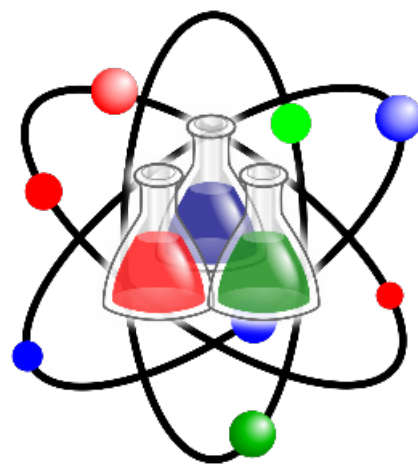


Edge Hill
University

Standalone Test Revision Support



Science GCSE Equivalency Exam Practice Paper

Version: 9 September 2025 / Series B

The Periodic Table of Elements – a copy of this page will be provided in your exam

Key

Relative atomic mass *A_r*
Atomic number (Proton number) *Z*

												1 H Hydrogen 1						4 He Helium 2
1	2											3	4	5	6	7		
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	99 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54	
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	209 Po Polonium 84	209 At Astatine 85	209 Rn Radon 86	
226 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89																

Elements 58-71 and 90-103 have been omitted.

1	Reactivity Series of Metals	Potassium Sodium Calcium Magnesium Aluminium <i>Carbon</i> Zinc Iron Tin Lead <i>Hydrogen</i> Copper Silver Gold Platinum	Most Reactive ↑ ↓ Least Reactive
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(elements in italics, though non-metals, have been included for comparison).

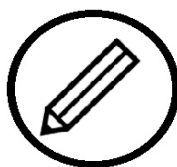
2	Formulae of Some Common Ions	Positive ions Name	Negative ions Formula Name
	Formula		
		Hydrogen H ⁺	Chloride Cl ⁻
		Sodium Na ⁺	Bromide Br ⁻
		Silver Ag ⁺	Fluoride F ⁻
		Potassium K ⁺	Iodide I ⁻
		Lithium Li ⁺	Hydroxide OH ⁻
		Ammonium NH ₄ ⁺	Nitrate NO ₃
		Barium Ba ²⁺	Oxide O ²⁻
		Calcium Ca ²⁺	Sulphide S ²⁻
		Copper (II) Cu ²⁺	Sulphate SO ₄ ²⁻

Magnesium	Mg ²⁺	Carbonate
CO ₃ ²⁻		
Zinc	Zn ²⁺	
Lead	Pb ²⁺	
Iron (I)	Fe ²⁺	
Iron (II)	Fe ³⁺	
Aluminium	Al ³⁺	

Edge Hill GCSE Science Equivalency Test

Practice Paper

2 Hours



This sample paper contains example questions to help you:

- **prepare for your exam**
- **test your knowledge**
- **identify topics for revision.**

The mark scheme for this paper
can be found at the back of the revision pack.

Biology

Animal Cells

Q1.

Figure 1 shows an animal cell.

Figure 1



(a) What is structure **A**?

Tick **one** box.

Cell membrane

Cell wall

Chromosome

Cytoplasm

(b) What is structure **B**?

Tick **one** box.

- Chloroplast
- Mitochondria
- Nucleus
- Vacuole

(1)

(c) **Figure 2** shows a sperm cell.

Figure 2

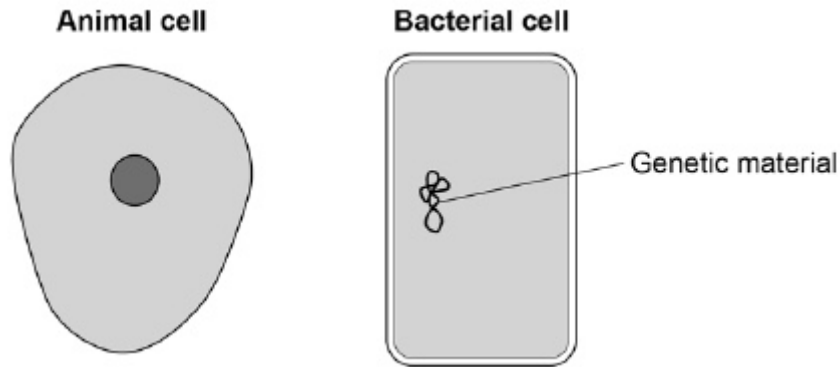


Describe how a sperm cell is adapted to carry out its function.

(1)

(d) **Figure 3** shows an animal cell and a bacterial cell.

Figure 3



Compare the structure of the cells in **Figure 3**.

Complete the sentences.

Choose the answers from the box.

cell membrane	cell wall	chloroplast
cytoplasm		nucleus

Only the animal cell contains a _____

Only the bacterial cell contains a _____

(2)

[5 marks]

Cancer

Q2.

Malignant tumours are called cancers.

(a) What does the term malignant indicate in relation to a tumour?

(3)

(b) The table below shows data for people diagnosed with cancer in 1960 and 2000.

Type of Cancer	Diagnosed in 1960	Diagnosed in 2000
	% people alive 10 years after diagnosis	% people alive 10 years after diagnosis
Bowel	22	54
Breast	38	76
Prostate	22	82
Skin	46	85
Testicular	66	96

Look at the data in the figure above for testicular cancer.

Calculate the percentage increase in the survival rate of people diagnosed with testicular cancer in 1960 compared to 2000.

Give your answer to **three** significant figures.

Survival rate increase = _____ %

(2)

Immune System

Q3.

White blood cells protect the body against pathogens such as bacteria and viruses.

(a) (i) Pathogens make us feel ill.

Give **one** reason why.

(1)

(ii) White blood cells produce antibodies. This is one way white blood cells protect us against pathogens.

Give **two** other ways that white blood cells protect us against pathogens.

1.

2.

(2)

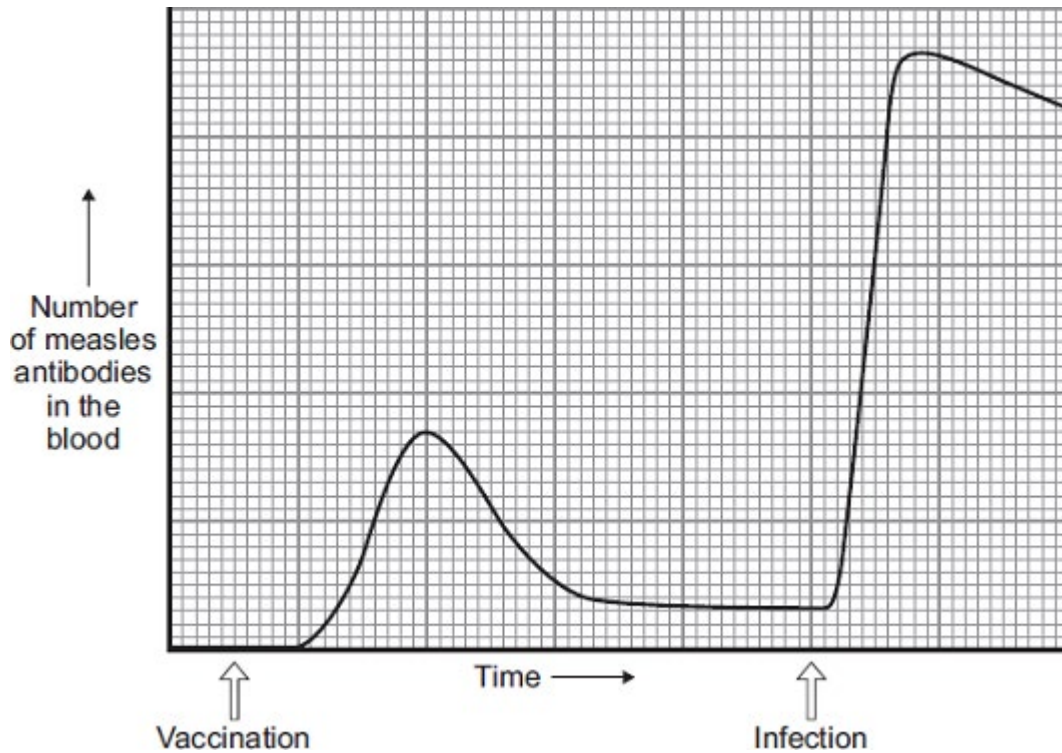
(b) Vaccination can protect us from the diseases pathogens cause.

(i) A doctor vaccinates a child against measles.

What does the doctor inject into the child to make the child immune to measles?

- (ii) A few weeks after the vaccination, the child becomes infected with measles viruses from another person.

The graph shows the number of measles antibodies in the child's blood from before the vaccination until after the infection.



More measles antibodies are produced after the infection than after the vaccination.

Describe other differences in antibody production after infection compared with after vaccination.

(iii) Vaccination against the measles virus will **not** protect the child against the rubella virus.

Why?

(1)

(c) What is the advantage of vaccinating a large proportion of the population against measles?

(1)

(d) In 2014 there was an outbreak of Ebola virus disease (EVD) in Africa.

At the time of the outbreak there were:

- no drugs to treat the disease
- no vaccines to prevent infection.

Why were antibiotics **not** used to treat EVD?

(1)

- (e) After the outbreak began, drug companies started to develop drugs and vaccines for EVD.

A drug must be thoroughly tested and trialled before it is licensed for use.

Testing, trialling and licensing new drugs usually takes several years.

Draw **one** line from each word about drug testing to the definition of the word.

Word about drug testing

Definition

Dose	Side effects making the person ill
Efficacy	The concentration of the drug to be used and how often the drug should be given
Toxicity	Whether the drug works to treat the illness

(2)

- (f) The results of drug testing and drug trials are studied in detail by other scientists.
Only then can the results be published by the drug company.
Suggest **one** reason why the results are studied by other scientists.

(1)

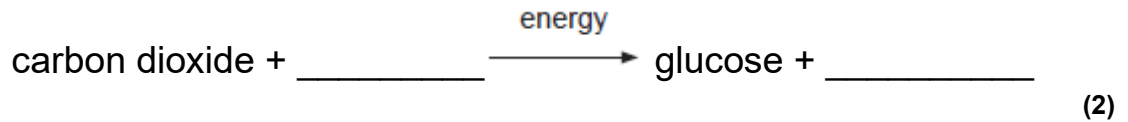
[14 marks]

Photosynthesis

Q4.

Photosynthesis uses carbon dioxide to make glucose.

- (a) (i) Complete the equation for photosynthesis.



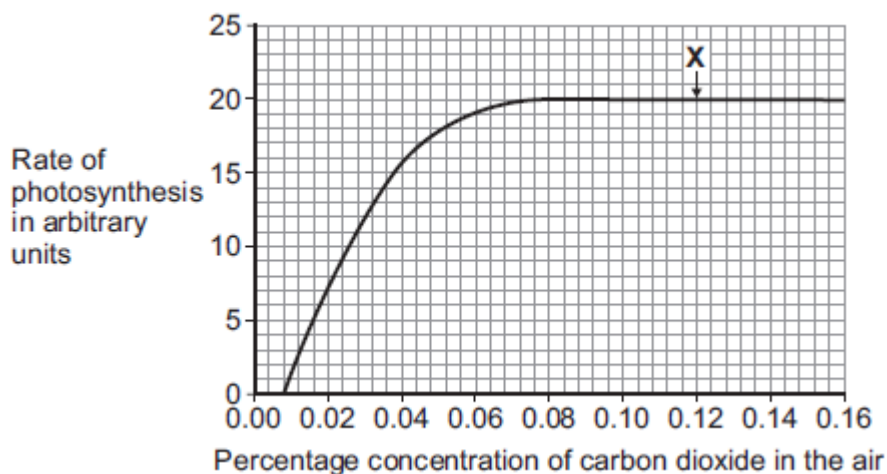
- (ii) What type of energy does a plant use in photosynthesis?

_____ (1)

- (iii) Which part of a plant **cell** absorbs the energy needed for photosynthesis?

_____ (1)

- (b) The graph shows the effect of the concentration of carbon dioxide on the rate of photosynthesis in tomato plants at 20 °C.



- (i) What is the maximum rate of photosynthesis of the tomato plants shown in the graph?

_____ arbitrary units (1)

- (ii) At point **X**, carbon dioxide is **not** a limiting factor of photosynthesis.

Suggest **one** factor that is limiting the rate of photosynthesis at point **X**.

_____ (1)

- (c) A farmer plans to grow tomatoes in a large greenhouse.

The concentration of carbon dioxide in the atmosphere is 0.04%.
The farmer adds carbon dioxide to the greenhouse so that its concentration is 0.08%.

- (i) Why does the farmer use 0.08% carbon dioxide?

Tick (✓) **one** box.

To increase the rate of growth of the tomato plants

To increase the rate of respiration of the tomato plants

To increase water uptake by the tomato plants

(1)

- (ii) Why does the farmer **not** use a concentration of carbon dioxide higher than 0.08%?

Tick (✓) **two** boxes.

Because it would cost more money than using 0.08%

Because it would decrease the temperature of the greenhouse

Because it would not increase the rate of photosynthesis of the tomato plants any further

Because it would increase water loss from the tomato plants

(2)

[9 marks]

Diabetes and Insulin

Q5.

Type 1 diabetes develops when the body does not produce enough insulin.

- (a) Which body organ produces insulin?

(1)

- (b) One treatment for diabetes is to inject insulin.

The table gives the properties of four different types of insulin, **A**, **B**, **C** and **D**.

Type of insulin	Time taken for the insulin to begin to work in minutes	Time taken for insulin to reach maximum concentration in the blood in minutes	Time when insulin is no longer effective in hours
A	15-20	30-90	3-4
B	30-60	80-120	4-6
C	120-240	360-600	14-16
D	240-360	600-960	18-20

- (i) Some people with diabetes need to inject insulin just before a meal to stop a big increase in blood sugar concentration.

Which type of insulin, **A**, **B**, **C** or **D**, should these people with diabetes inject just before a meal?

Give the reason for your answer.

(2)

- (ii) A person with diabetes is told to inject type **B** insulin immediately after breakfast at 09.00.
The person with diabetes is told to then inject a second type of insulin at lunchtime at 12.00.
The second type of insulin should keep the blood sugar level under control for the rest of the 24 hours.

Which type of insulin, **A**, **C** or **D**, should this person with diabetes inject at lunchtime?

Give the reason for your answer.

(2)
[5 marks]

Genetic Crosses

Q6.

In humans, hair colour is an inherited characteristic.

Red hair is caused by a recessive allele.

- (a) When does a recessive allele control the development of a characteristic?

Tick (✓) **one** box.

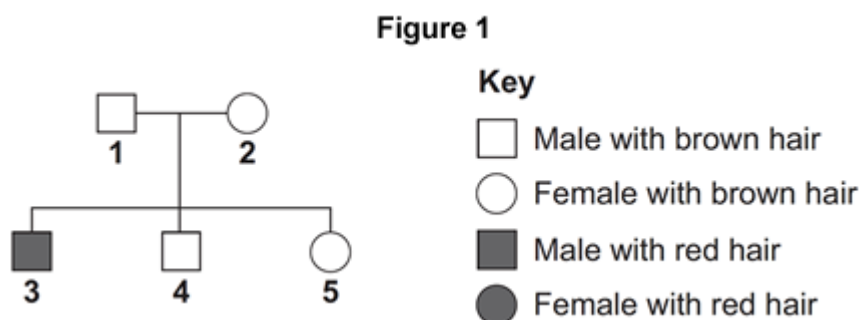
When the allele is present on only one of the chromosomes.

When the dominant allele is not present.

When the allele is inherited from the female parent.

(1)

- (b) **Figure 1** shows the inheritance of hair colour in one family.



- (i) Brown hair is caused by a dominant allele, **B**.

Red hair is caused by the recessive allele, **b**.

What combination of alleles does person **1** have?

Tick (✓) **one** box.

BB

Bb

bb

(1)

- (ii) Person 3 married a woman with brown hair.

Figure 2 shows how hair colour could be inherited by their children.

Figure 2

		Woman Brown hair	
		B	b
Person 3 Red hair	b	Bb	
	b		

Complete **Figure 2** to show the combination of alleles that the children would inherit.

One has been done for you.

(2)

- (iii) What is the probability that one of the children would have red hair?

Tick (✓) **one** box.

1 in 2

1 in 3

1 in 4

(1)

[5 marks]

Adaptation in Animals

Q7.

Organisms have adaptations that enable them to survive in extreme conditions.

(a) The photograph shows an arctic fox.



Suggest **two** ways in which the arctic fox is adapted for life in very cold conditions.

Explain how each adaptation helps the arctic fox to survive in very cold conditions.

Adaptation 1

How this adaptation helps the arctic fox to survive in very cold conditions.

Adaptation 2

How this adaptation helps the arctic fox to survive in very cold conditions.

(4)

(b) The photograph shows an antelope that lives in a sandy desert.



The antelope is prey to large cats such as lions.

Suggest **one** adaptation that helps this antelope avoid being killed by predators.

Explain how this adaptation helps the antelope avoid being killed by predators.

Adaptation

How this adaptation helps the antelope avoid being killed by predators.

(2)

[6 marks]

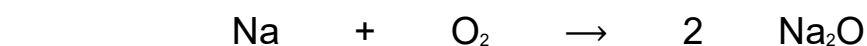
Chemistry

Q1.

This question is about metal oxides.

When sodium is heated in oxygen, sodium oxide is produced.

(a) Balance the equation for the reaction.



(1)

(b) Why is this an oxidation reaction?

(1)

(c) Sodium oxide is added to water and shaken.

Universal indicator is added.

The pH of the solution is 14

What is the colour of the universal indicator?

Tick (✓) **one** box.

Green

Purple

Red

Yellow

(1)

(d) Aluminium oxide reacts with hydrochloric acid to produce a salt.

What is the name of the salt produced?

Tick (✓) **one** box.

Aluminium chloride

Aluminium nitrate

Aluminium sulfate

Aluminium sulfide

(1)

A student investigates the solubility of four metal oxides and four non-metal oxides in water.

The student tests the pH of the solutions formed.

The table shows the student's results.

Type of oxide	Oxide	Solubility in water	pH of solution
Metal oxides	Sodium oxide	Soluble	14
	Calcium oxide	Soluble	10
	Magnesium oxide	Slightly soluble	9
	Zinc oxide	Insoluble	No solution formed
Non-metal oxides	Carbon dioxide	Soluble	5
	Sulfur dioxide	Soluble	2
	Phosphorus oxide	Soluble	1
	Silicon dioxide	Insoluble	No solution formed

The student makes two conclusions.

Conclusion 1: 'All metal oxides produce alkaline solutions.'

Conclusion 2: 'All non-metal oxides produce acidic solutions.'

(e) Explain why the student's conclusions are only partly correct.

Use information from the table above.

(4)

(f) Give an improved conclusion for metal oxides.

Use the table above.

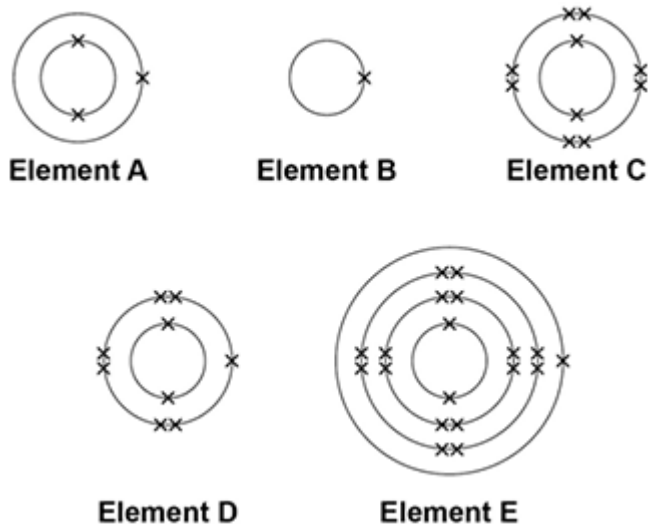
(2)

(Total 9 marks)

Q2.

The electronic structure of the atoms of five elements are shown in the figure below.

The letters are **not** the symbols of the elements.



Choose the element to answer the question. Each element can be used once, more than once or not at all. **Use the periodic table to help you.**

(a) Which element is hydrogen?

Tick **one** box.

A B C D E

(1)

(b) Which element is a halogen?

Tick **one** box.

A B C D E

(1)

(c) Which element is a metal in the same group of the periodic table as element **A**?

Tick **one** box.

A B C D E

(1)

(d) Which element exists as single atoms?

Tick **one** box.

A **B** **C** **D** **E**

(1)

(e) There are two isotopes of element **A**. Information about the two isotopes is shown in the table below.

Mass number of the isotope	6	7
Percentage abundance	92.5	7.5

Use the information in the table above to calculate the relative atomic mass of element **A**.

Give your answer to 2 decimal places.

Relative atomic mass = _____

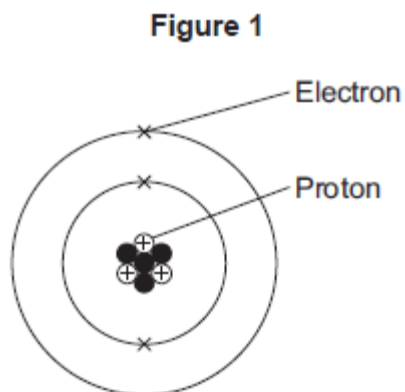
(4)

(Total 8 marks)

Q3.

There are eight elements in the second row (lithium to neon) of the periodic table.

(a) **Figure 1** shows a lithium atom.



(i) What is the mass number of the lithium atom in **Figure 1**?

Tick (✓) **one** box.

3

4

7

(1)

(ii) What is the charge of an electron?

Tick (✓) **one** box.

-1

0

+1

(1)

- (iii) Protons are in the nucleus.
Which other sub-atomic particles are in the nucleus?

Tick (✓) **one**
box.

ions

molecules

neutrons

(1)

- (b) What is **always** different for atoms of different elements?

Tick (✓) **one**
box.

number of
neutrons

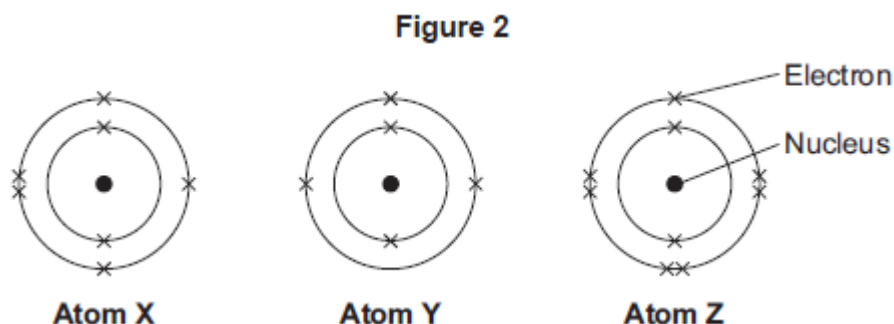
number of protons

number of shells

(1)

- (c) **Figure 2** shows the electron arrangements of three different atoms, **X**, **Y** and **Z**.

These atoms are from elements in the second row (lithium to neon) of the periodic table.



Which atom is from an element in Group 3 of the periodic table?

Tick (✓) **one** box.

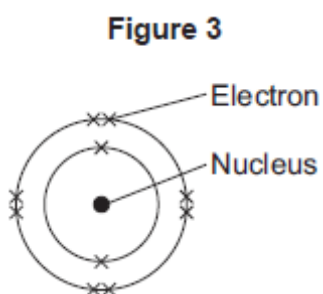
Atom X

Atom Y

Atom Z

(1)

- (d) **Figure 3** shows the electron arrangement of a different atom from an element in the second row of the periodic table.



- (i) Give the chemical symbol of this element.

(1)

(ii) Why is this element unreactive?

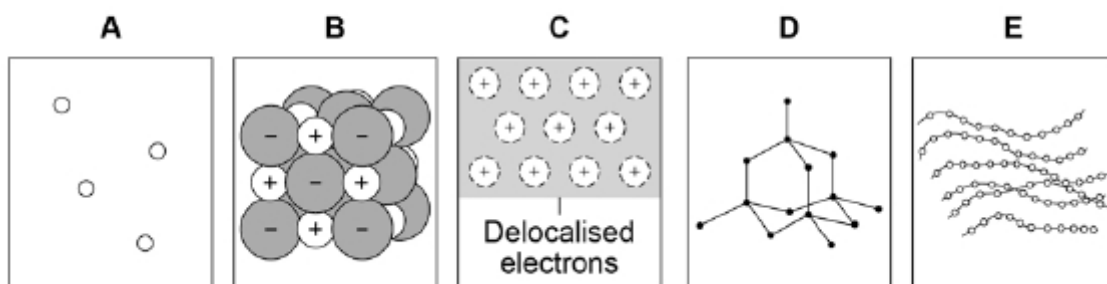
(1)

(Total 7 marks)

Q4.

Figure 1 shows the structure of five substances.

Figure 1



(a) Which diagram shows a gas?

Tick (✓) **one** box.

A B C D E

(1)

(b) Which diagram shows the structure of diamond?

Tick (✓) **one** box.

A B C D E

(1)

(c) Which diagram shows a metallic structure?

Tick (✓) **one** box.

A B C D E

(1)

(d) Which diagram shows a polymer?

Tick (✓) **one** box.

A B C D E

(1)

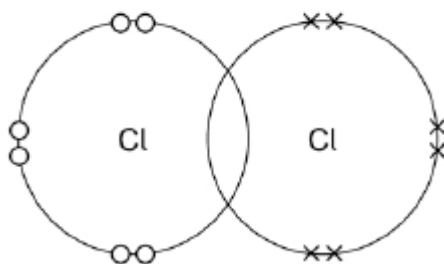
(e) A chlorine atom has 7 electrons in the outer shell.
Two chlorine atoms covalently bond to form a chlorine molecule,
 Cl_2

Figure 2 is a dot and cross diagram showing the outer shells and
some electrons in a chlorine molecule.

Complete the dot and cross diagram.

Show only the electrons in the outer shell.

Figure 2



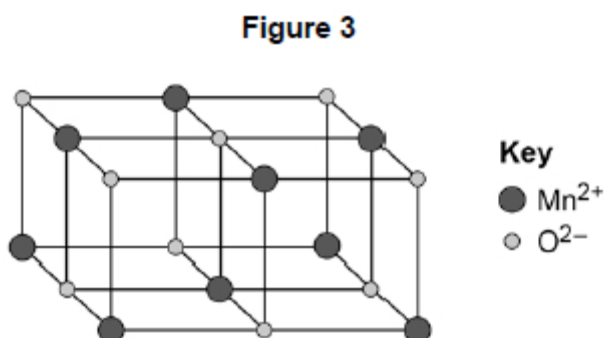
(1)

- (f) What is the reason for chlorine's low boiling point?
Tick (✓) **one** box.

- Strong covalent bonds
- Strong forces between molecules
- Weak covalent bonds
- Weak forces between molecules

(1)

Figure 3 represents the structure of manganese oxide.
Manganese oxide is an ionic compound.



- (g) Determine the empirical formula of manganese oxide.

Use **Figure 3**.

Empirical formula = _____

(1)

(h) Why does manganese oxide conduct electricity as a liquid?

Tick (✓) **one** box.

Atoms move around in the liquid

Electrons move around in the liquid

Ions move around in the liquid

Molecules move around in the liquid

(1)

(Total 8 marks)

Q5.

This question is about different substances and their structures.

- (a) Draw **one** line from each statement to the diagram which shows the structure.

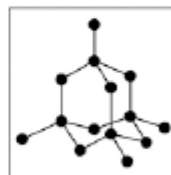
Statement

Structure

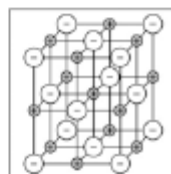
The substance is a gas



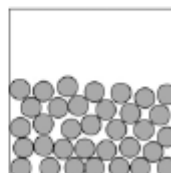
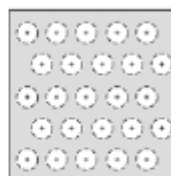
The substance is a liquid



The substance is ionic



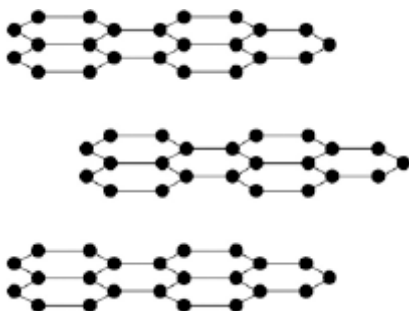
The substance is a solid metal



(4)

(b) **Figure 1** shows the structure of an element.

Figure 1



What is the name of this element?

Tick **one** box.

Carbon

Chloride

Nitrogen

Xenon

(1)

(c) Why does this element conduct electricity?

Tick **one** box.

It has delocalised electrons

It contains hexagonal rings

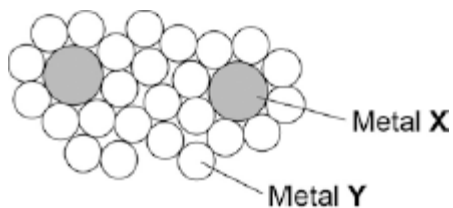
It has weak forces between the layers

It has ionic bonds

(1)

(d) **Figure 2** shows the structure of an alloy.

Figure 2



Explain why this alloy is harder than the pure metal Y.

(2)

(e) What percentage of the atoms in the alloys are atoms of X?

(2)

(f) What type of substance is an alloy?

Tick **one** box.

Compound

Element

Mixture

(1)

(Total 11 marks)

Q6.

A student investigated the reactivity of three different metals.

This is the method used.

1. Place 1 g of metal powder in a test tube.
2. Add 10 cm³ of metal sulphate.
3. Wait 1 minute and observe.
4. Repeat using the other metals and metal sulphates.

The student placed a tick in the table below if there was a reaction and a cross if there was no reaction.

	Zinc	Copper	Magnesium
Copper sulphate	✓	x	✓
Magnesium sulphate	x	x	x
Zinc sulphate	x	x	✓

(a) What is the dependent variable in the investigation?

Tick **one** box.

Time taken

Type of metal

Volume of metal sulphate

Whether there was a reaction
or not

(1)

(b) Give **one** observation the student could make that shows there is a reaction between zinc and copper sulphate.

(1)

- (c) The student used measuring instruments to measure some of the variables.

Draw **one** line from each variable to the measuring instrument used to measure the variable.

Variable	Measuring instrument
	Balance
	Measuring cylinder
Mass of metal powder	
	Ruler
	Burette
Volume of metal sulfate	
	Thermometer
	Test tube

(2)

- (d) Use the results shown in table above to place zinc, copper and magnesium in order of reactivity.

Most reactive _____
↕
Least reactive _____

(1)

- (e) Suggest **one** reason why the student should **not** use sodium in this investigation.

(1)

- (f) Which metal is found in the Earth as the metal itself?

Tick **one** box.

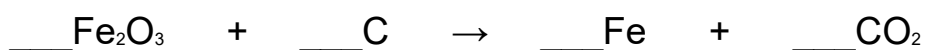
Calcium	<input type="checkbox"/>
Gold	<input type="checkbox"/>
Lithium	<input type="checkbox"/>
Potassium	<input type="checkbox"/>

(1)

- (g) Iron is found in the Earth as iron oxide (Fe_2O_3).

Iron oxide is reduced to produce iron.

Balance the equation for the reaction.



(1)

- (h) Name the element used to reduce iron oxide.

(1)

(i) What is meant by reduction?

Tick **one** box.

Gain of iron

Gain of oxide

Loss of iron

Loss of oxygen

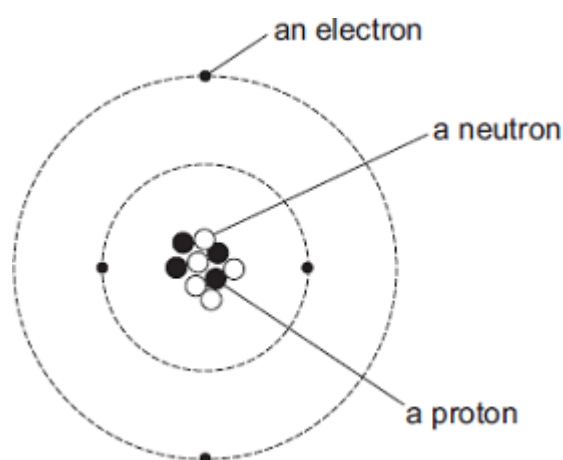
(1)

(Total 10 marks)

Physics

Q1.

The diagram represents an atom of beryllium. The three types of particle that make up the atom have been labelled.



- (a) Use the labels from the diagram to complete the following statements.

Each label should be used once.

The particle with a positive charge is

_____.

The particle with the smallest mass is

_____.

The particle with no charge is

_____.

(2)

- (b) What is the mass number of a beryllium atom?

Draw a ring around your answer.

4	5	9	13
---	---	---	----

Give a reason for your answer.

(2)

(Total 4 marks)

Q2.

(a) Which one of the following is not an electromagnetic wave?

Tick **one** box.

- | | |
|-------------|--------------------------|
| Gamma rays | <input type="checkbox"/> |
| Sound | <input type="checkbox"/> |
| Ultraviolet | <input type="checkbox"/> |
| X-rays | <input type="checkbox"/> |

(1)

(b) What type of electromagnetic wave do our eyes detect?

(1)

(c) What is a practical use for infrared waves?

Tick **one** box.

- | | |
|--------------------------|--------------------------|
| Cooking food | <input type="checkbox"/> |
| Energy efficient lamps | <input type="checkbox"/> |
| Medical imaging | <input type="checkbox"/> |
| Satellite communications | <input type="checkbox"/> |

(1)

Scientists have detected radio waves emitted from a distant galaxy.

Some of the radio waves from the distant galaxy have a frequency of 1 200 000 000 hertz.

(d) Which is the same as 1 200 000 000 hertz?

Tick **one** box.

- | | |
|----------------|--------------------------|
| 1.2 gigahertz | <input type="checkbox"/> |
| 1.2 kilohertz | <input type="checkbox"/> |
| 1.2 megahertz | <input type="checkbox"/> |
| 1.2 millihertz | <input type="checkbox"/> |

(1)

- (e) Radio waves travel through space at 300 000 kilometres per second (km/s).

How is 300 000 km/s converted to metres per second (m/s)?

Tick **one** box.

$300\,000 \div 1000 = 300 \text{ m/s}$

$300\,000 \times 1000 = 300\,000\,000 \text{ m/s}$

$300\,000 + 1000 = 301\,000 \text{ m/s}$

$300\,000 - 1000 = 299\,000 \text{ m/s}$

(1)

- (f) Write the equation which links frequency, wavelength and wave speed.

(1)

- (g) Calculate the wavelength of the radio waves emitted from the distant galaxy.

Give your answer in metres.

wavelength = _____ m

(3)

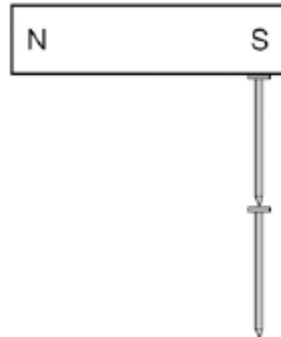
(Total 9 marks)

Q3.

Figure 1 shows two iron nails hanging from a bar magnet.

The iron nails which were unmagnetised are now magnetised.

Figure 1



(a) Complete the sentence.

Use a word from the box.

forced	induced	permanent
---------------	----------------	------------------

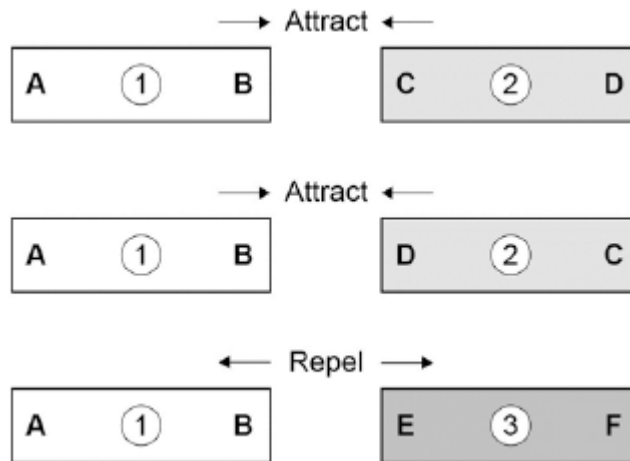
The iron nails have become _____ magnets.

(1)

- (b) Each of the three metal bars in **Figure 2** is either a bar magnet or a piece of unmagnetised iron.

The forces that act between the bars when different ends are placed close together are shown by the arrows.

Figure 2



Which **one** of the metal bars is a piece of unmagnetised iron?

Tick **one** box.

Bar 1

Bar 2

Bar 3

Give the reason for your answer.

(2)

- (c) A student investigated the strength of different fridge magnets by putting small sheets of paper between each magnet and the fridge door.

The student measured the maximum number of sheets of paper that each magnet was able to hold in place.

Why was it important that each small sheet of paper had the same thickness?

(1)

- (d) Before starting the investigation, the student wrote the following hypothesis:

'The bigger the area of a fridge magnet the stronger the magnet will be.'

The student's results are given in the table below.

Fridge magnet	Area of magnet in mm ²	Number of sheets of paper held
A	40	20
B	110	16
C	250	6
D	340	8
E	1350	4

Give **one** reason why the results from the investigation **do not** support the student's hypothesis.

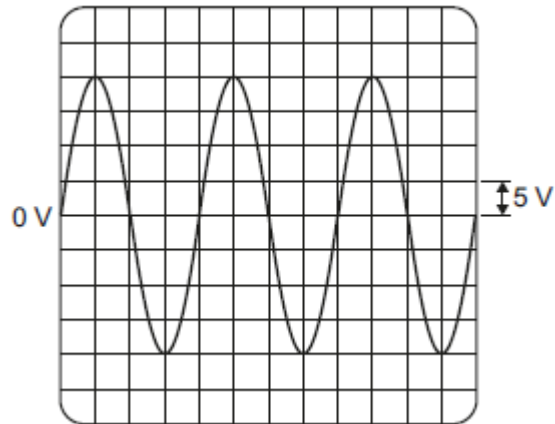
(1)

(Total 5 marks)

Q4.

- (a) **Figure 1** shows the oscilloscope trace an alternating current (a.c.) electricity supply produces.

Figure 1



One vertical division on the oscilloscope screen represents 5 volts.
Calculate the peak potential difference of the electricity supply.

Peak potential difference = _____ V

(1)

- (b) Use the correct answer from the box to complete the sentence.

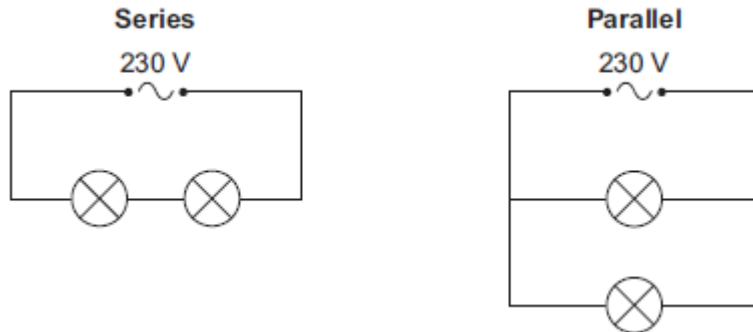
40	50	60
-----------	-----------	-----------

In the UK, the frequency of the a.c. mains electricity supply is _____ hertz.

(1)

- (c) **Figure 2** shows how two lamps may be connected in series or in parallel to the 230 volt mains electricity supply.

Figure 2



- (i) Calculate the potential difference across each lamp when the lamps are connected in **series**.

The lamps are identical.

Potential difference when in series = _____ V

(1)

- (ii) What is the potential difference across each lamp when the lamps are connected in **parallel**?

Tick (✓) **one** box.

115 V 230 V 460 V

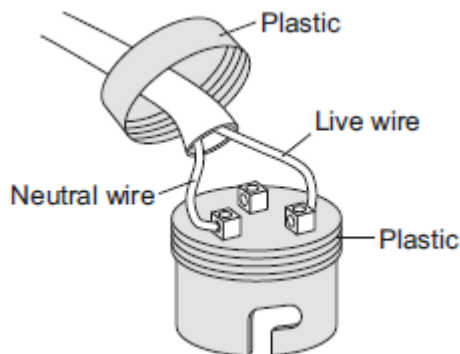
(1)

- (iii) Give **one** advantage of connecting the lamps in parallel instead of in series.

(1)

- (d) **Figure 3** shows the light fitting used to connect a filament light bulb to the mains electricity supply.

Figure 3



The light fitting does **not** have an earth wire connected.

Explain why the light fitting is safe to use.

(2)

- (e) A fuse can be used to protect an electrical circuit.

Name a different device that can also be used to protect an electrical circuit.

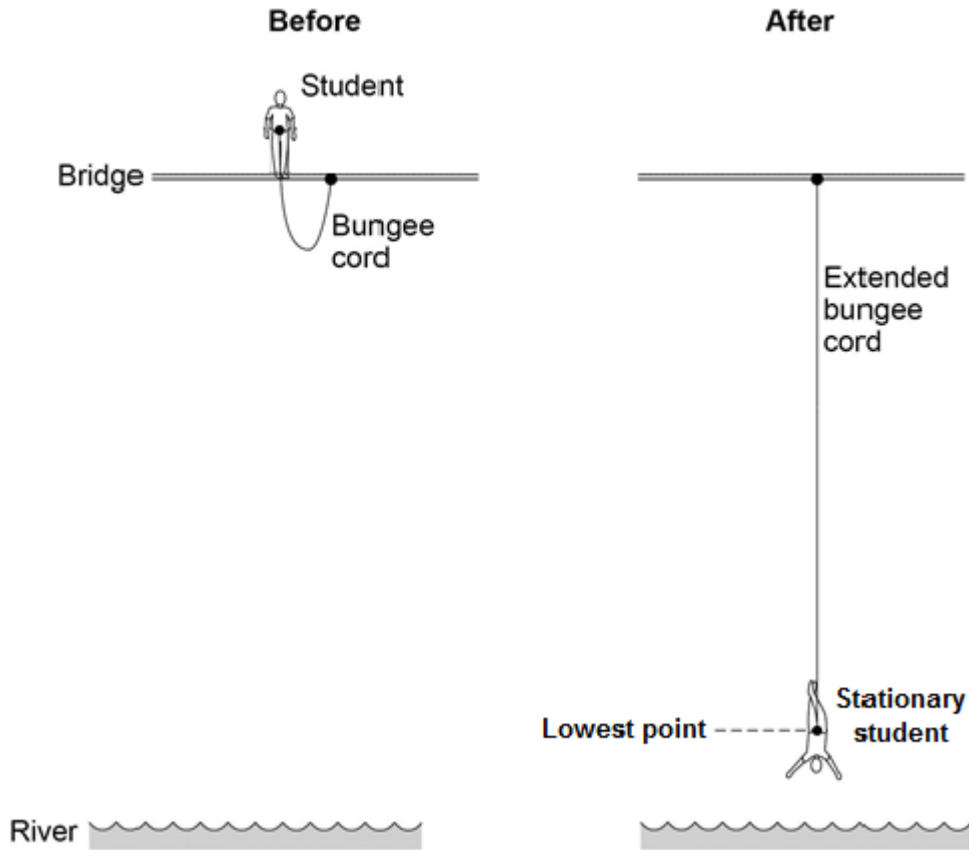
(1)

(Total 8 marks)

Q5.

The image below shows a student before and after a bungee jump.

The bungee cord has an unstretched length of 20 m.



- (a) For safety reasons, it is important that the bungee cord used is appropriate for the student's weight.

Give **two** reasons why.

1.

2.

(2)

(b) The student jumps off the bridge.

Complete the sentences to describe the energy transfers.

Use answers from the box.

elastic potential	gravitational
potential	kinetic
sound	thermal

Before the student jumps from the bridge he has a store of

_____ energy.

When he is falling, the student's store of

energy increases.

When the bungee cord is stretched, the cord stores energy as

_____ energy.

(3)

(c) At the lowest point in the jump when the student is stationary, the extension of the bungee cord is 35 metres.

The bungee cord behaves like a spring with a spring constant of 40 N / m.

Calculate the energy stored in the stretched bungee cord.

Energy = _____ J

(2)

(Total 7 marks)

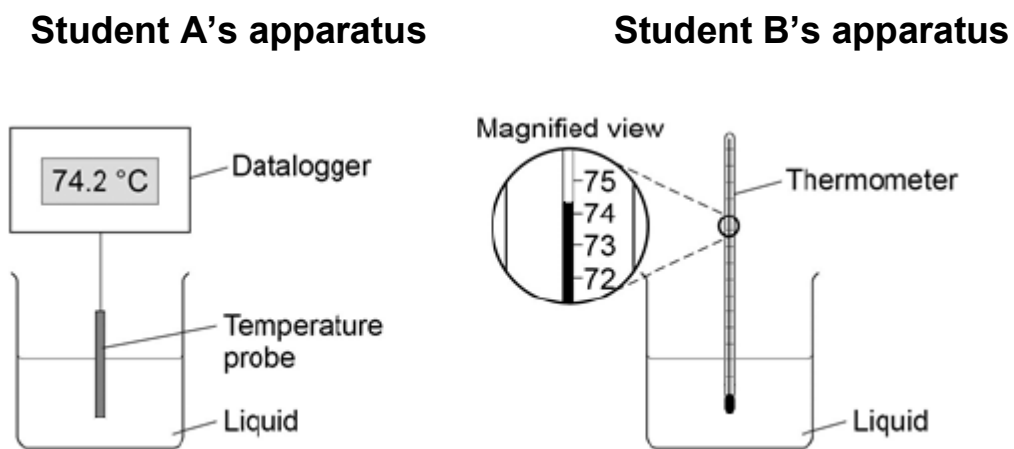
Q6.

Two students investigated the change of state of stearic acid from liquid to solid.

They measured how the temperature of stearic acid changed over 5 minutes as it changed from liquid to solid.

Figure 1 shows the different apparatus the two students used.

Figure 1



(a) Choose **two** advantages of using student **A**'s apparatus.

Tick **two** boxes.

Student **A**'s apparatus made sure the test was fair.

Student **B**'s apparatus only measured categorical variables.

Student **A**'s measurements had a higher resolution.

Student **B** was more likely to misread the temperature.

(2)

- (b) Student **B** removed the thermometer from the liquid each time he took a temperature reading.

What type of error would this cause?

Tick **one** box.

A systematic error

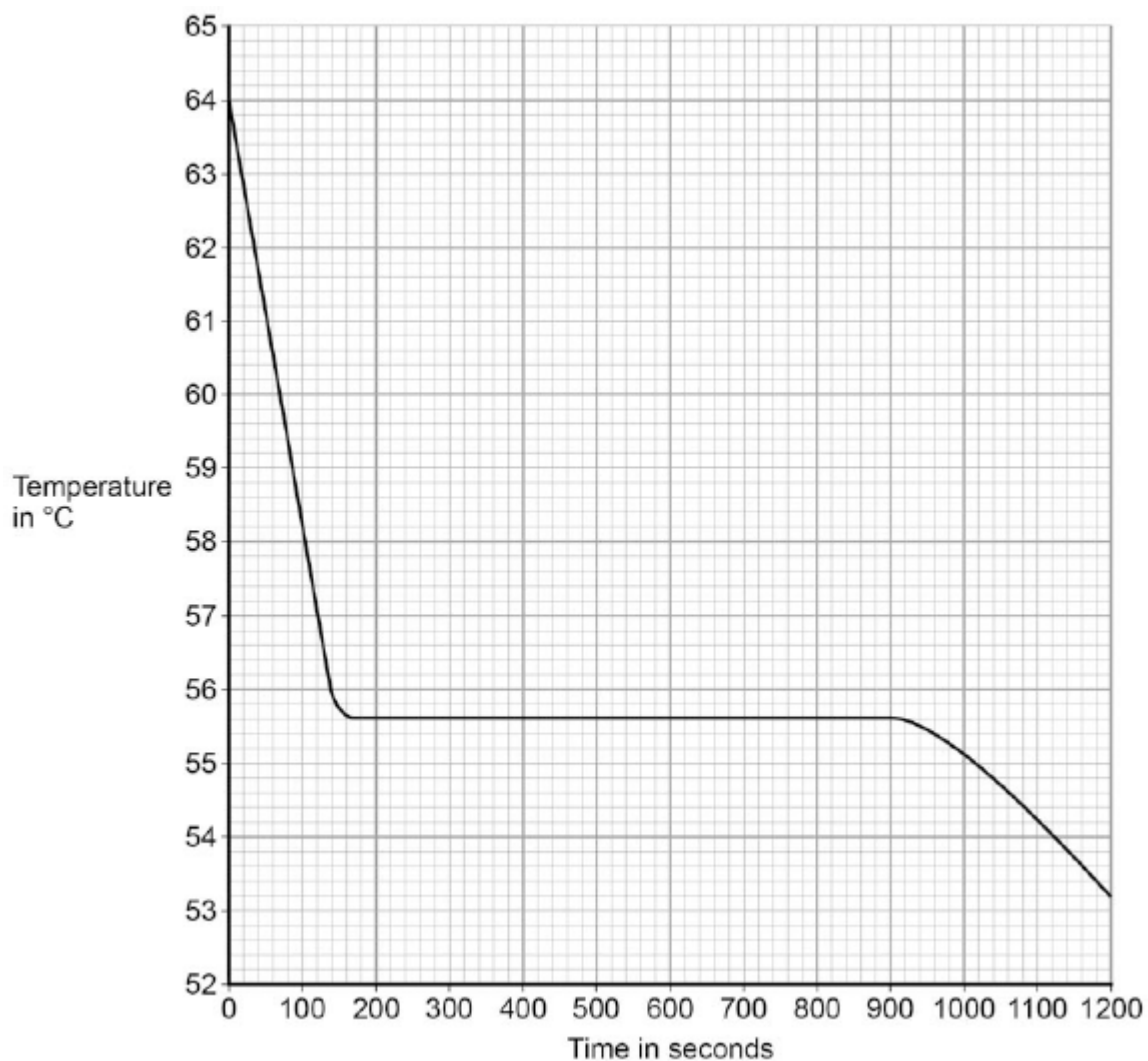
A random error

A zero error

(1)

(c) Student **A**'s results are shown in **Figure 2**.

Figure 2



What was the decrease in temperature between 0 and 160 seconds?

Tick **one** box.

8.2 °C

8.4 °C

53.2 °C

55.6 °C

(1)

- (d) Use **Figure 2** to determine the time taken for the stearic acid to change from a liquid to a solid.

Time = _____ seconds

(1)

- (e) Calculate the energy transferred to the surroundings as 0.40 kg of stearic acid changed state from liquid to solid.

The specific latent heat of fusion of stearic acid is 199 000 J / kg.

Energy = _____ J

(2)

- (f) After 1200 seconds the temperature of the stearic acid continued to decrease.

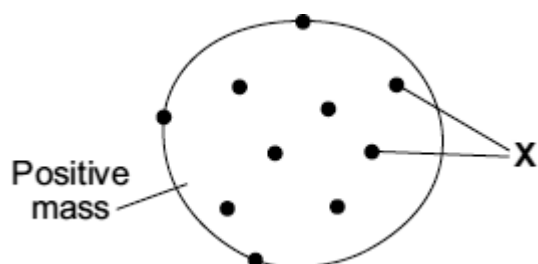
Explain why.

(2)

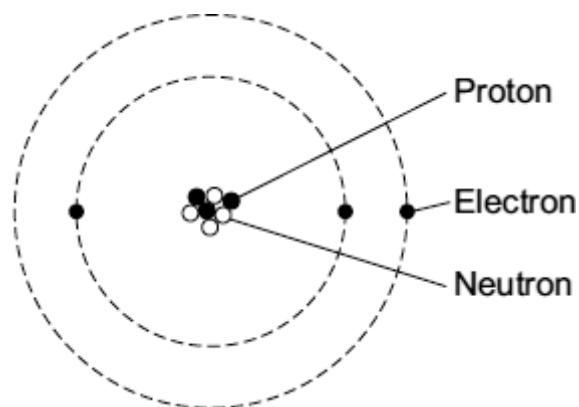
(Total 9 marks)

Q7.

The diagrams show two different models of an atom.



'Plum pudding' model



Model used today

- (a) The particles labelled 'X' in the plum pudding model are also included in the model of the atom used today.

What are the particles labelled 'X' ?

(1)

- (b) Scientists decided that the 'plum pudding' model was wrong and needed replacing.

Which **one** of the following statements gives a reason for deciding that a scientific model needs replacing?

Tick (✓) **one** box.

The model is too simple.

The model has been used by scientists for a long time.

The model cannot explain the results from a new experiment.

(1)

- (c) The table gives information about the three types of particle that are in the model of the atom used today.

Particle	Relative mass	Relative charge
	1	+1
	very small	-1
	1	0

Complete the table by adding the names of the particles.

(2)

(Total 4 marks)

END OF EXAM

Edge Hill GCSE Science Equivalency Test

Practice Paper: *Answers*

Practice Paper: Answers
Biology

Animal Cells

Q1.

- (a) cell membrane
extra boxes ticked negates mark (1)
- (b) nucleus
extra boxes ticked negates mark (1)
- (c) has a tail so it can swim (to an egg)
accept has many mitochondria to release energy to swim (1)
- (d) nucleus (1)
- cell wall (1)

[5 marks]

Cancer

Q2.

- (a) cells can break off
allow cells invade other tissues (1)
- cells multiply faster (1)
- can potentially result in death (1)
- (b) $96 - 66 = 30$ (1)
- $30 / 66 \times 100 = 45.5\%$ increase

(1)

allow 45.5 (%) with no working shown for 2

marks)

[5 marks]

Immune System

Q3.

(a) (i) any **one** from:

- (produce) toxins / poisons
- (cause) damage to cells
kill / destroy cells
allow kills white blood cells

(1)

(ii) produce antitoxins

(1)

engulf / ingest / digest pathogens / viruses / bacteria / microorganisms

accept phagocytosis or description

ignore eat / consume / absorb for engulf

ignore references to memory cells

(1)

(b) (i) dead / inactive / weakened

accept idea of antigen / protein

(1)

(measles) pathogen / virus

ignore bacteria

(1)

(ii) (after infection)

accept converse if clearly referring to before vaccination

(1)

rise begins sooner / less lag time

steeper / faster rise (in number)

(1)

longer lasting **or** doesn't drop so quickly

idea of staying high for longer

ignore reference to higher starting point

(1)

(iii) antibodies are specific or needs different antibodies
accept antigens are different or white blood cells do not recognise virus

(1)

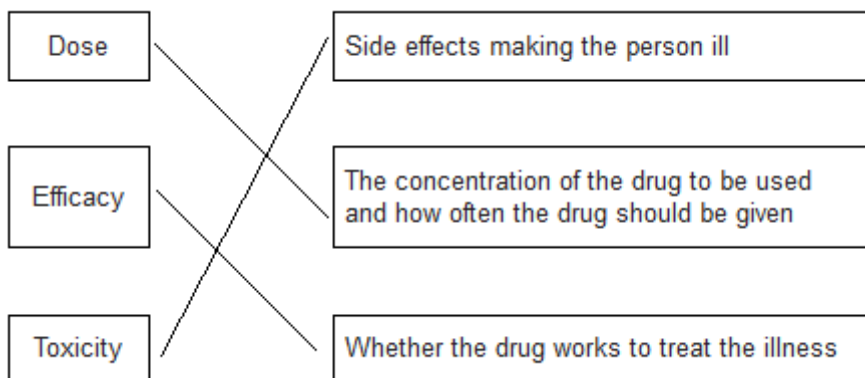
(c) reduces spread of infection / less likely to get an epidemic
accept idea of eradicating measles

(1)

(d) antibiotics do not kill viruses
allow antibiotics only kill bacteria

(1)

(e)



*all correct for 2 marks
1 or 2 correct for 1 mark*

(2)

(f) any **one** from:

- to prevent false claims
- to make sure the conclusions are correct / valid
- to avoid bias

(1)

[14 marks]

Photosynthesis

Q4.

(a) (i) LHS = water
accept H₂O
*do **not** accept H²O / H2O*

(1)

RHS = oxygen

accept O_2
do **not** accept O / O^2 / O_2

(1)

- (ii) light / sunlight
ignore solar / sun / sunshine
do not allow thermal / heat

(1)

- (iii) chloroplasts
allow chlorophyll

(1)

- (b) (i) 20

(1)

- (ii) any **one** from:
• light (intensity)
• temperature.

(1)

- (c) (i) To increase the rate of growth of the tomato plants

(1)

- (ii) Because it would cost more money than using 0.08%

(1)

Because it would not increase the rate of photosynthesis of the tomato plants any further

(1)

[9 marks]

Diabetes and Insulin

Q5.

- (a) pancreas

allow phonetic spelling

(1)

- (b) (i) A

(1)

shortest / quicker time (to work)

(1)

- (ii) D

(1)

acts for longest time

mark dependent on D

allow D will last until 09.00 / breakfast / 24 hours

(1)
[5 marks]

Genetic Crosses

Q6.

(a) When the dominant allele is not present.

(1)

(b) (i) Bb

(1)

		Woman Brown hair	
		B	b
Person 3 Red hair	b		bb
	b	Bb	bb

(ii)

3 correct = 2 marks

2 correct = 1 mark

1 or 0 correct = 0 marks

allow bB for Bb

(2)

(iii) 1 in 2

allow ecf from part ii

(1)

[5 marks]

Adaptation in Animals

Q7.

(a) 1 mark for each adaptation and 1 mark for its correct linked advantage

- long / thick hair / fur (1) for insulation (1)

allow keeps warm

- small ears (1) for reduced heat loss (1)
- small feet (1) for reduced heat loss (1)
ignore wide feet
ignore prevent sinking
- white fur / coat (1) for camouflage / poor emitter (1)
- small SA/V ratio (1) reduces heat loss (1)
- thick layer of fat (1) insulates / keeps warm (1)

(Max 4)

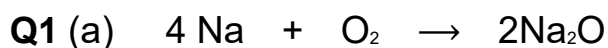
(b) 1 mark for an adaptation and 1 mark for its correct linked advantage

- horns (1) for defence (1)
- long legs (1) for speed / escape / vision (1)
- light colour (1) for camouflage (1)
allow pattern
- eyes on side of head (1) for wider field of vision (1)
- hooves (1) for speed / escape (1)
- large ears (1) to hear predators better (1)

(Max 2)

[6 marks]

Practice Paper: Answers Chemistry



allow multiples

1

(b) (sodium) gains oxygen

1

(c) purple

1

(d) aluminium chloride

1

(e) **Level 2 (3-4 marks):**

Relevant reasons are identified, given in detail and logically linked to form a clear account.

Level 1 (1-2 marks):

Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

Level 0

No relevant content

Indicative content

conclusion 1

- pH values above 7 are alkaline
- sodium oxide, calcium oxide and magnesium oxide do form alkaline solutions (so correct for those)
- not all metal oxides form solutions (so incorrect for zinc oxide)

conclusion 2

- pH values below 7 are acidic
- carbon dioxide, sulfur dioxide and phosphorus oxide do form acidic solutions (so correct for those)
- not all non-metal oxides form solutions (so incorrect for silicon oxide)]

4

(f) metal oxides produce alkaline solutions if they dissolve in water

allow 1 mark for most metal oxides produce alkaline solutions

2

[10]

Q2 (a) B

1

(b) **D**

1

(c) **E**

1

(d) **C**

1

(e) 92.5×6 **and**

$$7 \times 7.5$$

1

$$\frac{607.5}{100}$$

1

$$6.075$$

1

$$6.08$$

1

allow 6.08 with no working shown for 4 marks

[8]

Q3 (a) (i) 7

1

(ii) -1

1

(iii) neutrons

1

(b) number of protons

1

(c) atom **Y**

1

(d) (i) Ne

allow neon

1

(ii) has a full outer shell

allow in Group 0

allow a noble gas

or

full outer energy level

allow the shells are full

or

has 8 electrons in its outer shell

ignore in Group 8

1

[7]

Q4 (a) A

1

(b) D

1

(c) C

1

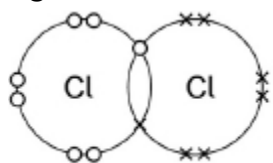
(d) E

1

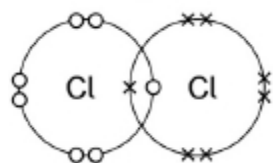
(e) bonding pair of electrons drawn

electrons can be dots, crosses or e^{-} in any combination

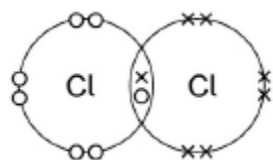
eg



or



or



*do **not** accept if electrons added to outer shells outside overlap*

1

(f) weak forces between molecules

1

(g) MnO

1

(h) ions move around in the liquid

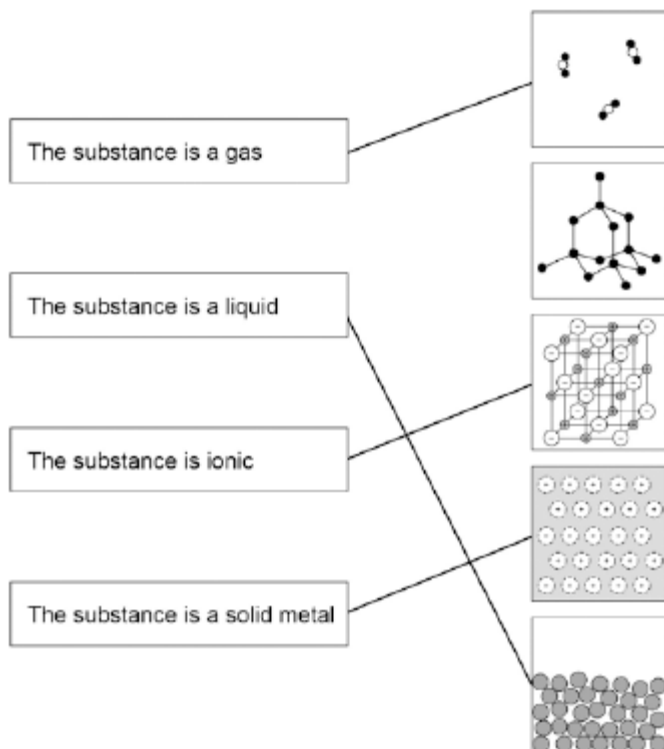
1

[8]

Q5 (a)

Statement

Structure



more than one line drawn from a variable negates the mark

4

(b) Carbon

1

(c) It has delocalised electrons

1

(d) the atoms / particles / ions are different sizes
do not accept molecules

1

so there are no rows / layers to slide
accept the layers are disrupted

1

(e) $\frac{2}{27} \times 100$

1

7.4%

1

allow 7.4% with no working shown for 2 marks

(f) Mixture

1

[11]
]

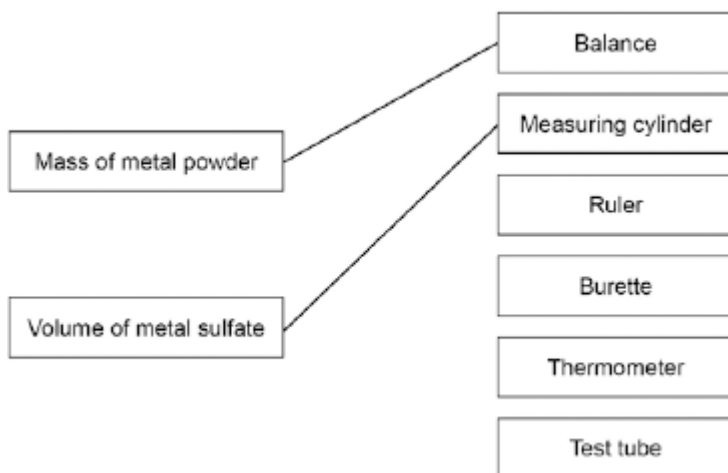
Q6 (a) Whether there was a reaction or not

1

- (b) brown / orange / dark deposit on zinc
or
 blue solution turns colourless / paler

1

- (c) **Variable** **Measuring instrument**



more than one line drawn from a variable negates the mark

2

- (d) (Most reactive) **Magnesium**
Zinc
 (Least reactive) **Copper**
must all be correct

1

- (e) would not be safe **or**
 too reactive

allow too dangerous

1

- (f) Gold

1

- (g) $2\text{Fe}_2\text{O}_3 + 3\text{C} \rightarrow 4\text{Fe} + 3\text{CO}_2$
allow multiples

1

- (h) carbon

1

- (i) Loss of oxygen

1

[10]

Practice Paper: Answers
Physics

Q1 (a)	proton		
		<i>all 3 in correct order</i>	
	electron		
		<i>allow 1 mark for 1 correct do not</i>	
	neutron		
		<i>accept letters p, e, n</i>	2
(b)	9		
		<i>reason only scores if 9 is chosen</i>	1
	number of neutrons and protons		1
			[4]
Q2 (a)	sound		1
(b)	(visible) light		1
(c)	cooking food		1
(d)	1.2 gigahertz		1
(e)	$300\,000 \times 1000 = 300\,000\,000$ m/s		1
(f)	wave speed = frequency \times wavelength <i>allow $v = f \lambda$</i>		1
(g)	$300\,000\,000 = 1200\,000\,000 \times \lambda$ <i>an answer of 0.25 scores 3 marks</i>		1
	$\lambda = \frac{300\,000\,000}{1\,200\,000\,000}$ <i>allow ecf from (e)</i>		1
	$\lambda = 0.25$ (m)		1
			[10]

- Q3 (a)** induced 1
- (b) bar 2 1
- (the same end) of bar 1 attracts both ends of bar 2
- or**
- only two magnets can repel so cannot be bar 1 or bar 3 1
- (c) so the results for each magnet can be compared
- or**
- so there is only one independent variable
- fair test is insufficient*
- allow different thickness of paper would affect number of sheets each magnet could hold*
- accept it is a control variable* 1
- (d) because the magnet with the biggest area was not the strongest
- accept any correct reason that confirms the hypothesis is wrong eg smallest magnet holds more sheets than the largest* 1
- Q4 (a)** 20 [5]
- (b) 50 1
- (c) (i) 115 1
- (ii) 230 1
- (iii) if one goes out the other still works
- or**
- brighter
- accept power (output) is greater*
- can be switched on/off independently is insufficient* 1
- (d) the outside/casing is plastic

there is plastic around the wires is insufficient
it is plastic is insufficient

1

and plastic is an insulator

an answer the light fitting is double insulated
gains both marks

1

(e) (residual current) circuit breaker

accept RCCB

accept RCBO

accept RCCD

accept RCB

accept miniature circuit breaker / MCB

trip switch is insufficient

breaker is insufficient

do not accept earth wire

1

[8]

Q5 (a) any **two** from:

- bungee rope may snap
- rope may extend too much
- student may land in the river

2

(b) gravitational potential

correct order only

1

kinetic

1

elastic potential

1

(c) $\frac{1}{2} \times 40 \times 35^2$

1

24 500 (J)

accept 25 000 (J) (2 significant figures)

1

allow 24 500 (J) with no working shown for 2 marks

[7]

Q6 (a) Student A's measurements had a higher resolution

Student B was more likely to misread the temperature

1

(b) a random error

1

(c) 8.4 °C

1

(d) 740 (seconds)

allow answers in the range 730 – 780

1

1

(e) $0.40 \times 199\,000$

1

79 600 (J)

1

accept 79 600 (J) with no working shown for 2 marks

(f) stearic acid has a higher temperature than the surroundings

accept stearic acid is hotter than the surroundings

1

temperature will decrease until stearic acid is the same as the room temperature / surroundings

1

[9]

Q7 (a) electron(s)

1

(b) 3rd box ticked

The model cannot explain the results from a new experiment

1

(c) all three correct

Particle
Proton
Electron
Neutron

allow 1 mark for 1 correct

2

[4]

1.