is **not** considered a method of contraception.

.....
..... [2]

[Total:10]

- End of Paper –

Group																		
1	2	Key										1	13	14	15	16	17	18
		proton (atomic) number	atomic symbol	name	relative atomic mass													
3 Li lithium 7	4 Be beryllium 9																	
11 Na sodium 23	12 Mg magnesium 24																	
19 K potassium 39	20 Ca calcium 40	3	4	5	6	7	8	9	10	11	12							
37 Rb rubidium 85	38 Sr strontium 88	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
55 Cs caesium 133	56 Ba barium 137	Sc scandium 45	Ti titanium 48	V vanadium 51	Cr chromium 52	Mn manganese 55	Fe iron 56	Co cobalt 59	Ni nickel 59	Cu copper 64	Zn zinc 65	Ga gallium 70	Ge germanium 73	As arsenic 75	Se selenium 79	Br bromine 80	Kr krypton 84	
87 Fr francium	88 Ra radium	39 Y yttrium 89	Zr zirconium 91	Nb niobium 93	Mo molybdenum 96	Tc technetium	Ru ruthenium 101	Rh rhodium 103	Pd palladium 106	Ag silver 108	Cd cadmium 112	In indium 115	Sn tin 119	Sb antimony 122	Te tellurium 128	I iodine 127	Xe xenon 131	
		57-71 lanthanoids	Hf hafnium 178	Ta tantalum 181	W tungsten 184	Re rhenium 186	Os osmium 190	Ir iridium 192	Pt platinum 195	Au gold 197	Hg mercury 201	Tl thallium 204	Pb lead 207	Bi bismuth 209	Po polonium	At astatine	Rn radon	
		89-103 actinoids	Rf rutherfordium	Db dubnium	Sg seaborgium	Bh bohrium	Hs hassium	Mt meitnerium	Ds darmstadtium	Rg roentgenium	Cn copernicium		Fl flerovium		Lv livermorium			
lanthanoids		57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175		
actinoids		89 Ac actinium	90 Th thorium 232	91 Pa protactinium	92 U uranium 238	93 Np neptunium	94 Pu plutonium	95 Am americium	96 Cm curium	97 Bk berkelium	98 Cf californium	99 Es einsteinium	100 Fm fermium	101 Md mendelevium	102 No nobelium	103 Lr lawrencium		