



CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

0653/31

May/June 2020

1 hour 15 minutes

No additional materials are needed.

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].
- The Periodic Table is printed in the question paper.

This document has **24** pages. Blank pages are indicated.

- 1 (a) Fig. 1.1 shows the structure of a human heart.

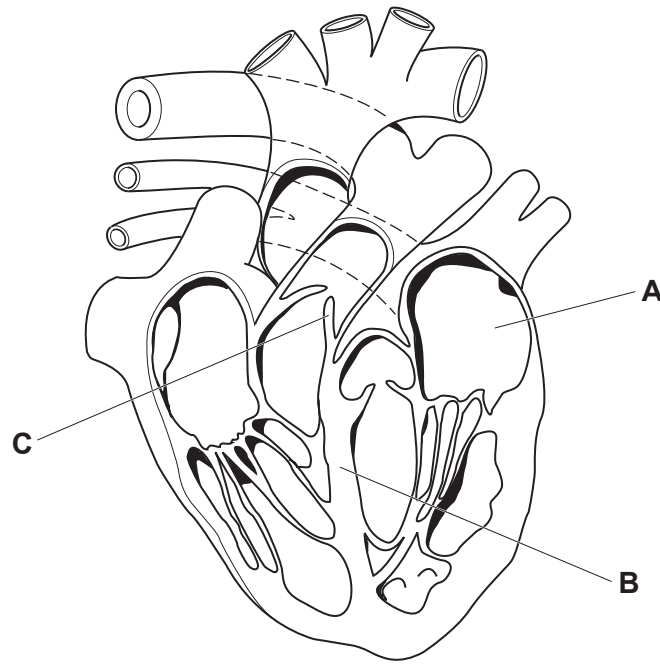


Fig. 1.1

- (i) Identify parts **A** and **B** shown in Fig. 1.1.

A

B

[2]

- (ii) Identify part **C** shown in Fig. 1.1.

..... [1]

- (iii) Describe the importance of part **C** to the flow of blood through the heart.

.....

..... [1]

(b) Complete Table 1.1 to show the function of different components of blood.

Table 1.1

components of blood	function
	produces antibodies
	transport hormones
platelets	

[3]

(c) Blood transports carbon dioxide around the body.

(i) Name the process in the body that produces carbon dioxide.

..... [1]

(ii) Carbon dioxide moves from the cells into the blood.

Complete the sentences to describe how carbon dioxide **moves out** of a cell into the blood.

The concentration of carbon dioxide is inside the cell than in the blood.

This causes carbon dioxide to move out of the cell by [2]

[Total: 10]

- 2 (a) A teacher uses the apparatus shown in Fig. 2.1.

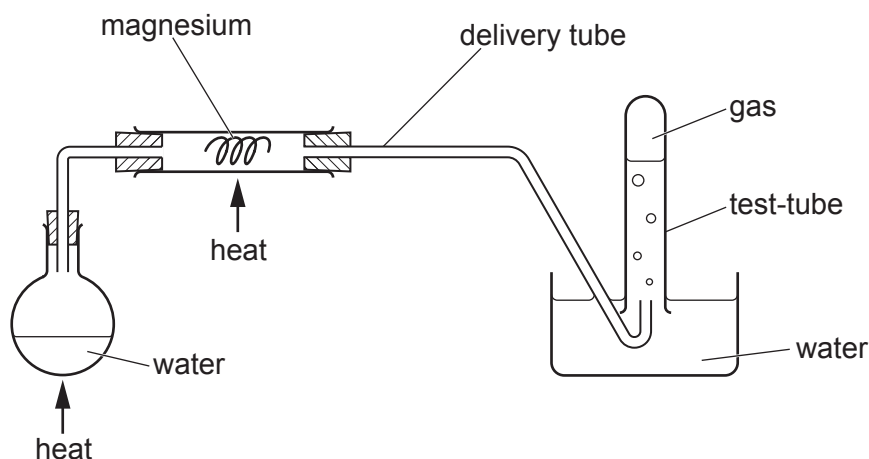


Fig. 2.1

The teacher heats the water to make steam.

The steam passes over heated magnesium.

The magnesium burns brightly. A white solid and a gas form.

The gas is collected in a test-tube. The teacher tests the gas using a lighted splint. It burns with a squeaky pop.

- (i) Identify **one** chemical change and **one** physical change in the teacher's experiment.

chemical change

physical change

[2]

- (ii) Give the chemical names for the white solid and the gas that form.

white solid

gas

[2]

- (b) An atom of sodium can be represented by the symbol shown.



Deduce the number of protons and the number of neutrons in this atom.

protons

neutrons

[2]

- (c) The electronic structure of a sodium atom is shown in Fig. 2.2.

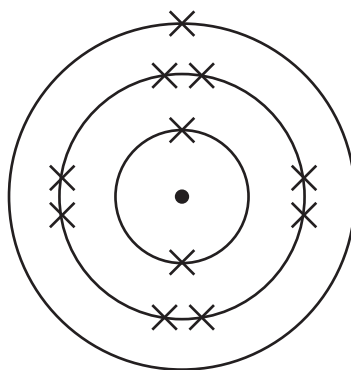


Fig. 2.2

Sodium reacts with chlorine to make sodium chloride.

Sodium chloride contains sodium ions, Na^+ , and chloride ions, Cl^- .

- (i) State the change to the electronic structure of sodium atoms when sodium reacts with chlorine.

..... [1]

- (ii) State which feature of the electronic structure of the sodium ion, Na^+ , makes the ion stable.

.....

..... [1]

[Total: 8]

- 3 Fig. 3.1 shows a rocket about to transport a large mirror into orbit around the Earth.

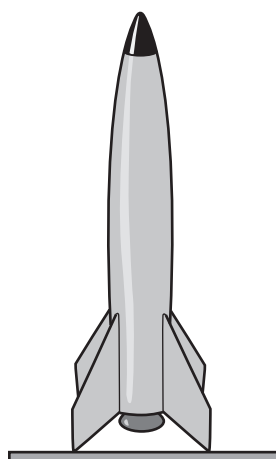


Fig. 3.1

- (a) The total mass of the rocket is 750 000 kg.
- (i) The Earth's gravitational field strength is 10 N/kg.

Calculate the weight of the rocket.

weight = ... N [1]

- (ii) When the rocket is launched, the force exerted on the rocket is 12 000 000 N vertically upwards.

Calculate the resultant force on the rocket.

State the direction of the resultant force.

resultant force = ... N

direction is [2]

- (iii) Describe the motion of the rocket as it leaves the Earth.

..... [1]

- (b) The rocket is powered by a fuel. The fuel is a store of chemical potential energy.

As the rocket moves upwards, large flames can be seen coming out of the back of the rocket.

The ground crew wear ear protection for their hearing as the rocket rises off the ground.

Use this information to identify **three** forms of energy resulting from the launch of the rocket.

1. energy
 2. energy
 3. energy
- [3]

- (c) In space, the rocket places a large mirror in orbit so that it reflects sunlight down to a solar panel on Earth.

Fig. 3.2 shows how the mirror is placed to reflect sunlight to a solar panel on Earth at night.

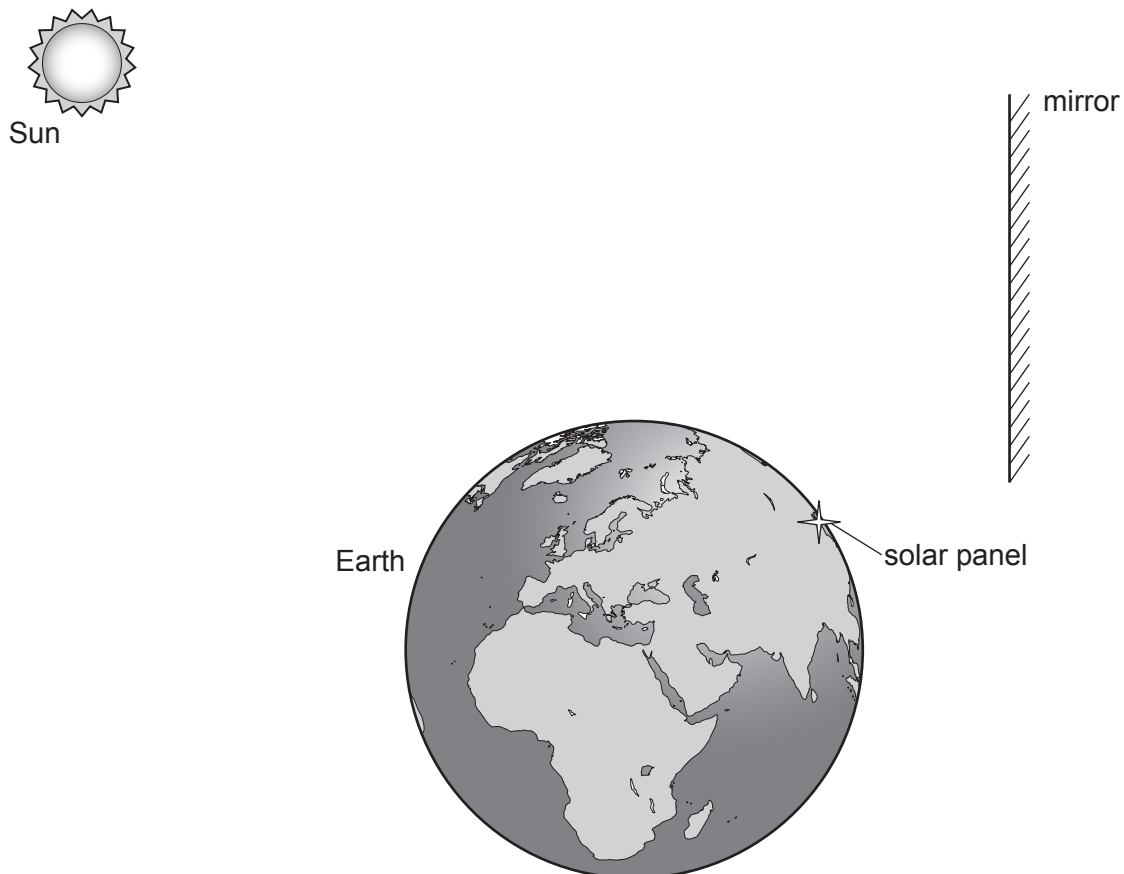


Fig. 3.2 (not to scale)

On Fig. 3.2, draw a ray to show how the mirror can reflect sunlight to the solar panel. [2]

[Total: 9]

- 4 (a) Fig. 4.1 is a graph showing the vitamin C content in 100 g of different foods.

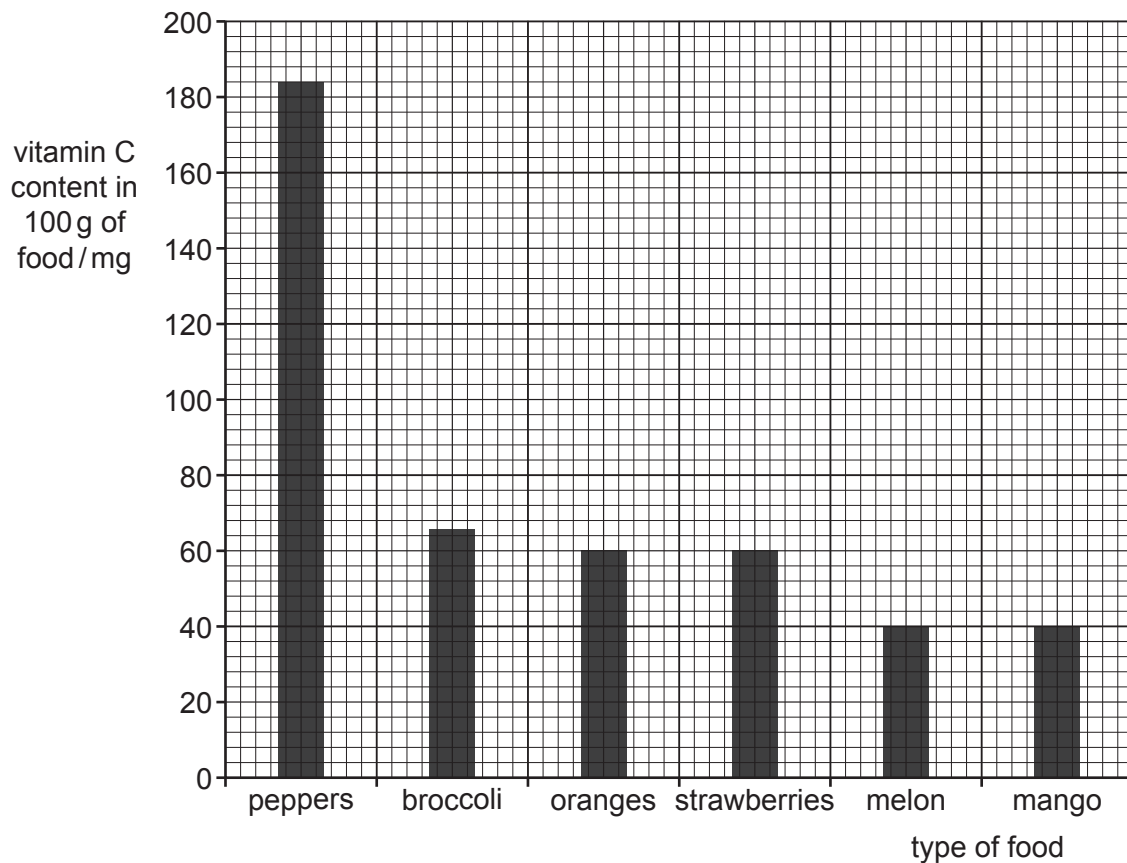


Fig. 4.1

- (i) Name **two** foods from Fig. 4.1 that contain exactly 60 mg of vitamin C in 100 g of the food.

..... and [1]

- (ii) Calculate the mass of mango needed to provide 80 mg of vitamin C.

mass = ...g [2]

(b) Fig. 4.2 shows the names and functions of some parts of the human alimentary canal.

Draw **one** line from the name of each part to its correct function.

name	function
anus	absorption
liver	ingestion
mouth	produces bile
small intestine	egestion

Fig. 4.2

[3]

(c) (i) Proteins and carbohydrates are made up of chemical elements.

List the chemical elements found in **both** proteins and carbohydrates.

..... [1]

- (ii) Proteins are digested by the enzyme pepsin.

Pepsin works best in the stomach.

The pH of the stomach is pH2.

Complete Fig. 4.3 by sketching a curve to show how the activity of the enzyme pepsin changes with pH.

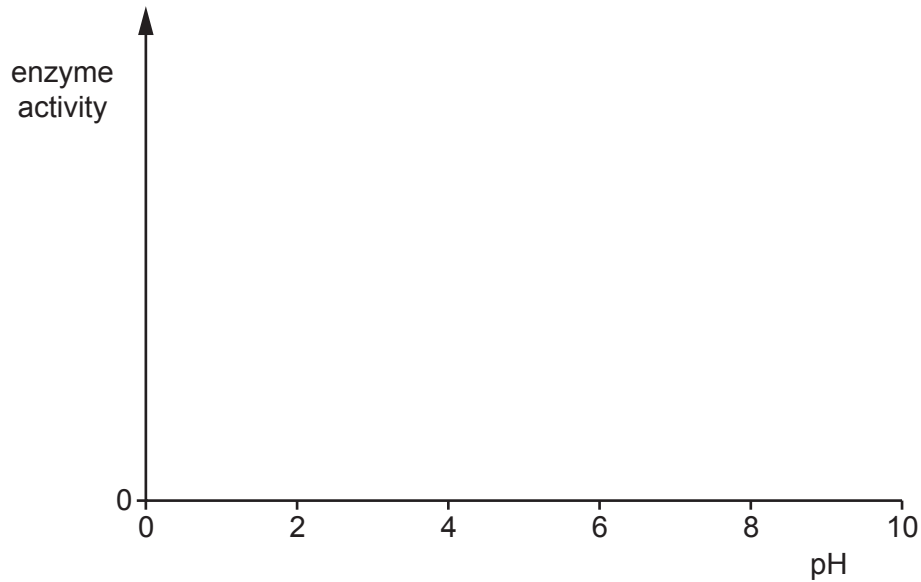


Fig. 4.3

[2]

- (iii) Proteins are made from small molecules that have reacted together.

Name these small molecules.

..... [1]

[Total: 10]

BLANK PAGE

- 5 (a) Petroleum is separated using the process shown in Fig. 5.1.

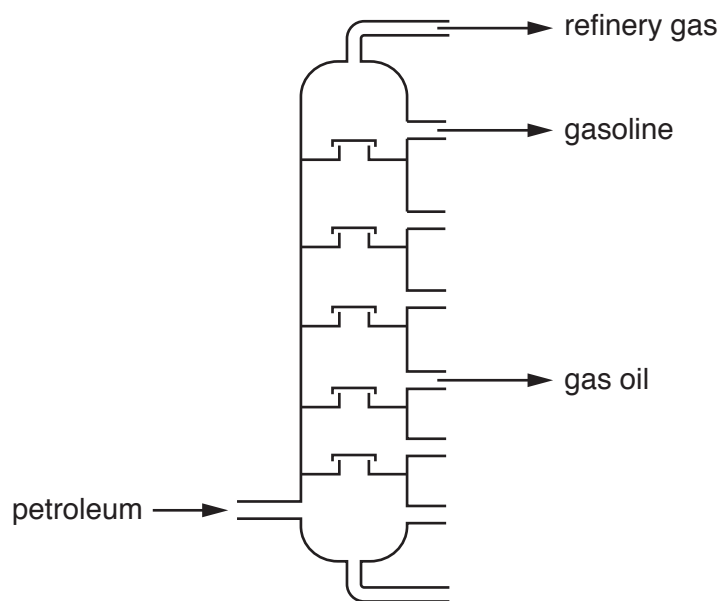


Fig. 5.1

- (i) Name the process shown in Fig. 5.1.

..... [1]

- (ii) Refinery gas and gas oil can be used as fuels.

State **one** use for each of these fuels.

refinery gas

gas oil

[2]

- (iii) Identify the greenhouse gas that forms during the complete combustion of gasoline.

..... [1]

- (b) Petroleum is a mixture of hydrocarbon molecules called alkanes.

- (i) Explain what is meant by *hydrocarbon*.

.....

..... [2]

- (ii) State the name of a process used to produce alkenes.

..... [1]

- (iii) Describe the difference between the bonding in alkanes and in alkenes.

.....

..... [1]

- (iv) Many ethene molecules combine to form poly(ethene).

State the type of addition reaction that occurs.

..... [1]

[Total: 9]

- 6 Fig. 6.1 shows a bucket of crushed ice used to cool drinks.

A thermometer is placed in the ice to check the temperature, and a glass bottle containing a drink is placed in the ice to cool.

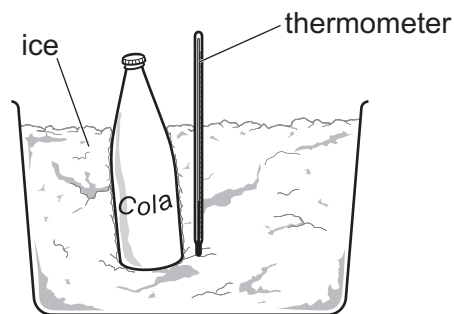


Fig. 6.1

The temperature of the ice when it is put in the bucket is -15°C .

The temperature of the drink before it is placed in the ice is 20°C .

- (a) Calculate the temperature difference between the ice and the drink at the start.

temperature difference = ... $^{\circ}\text{C}$ [1]

- (b) After 5 minutes the contents of the bucket are stirred and the temperature of the ice is taken again. The thermometer reading is -10°C .

State the names of **two** ways in which thermal energy has been transferred from the drink inside the bottle to the ice.

1.

2.

[2]

- (c) Fig. 6.2 shows a graph of how the temperature of the ice in the bucket changes over 30 minutes as the drink is cooled.

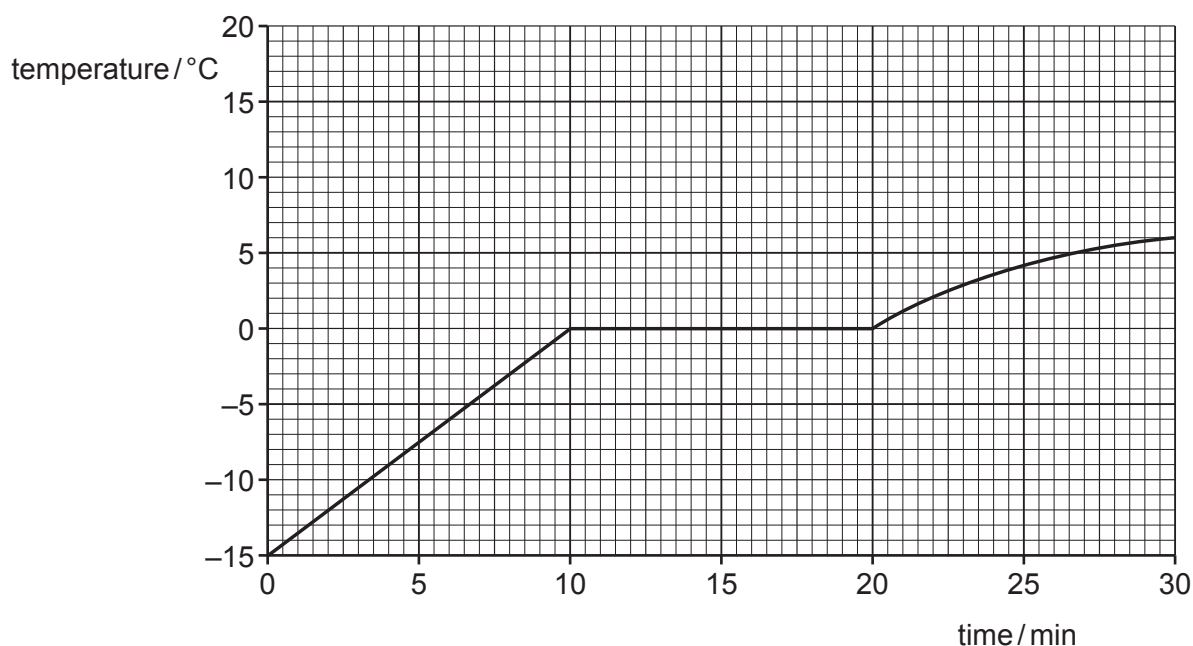


Fig. 6.2

- (i) State what is happening to the ice in the bucket between 10 and 20 minutes.
 [1]
- (ii) On Fig. 6.2, sketch a graph to show how the temperature of the drink in the bottle changes over the 30 minutes it is cooling in the ice bucket. [2]
- (d) At the start, the total mass of the bucket, ice and bottle of drink is 2.25 kg.
- (i) Predict the total mass of the bucket, ice and bottle of drink after 30 minutes.
 Give a reason for your answer.
 total mass = ... kg
 reason
 [1]
- (ii) The ice placed in the bucket is made from a block of mass 400 g.
 The volume of the block of ice is 436 cm³.
 Calculate the density of the ice.

density = ... g/cm³ [2]

[Total: 9]

[Turn over]

7 (a) Fig. 7.1 shows a food web.

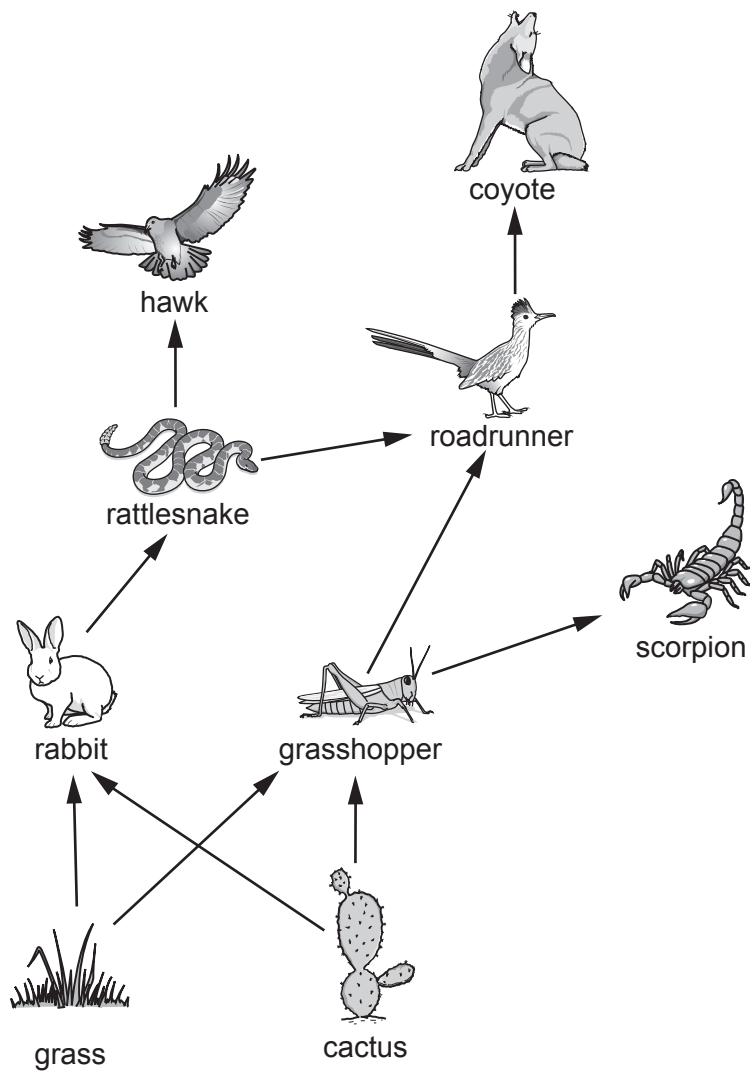


Fig. 7.1

(i) The food web is **not** complete.

Scorpions are eaten by roadrunners.

Use this information to complete the food web in Fig. 7.1 by drawing **one** arrow. [1]

(ii) Identify **one** tertiary consumer from the food web in Fig. 7.1.

..... [1]

- (iii) One year the number of rattlesnakes decreases.

This leads to a decrease in the number of grasshoppers.

Explain why using the information in Fig. 7.1.

.....

.....

.....

..... [2]

- (b) Fig. 7.2 is a diagram of a cactus growing in a desert.

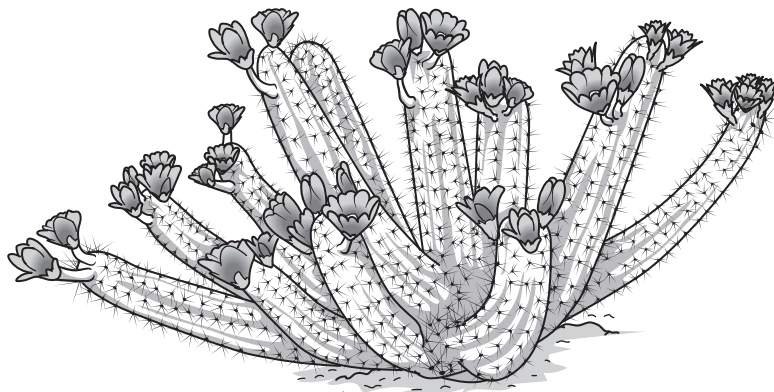


Fig. 7.2

The cactus is a flowering plant.

A bird feeds on the nectar produced by the flowers. As it feeds, pollen sticks to the bird and can be moved from one flower to another.

Complete the sentences using words from the list.

Each word may be used once, more than once or not at all.

agent

anther

catalyst

ovule

petals

sepals

stigma

The cactus flower is pollinated when pollen is transferred to the

The bird is the of pollination.

The flower has nectar and coloured to attract the bird. [3]

[Total: 7]

- 8 Period 4 of the Periodic Table is shown in Fig. 8.1. It contains the elements from potassium, K, to krypton, Kr.

Group																	
I	II											III	IV	V	VI	VII	VIII
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84

Key

atomic number
atomic symbol
name
relative atomic mass

Fig. 8.1

- (a) State the trend in the metallic character of the elements from potassium to krypton.

..... to [1]

- (b) Iron is in a collection of elements between calcium, Ca, and gallium, Ga, in period 4.

These elements have high densities and form coloured compounds.

- (i) State the name of this collection of elements.

..... [1]

- (ii) Describe **one** other property shown by these elements.

..... [1]

- (c) Chlorine is a gas in Group VII.

It is made by passing electricity through an aqueous salt.

- (i) Name the process which uses electricity to break down an aqueous salt.

..... [1]

- (ii) Suggest **one** aqueous salt that is used to make chlorine in this process.

..... [1]

- (iii) Describe a chemical test for chlorine and the positive result for this test.

test

result

[2]

- (iv) State the name of the collection of elements in Group VII.

..... [1]

(d) Krypton is a gas in Group VIII (Group 0) in the Periodic Table.

Complete the sentence about this group.

The Group VIII (Group 0) gases are known as the gases. [1]

[Total: 9]

- 9 Fig. 9.1 shows a mobile (cell) phone and a loudspeaker.

The mobile phone transmits a signal to the loudspeaker.

The loudspeaker converts the signal into sound.

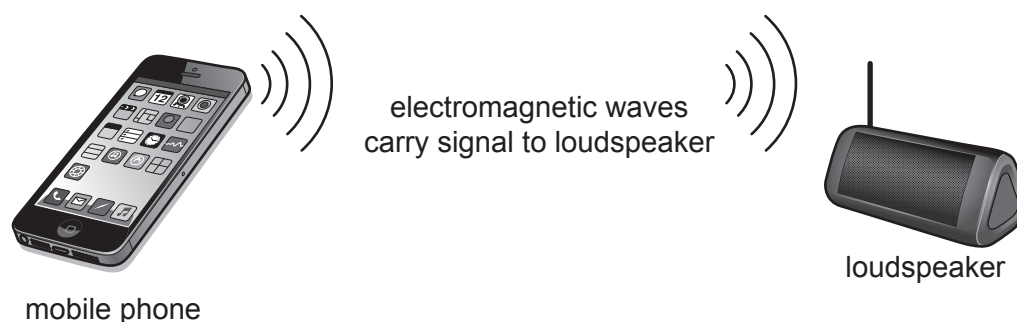


Fig. 9.1

- (a) Electromagnetic waves of frequency 2.4×10^9 Hz are used to carry the signal from the mobile phone to the loudspeaker.
- (i) Fig. 9.2 shows the approximate ranges of frequency for each type of electromagnetic wave.

more than 10^{19} Hz	10^{19} to 10^{17} Hz	10^{17} to 10^{15} Hz	10^{15} to 10^{14} Hz	10^{14} to 10^{11} Hz	10^{11} to 10^9 Hz	less than 10^9 Hz
gamma radiation	X-rays	ultraviolet	visible light	infrared	microwaves	radio waves

Fig. 9.2

Use the information in Fig. 9.2 to identify the type of electromagnetic wave used to carry the signal to the loudspeaker.

..... [1]

- (ii) The loudspeaker can be switched on and off using a remote controller.

State the type of electromagnetic wave transmitted by a remote controller.

..... [1]

- (b) The loudspeaker is operated by an alternating current (a.c.) supply.

A lamp is connected in parallel with the loudspeaker.

A switch is used to switch on both the lamp and the loudspeaker.

- (i) On Fig. 9.3, complete the circuit diagram to show how the loudspeaker, lamp and switch are connected.

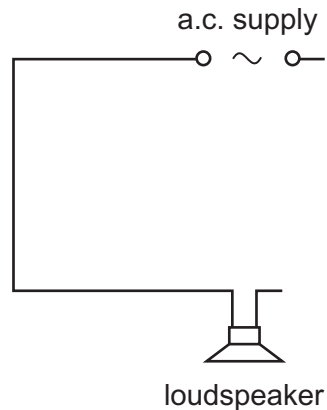


Fig. 9.3

[3]

- (ii) The loudspeaker requires a current of 0.80 A.

The power supply provides a voltage of 20 V across the loudspeaker.

Calculate the resistance of the loudspeaker.

Give the unit of your answer.

resistance = ... unit [3]

- (c) The alternating current supply has a frequency of 50 Hz.

When the speaker is switched on, but no signal is being received, sound waves of frequency 50 Hz are emitted from the loudspeaker.

Suggest whether a person near the loudspeaker will hear these sound waves.

Give a reason for your answer.

.....

 [1]

[Total: 9]

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.

The Periodic Table of Elements

Group																																			
I	II	1 H hydrogen 1						III	IV	V	VI	VII	VIII																						
		Key atomic number atomic symbol name relative atomic mass																																	
3 Li lithium 7	4 Be beryllium 9																																		
11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84										
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	114 Fl flerovium —	116 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 231	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 —

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



CANDIDATE
NAME

--

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

0653/32

May/June 2020

1 hour 15 minutes

No additional materials are needed.

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].
- The Periodic Table is printed in the question paper.

This document has **20** pages. Blank pages are indicated.

- 1 (a) Fig. 1.1 shows red blood cells.



Fig. 1.1

- (i) State the function of red blood cells.

.....
 [1]

- (ii) A component of the blood is needed to clot the blood.

State the name of this component.

..... [1]

- (b) Fig. 1.2 shows a diagram of a different type of human blood cell.

The diameter **XY** in the diagram of the cell is 30 mm.

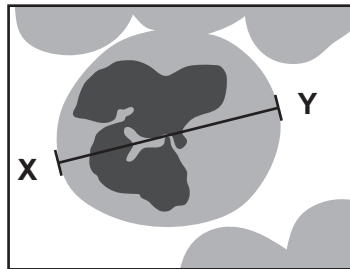


Fig. 1.2

The actual diameter **XY** of the cell is 0.015 mm.

Calculate the magnification of the cell shown in Fig. 1.2.

magnification = ... [2]

- (c) Water is transported to the cells of the body by the blood.

Complete the sentence about movement of water into and out of cells.

Water diffuses through a permeable membrane by [2]

- (d) Water is also transported through plants.

- (i) Fig. 1.3 shows the pathway taken by water through the cells of a root.

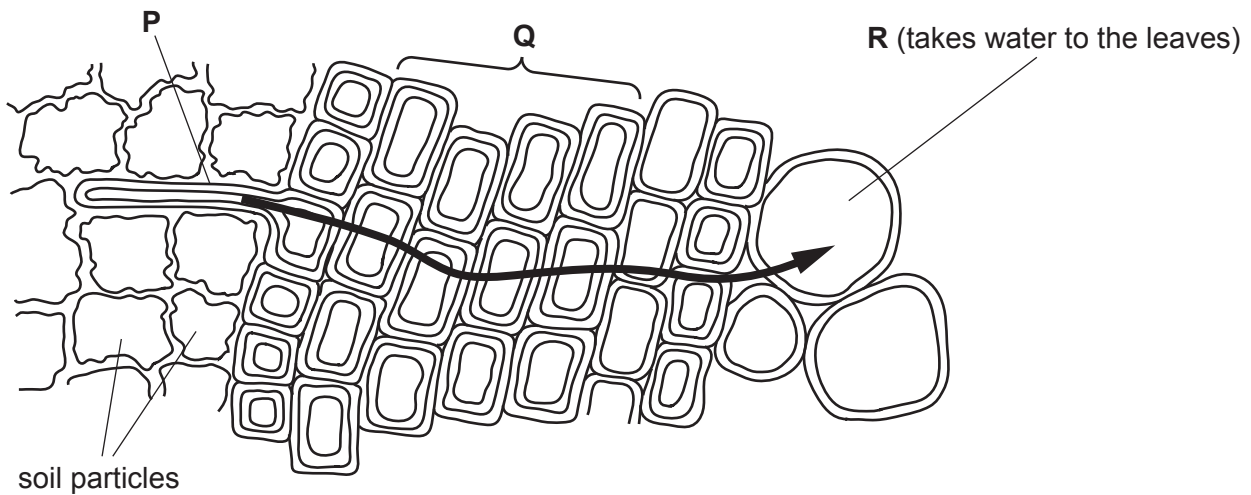


Fig. 1.3

Identify structures **P**, **Q** and **R** shown in Fig. 1.3.

P

Q

R

[3]

- (ii) Transport of water in plants involves transpiration.

State **two** factors that **increase** the rate of transpiration.

1.

2.

[2]

[Total: 11]

- 2 (a) A teacher puts a small piece of sodium onto water in a water trough, as shown in Fig. 2.1.

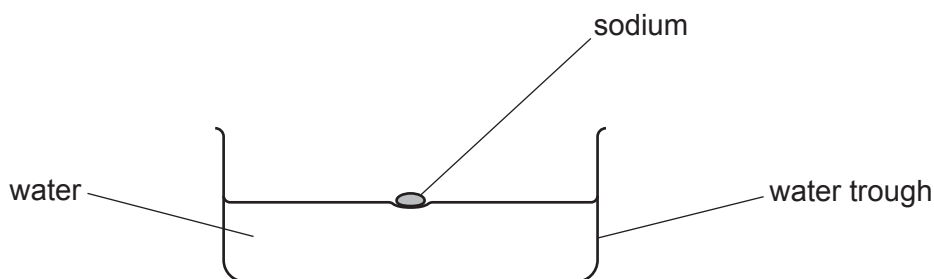


Fig. 2.1

The students observe the reaction between sodium and water.

The teacher repeats the experiment using potassium instead of sodium.

- (i) Describe **one** similarity in the reactions of potassium and of sodium with water.

..... [1]

- (ii) Describe **one** difference between the observations for the reactions of potassium and of sodium with water.

Explain the reason for this difference.

difference

explanation

[2]

- (b) Iron is in a collection of metals in the Periodic Table shown on page 20.

- (i) Name this collection of metals.

..... [1]

- (ii) State **one** physical property of iron that is also a physical property of sodium.

..... [1]

- (iii) State **one** property of iron that is **not** a property of sodium.

..... [1]

- (c) The metals aluminium, copper and iron can be recycled.

State **one** reason, other than cost, why these metals can be recycled.

.....

.....

[1]

- (d) An atom of aluminium is represented by the symbol shown.



- (i) Complete Fig. 2.2 to show the electronic structure of this atom.

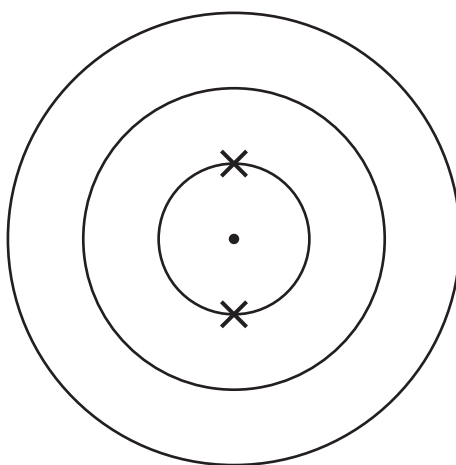


Fig. 2.2

[2]

- (ii) Describe how this atom forms an aluminium ion, Al^{3+} .

.....

.....

[1]

[Total: 10]

- 3 Fig. 3.1 shows a square sheet of metal.

The dimensions of the largest face are $20\text{ cm} \times 20\text{ cm}$.

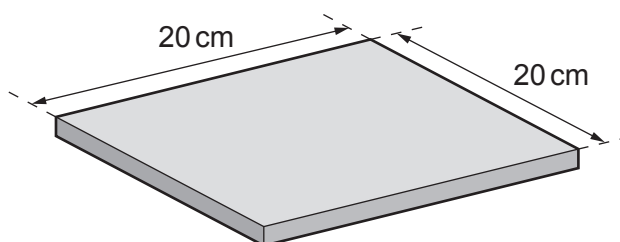


Fig. 3.1 (not to scale)

- (a) (i) The thickness of the sheet is 1.1 cm .

Show that the volume of the sheet is 440 cm^3 .

[1]

- (ii) The mass of the sheet is 1800 g .

Calculate the density of the metal.

density = ... g/cm^3 [2]

- (iii) The sheet lying flat on the ground in Fig. 3.1 exerts pressure on the ground.

Fig. 3.2 shows the sheet standing on one edge on the ground.

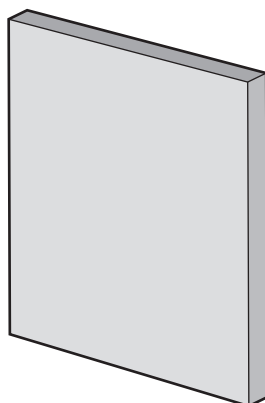


Fig. 3.2 (not to scale)

Explain why the sheet in Fig. 3.2 exerts a much greater pressure on the ground than the sheet in Fig. 3.1.

.....

.....

..... [2]

(b) The weight of the metal plate is 18 N.

The metal plate is lifted from the ground with an upwards force of 20 N.

(i) Calculate the resultant force on the metal plate.

resultant force = ... N [1]

(ii) Fig. 3.3 shows a speed–time graph for the plate as it is lifted from the ground until it stops moving again.

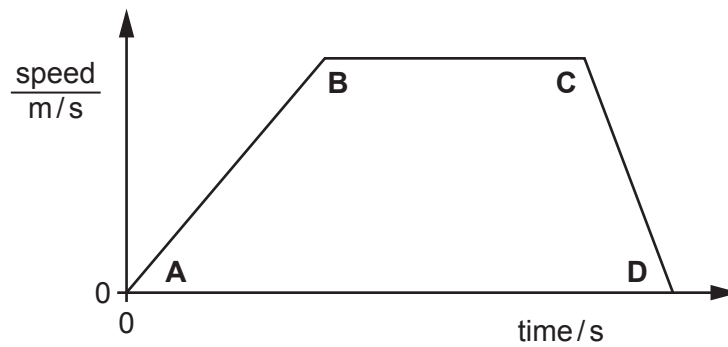


Fig. 3.3

Describe the motion of the plate between the points shown on Fig. 3.3.

A and B

B and C

C and D

[2]

[Total: 8]

- 4 (a) Fig. 4.1 shows the human alimentary canal and associated organs.

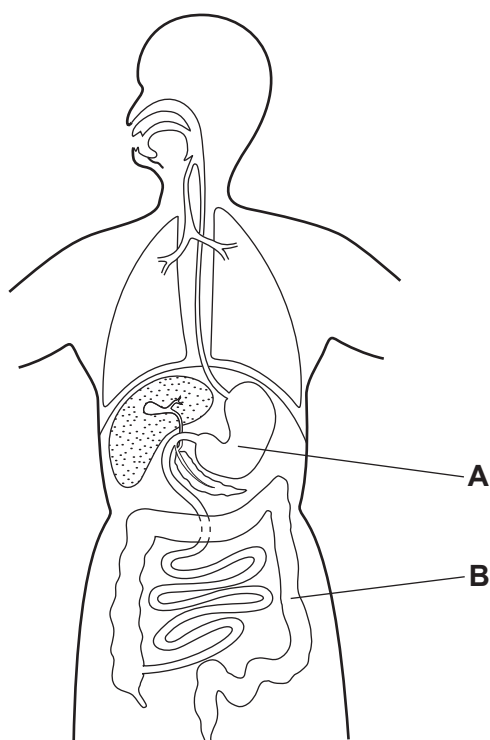


Fig. 4.1

- (i) Identify parts **A** and **B** shown in Fig. 4.1.

A

B

[2]

- (ii) Use a label line and the letter **X** to show a possible position of a salivary gland in Fig. 4.1.

[1]

- (b) Large food molecules are made from smaller molecules.

Table 4.1 shows some large molecules and the smaller molecules they are made from.

Complete Table 4.1.

Table 4.1

large molecules	smaller molecules
glycogen	
.....	amino acids
oils	 and

[3]

(c) Fig. 4.2 shows a graph of the activity of two enzymes **A** and **B** from the alimentary canal.

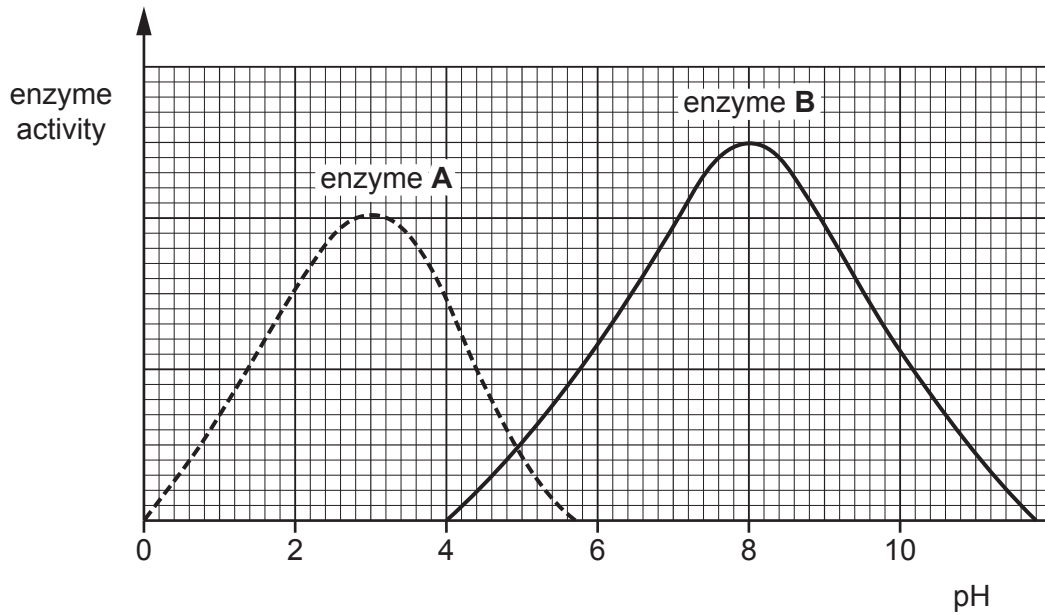


Fig. 4.2

- (i) Describe the effect of changes in pH on the activity of enzyme **B**.

Use data from Fig. 4.2 to support your answer.

.....

 [2]

- (ii) The stomach produces hydrochloric acid to kill bacteria in food.

Identify which enzyme **A** or **B** works best in the stomach.

Explain your answer.

enzyme
 explanation
 [1]

[Total: 9]

5 (a) A liquid fuel contains atoms of carbon and hydrogen only.

(i) State the type of compound which contains atoms of carbon and hydrogen only.

..... [1]

(ii) Deduce the naturally occurring substance from which this liquid fuel is obtained.

..... [1]

(iii) Deduce the type of chemical bond that forms between atoms of carbon and atoms of hydrogen.

..... [1]

(b) Propene is a gas at room temperature and pressure.

Fig. 5.1 shows the structure of a molecule of propene.

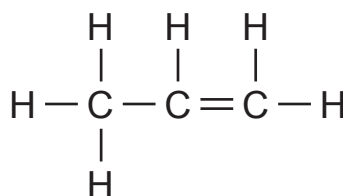


Fig. 5.1

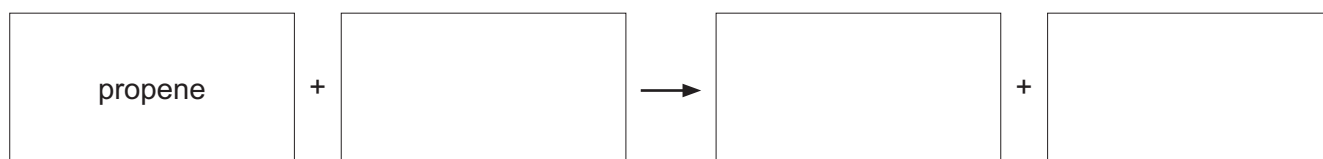
(i) Deduce the formula of propene.

..... [1]

(ii) Describe the effect, if any, of propene on aqueous bromine.

.....
 [1]

(iii) Complete the word equation for the complete combustion of propene.



[2]

(iv) Propene is transported as a liquid.

Describe the difference between gaseous propene and liquid propene in terms of the separation of the molecules and the motion of the molecules.

separation

.....

motion

.....

[2]

[Total: 9]

- 6 Fig. 6.1 shows a man holding a glass rod in one hand and a metal rod in the other hand. He holds both rods so that their ends are in a hot flame.

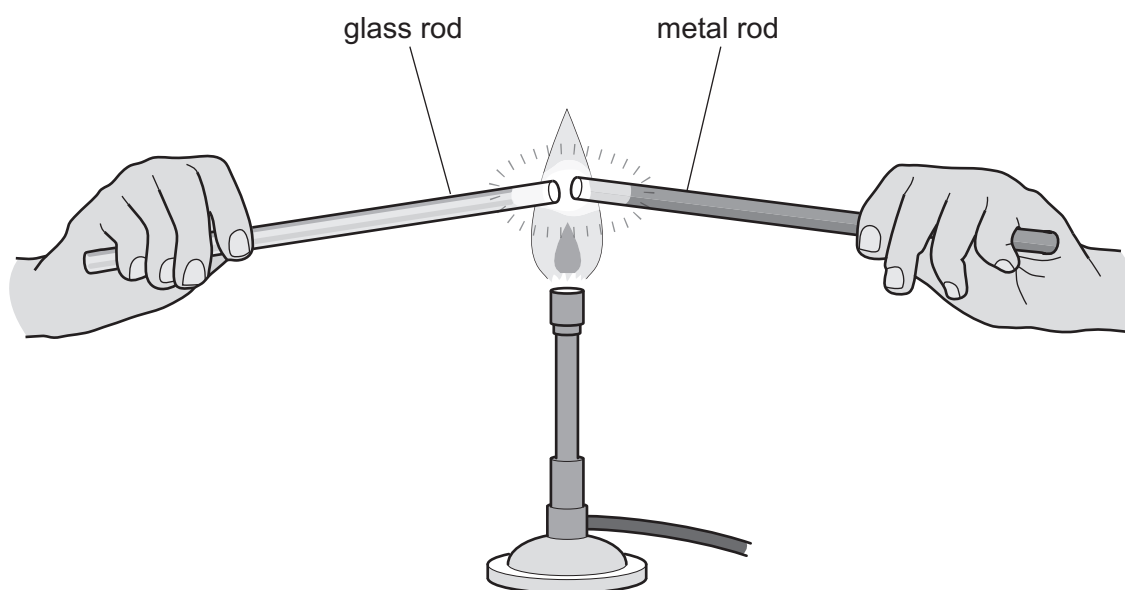


Fig. 6.1

- (a) After some time, the man suddenly drops the metal rod because it becomes too hot.

He can hold the glass rod for a much longer time.

- (i) State the method of thermal energy transfer along the metal rod to the man's hand.

..... [1]

- (ii) State the method of energy transfer which does not require a medium to travel through.

..... [1]

- (iii) Explain why the man can hold the glass rod for much longer than he can hold the metal rod.

.....

..... [1]

- (b) The man now uses tongs to hold the two rods.

The temperature of the hot flame is gradually increased to a maximum of 900°C .

At 500°C , the end of the glass rod softens and melts, but the end of the metal rod does not melt.

The end of the metal rod melts before the maximum flame temperature is reached.

Table 6.1 shows the melting points of some metals.

Table 6.1

metal	melting point/ $^{\circ}\text{C}$
aluminium	660
copper	1083
iron	1535
silver	962
zinc	420

Identify the metal from which the metal rod is made.

..... [1]

- (c) A metal bar is made of a strip of copper and a strip of iron fixed together. Fig. 6.2 shows the metal bar at room temperature.

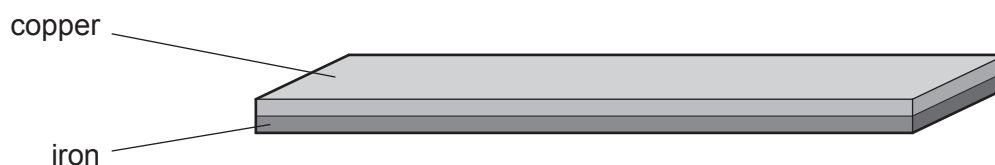


Fig. 6.2

Fig. 6.3 shows what happens to the bar when it is heated in the flame.

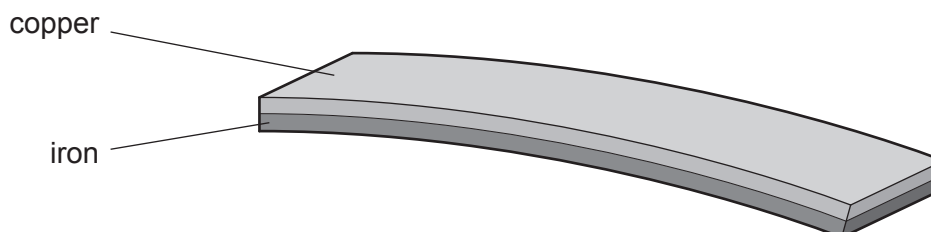


Fig. 6.3

Suggest why the bar bends when it is heated.

.....

 [2]

- (d) (i) Fig. 6.4 shows a musical instrument called tubular bells. The instrument is made of different lengths of metal tubing.



Fig. 6.4

The instrument is played by hitting the tubes with a plastic hammer.

Shorter metal tubes produce musical notes at a higher pitch than longer tubes.

Complete the sentences using words from the list.

Each word may be used once, more than once or not at all.

larger

higher

longer

lower

shorter

smaller

The frequency of the sound wave emitted by a longer tube is
than the frequency of the sound wave emitted by a shorter tube.

When the same longer tube is hit harder with the plastic hammer, the sound wave it
emits has the same frequency but a amplitude. [2]

- (ii) On days when the temperature is very hot, the note emitted by each tube can change.

Suggest how the note from a tube might change when the temperature rises.

Give a reason for your answer.

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

[Total: 9]

- 7 (a) Fig. 7.1 shows the male reproductive organs.

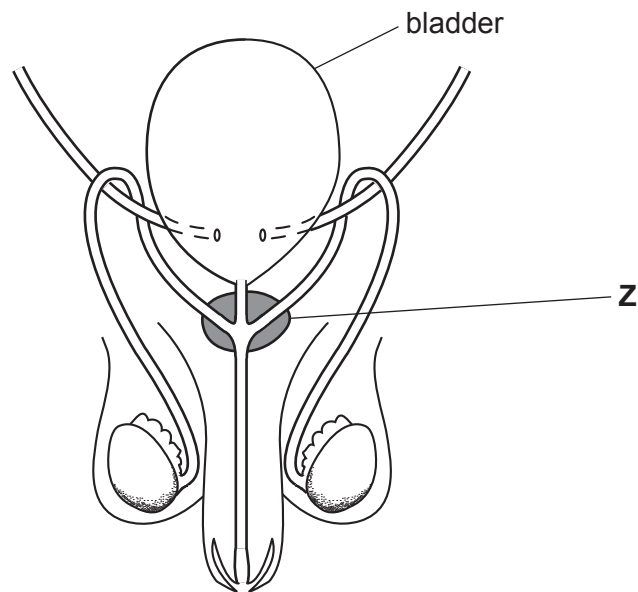


Fig. 7.1

Identify the name and function of part **Z** shown in Fig. 7.1.

name

function

.....

[2]

- (b) Humans reproduce by sexual reproduction.

Some organisms reproduce by asexual reproduction.

State **two** ways in which sexual reproduction is different from asexual reproduction.

1.

.....

2.

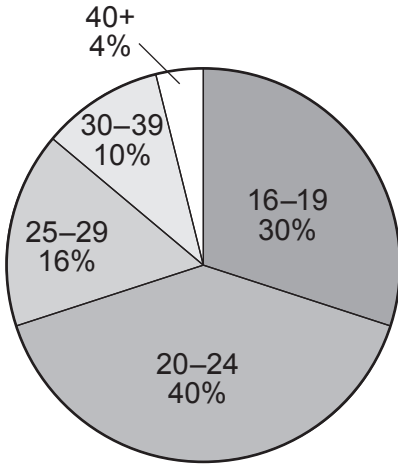
.....

[2]

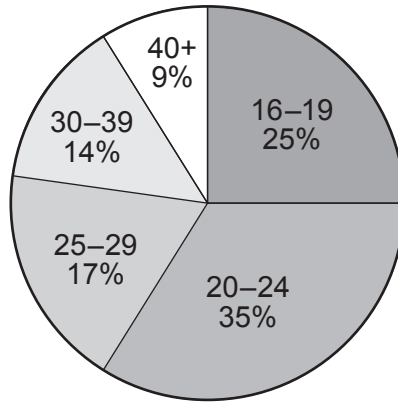
- (c) Chlamydia, gonorrhea and HIV are sexually transmitted infections (STIs).

Fig. 7.2 shows the percentage of new cases of chlamydia, gonorrhea and HIV for one country in one year.

chlamydia, by age in years



gonorrhea, by age in years



HIV, by age in years

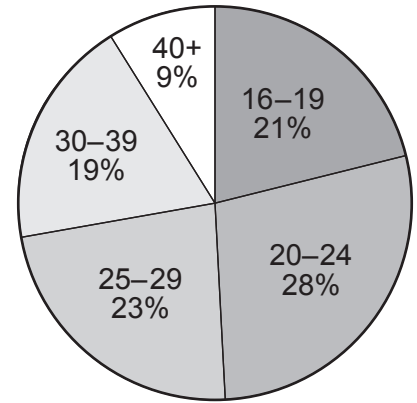


Fig. 7.2

- (i) State the age group with the lowest percentage of HIV cases.

age group = ... years [1]

- (ii) The country made this statement about the data.

Young adults aged 20–24 years are at **greatest** risk of sexually transmitted infections.

Identify evidence from Fig. 7.2 that supports this statement.

..... [1]

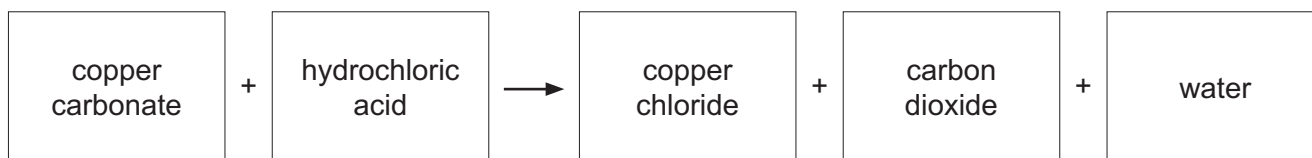
- (iii) Describe **one** way in which the spread of sexually transmitted infections is controlled.

..... [1]

[Total: 7]

- 8 (a) Copper chloride is made in the reaction between excess solid copper carbonate and dilute hydrochloric acid.

The word equation for this reaction is shown.



- (i) Describe how unreacted copper carbonate is removed from the mixture when the reaction is complete.
 [1]
- (ii) Suggest how solid copper chloride is obtained from the aqueous copper chloride that forms.
 [1]
- (iii) State the test for carbon dioxide and the positive test result.
 test
 result [2]
- (b) Chlorine is produced when electricity is passed through concentrated aqueous sodium chloride, as shown in Fig. 8.1.

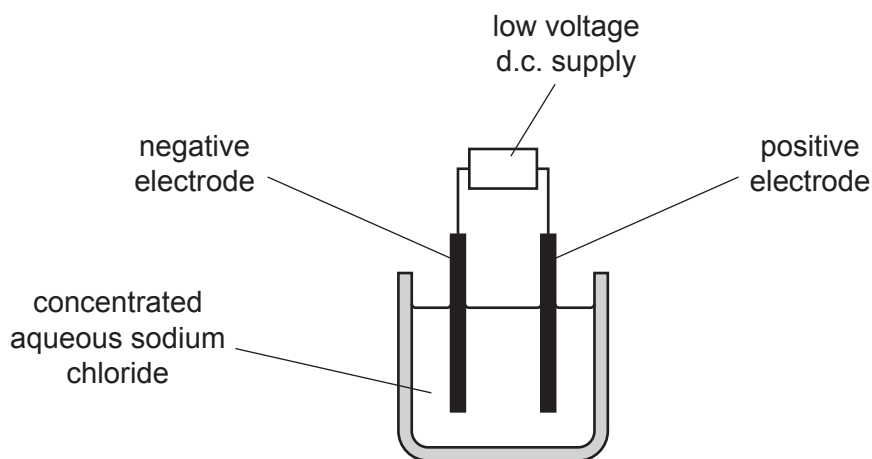


Fig. 8.1

- (i) Name this process.
 [1]
- (ii) Identify the solvent and the solute through which electricity is passed during this process.
 solvent.....
 solute [1]

- (iii) Identify **one** element in the same group of the Periodic Table as chlorine that has a higher melting point than chlorine.

..... [1]

[Total: 7]

- 9 Fig. 9.1 shows a simple circuit containing two identical lamps **A** and **B**.

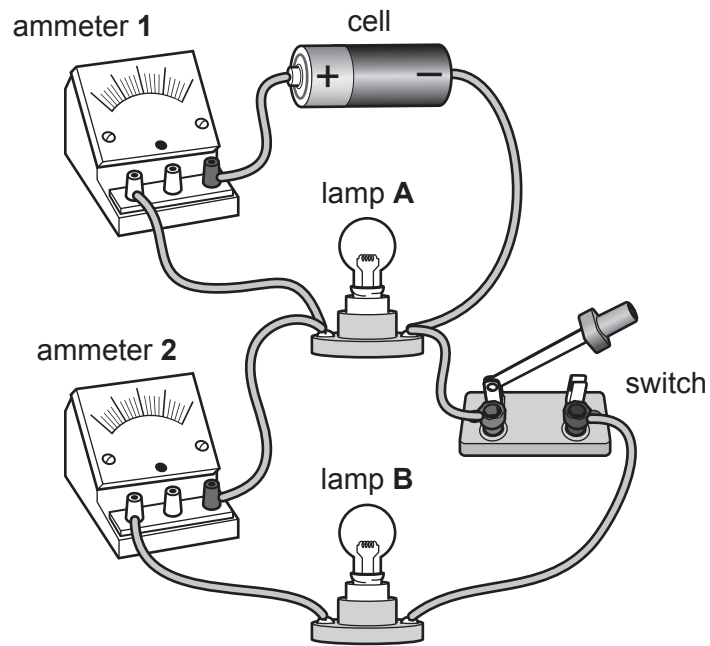


Fig. 9.1

- (a) (i) The switch in Fig. 9.1 is open. Circle the correct configuration of the lamps.

lamp **A**: ON/OFF

lamp **B**: ON/OFF

[1]

- (ii) The switch shown in Fig. 9.1 is now closed. Circle the correct configuration of the lamps.

lamp **A**: ON/OFF

lamp **B**: ON/OFF

[1]

- (b) (i) Name the type of circuit arrangement of the two lamps in this circuit.

..... [1]

- (ii) Draw the circuit diagram for the circuit pictured in Fig. 9.1.

[3]

- (c) When both lamps are lit, ammeter **1** shows the total current in the circuit. The reading on ammeter **1** is 0.60A.

- (i) Suggest the reading on ammeter **2**.

Explain your answer.

reading = ...

explanation

[2]

- (ii) The combined resistance of lamps **A** and **B** when both are lit is 2.5Ω .

Calculate the potential difference (p.d.) across the cell.

potential difference = ... V [2]

[Total: 10]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.

The Periodic Table of Elements

Group																			
I	II	Key										III	IV	V	VI	VII	VIII		
		1 H hydrogen 1																	
		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	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84		
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131		
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —		
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	114 Fl flerovium —	116 Lv livermorium —	118 Ts tennessine —	119 Og oganesson —	120 Nh nihonium —	121 Lr lawrencium —		

lanthanoids

actinoids

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	euroium	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
89	Ac	actinium	—	90	Th	thorium	232	91	Pa	protactinium	231	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	—

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).