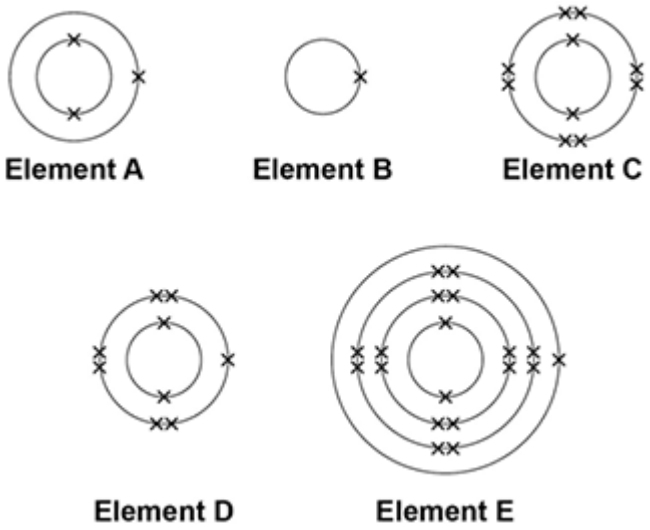
Q1. The electronic structure of the atoms of five elements are shown in the figure below.

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 above to calculate the relative atomic mass of element **A**.
Give your answer to 2 decimal places.

.....

.....

.....

.....

.....

.....

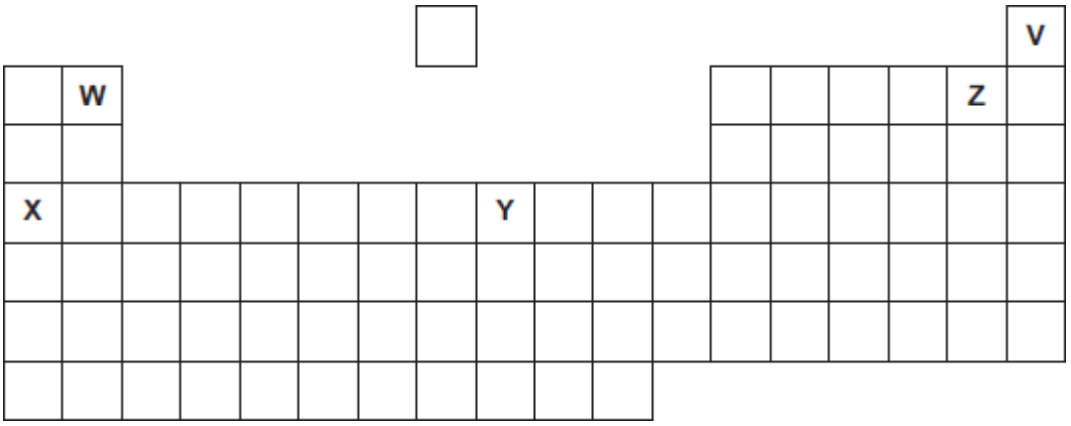
.....

Relative atomic mass = ...

(4)
(Total 8 marks)

Q2. Five elements, **V**, **W**, **X**, **Y** and **Z**, are shown in the periodic table.

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



Use the correct letter, **V**, **W**, **X**, **Y** or **Z**, to answer each question.

(a) Which element is a transition metal?

(1)

(b) Which element is in Group 2?

(1)

(c) Which element is a noble gas?

(1)

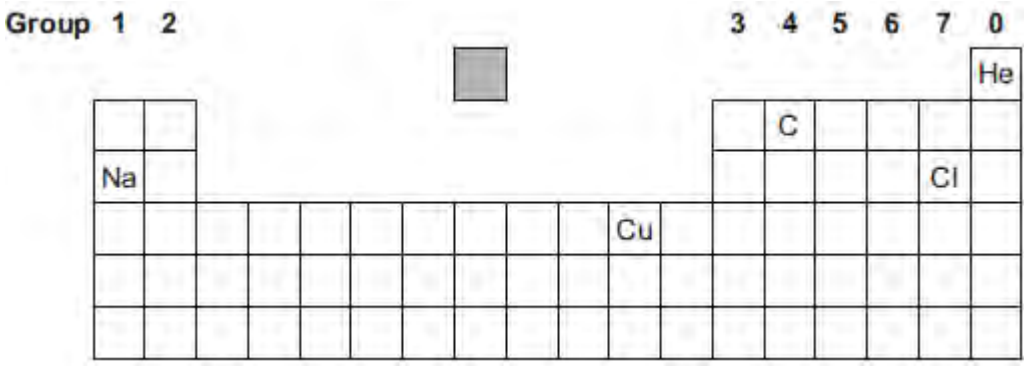
(d) Which element has an atomic (proton) number of 4?

(1)

(e) Which element forms only 1+ ions?

(1)
(Total 5 marks)

Q3. The diagram shows the chemical symbols of five elements in the periodic table.



(a) Choose the correct chemical symbol to complete each sentence.

(i) The element that is an alkali metal is ..... .

(1)

(ii) The element that is a transition metal is ..... .

(1)

(iii) The element in Group 4 is ..... .

(1)

(iv) The element with a full outer energy level (shell) of electrons is

..... .

(1)

(b) Which other element goes in the shaded box?

.....

(1)

(Total 5 marks)

Q4. This question is about the periodic table of elements.

Use the Chemistry Data Sheet to help you to answer these questions.

In 1869 Dmitri Mendeleev produced an early version of the periodic table.

(a) Draw a ring around the correct answer to complete each sentence.

(i)

Mendeleev first arranged the elements in order of their

atomic weight.
date of discovery.
electron number.

(1)

(ii)

Mendeleev then placed elements with similar properties in columns called

groups.
periods.
shells.

(1)

(iii) When the next element did not fit the pattern,

Mendeleev

ignored the element.
left a gap.
put the element at the end of the row.

(1)

(iv) Mendeleev was not able to include the noble gases (Group 0) in his periodic table

because the noble gases

- are not elements.
- are not reactive.
- had not been discovered by 1869.

(1)

(b) Use the correct word from the box to complete each sentence.

electrons	**molecules**	**neutrons**	**protons**

In the modern periodic table elements are arranged in order of the number of ..... in their nucleus. Elements in the same group have the same number of ..... in their highest energy level (outer shell).

(2)

(c) Sodium (Na) is in Group 1 of the periodic table.

Nickel (Ni) is a transition element.

Tick (✓) **two** correct statements about sodium and nickel.

Statement	**Tick (✓)**
Sodium and nickel are both metals.	
Sodium has a higher melting point than nickel.	
Sodium is more reactive than nickel.	
Sodium is harder than nickel.	

(2)

(d) Chlorine, bromine and iodine are in Group 7 of the periodic table.

Chlorine is more reactive than bromine.

(i) Complete the word equation for the reaction between chlorine and sodium bromide.

chlorine + sodium bromide ⟶ ..... + sodium chloride

(1)

(ii) Why does iodine **not** react with sodium bromide solution?

.....

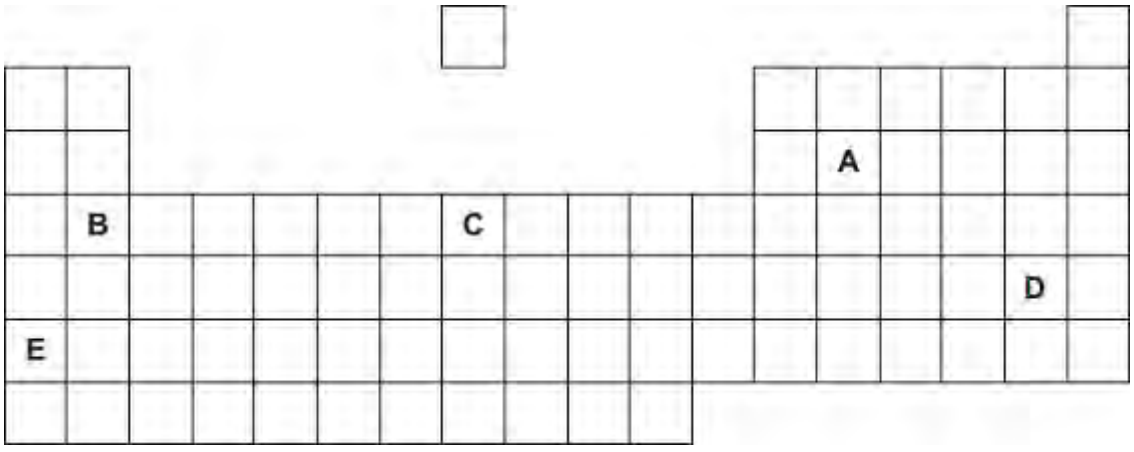
.....

(1)

(Total 10 marks)

Q5. The periodic table on the Data Sheet may help you to answer these questions.

Part of the periodic table is shown below.



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

Choose your answers **only** from the letters shown in the periodic table above.

Which letter, **A**, **B**, **C**, **D** or **E**, represents:

(a) (i) an alkali metal Letter ☐

(1)

(ii) a transition element Letter ☐

(1)

(iii) a Group 4 element Letter ☐

(1)

(b) A chemistry teacher demonstrated the reaction between sodium and water to a class of students. One of the students wrote the following notes:

The reaction between sodium and water

A piece of sodium was cut easily into smaller pieces with a knife.

The sodium was added to some water in a trough.

The sodium:

- floated
- melted quickly to give a silvery ball
- moved on the surface of the water
- fizzed.

Use the information in the box to help you answer these questions.

What evidence is there that:

(i) sodium has a low melting point

.....

.....

(1)

(ii) sodium is soft

.....

.....

(1)

(iii) a gas was produced?

.....

.....

(1)

(Total 6 marks)

Q6. This question is about lithium and sodium.

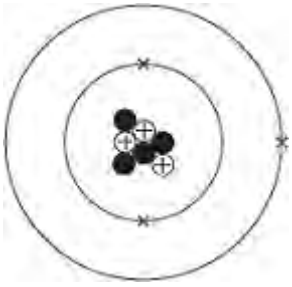
(a) Use the Chemistry Data Sheet to help you to answer this question.

In which group of the periodic table are lithium and sodium? Group ☐

(1)

(b) A lithium atom can be represented as $^{7}_{3}Li$

The diagram represents the lithium atom.



(i) Some particles in the nucleus have a positive charge.

What is the name of these particles? .....

(1)

(ii) Some particles in the nucleus have no charge.

What is the name of these particles? .....

(1)

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

3	**4**	**7**

The mass number of this atom of lithium is ☐

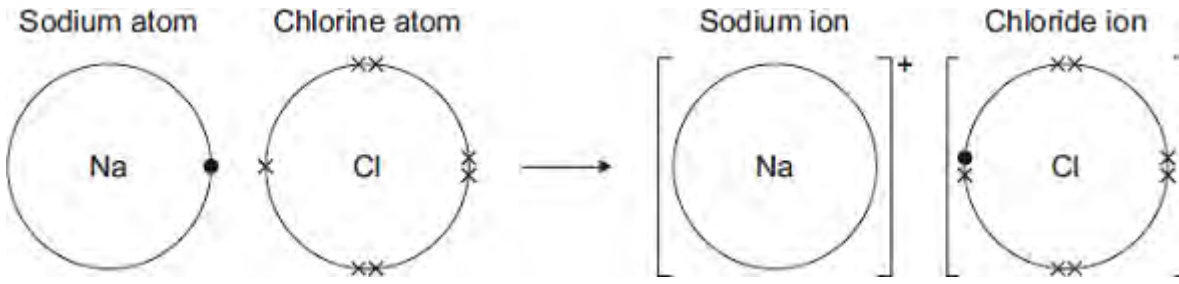
(1)

(c) Sodium reacts with chlorine to produce sodium chloride.

sodium + chlorine ⟶ sodium chloride

The diagram shows how the reaction happens.

Only the outer electrons are shown.



Draw a ring around the correct answer to complete each sentence.

(i)

A sodium atom changes into a sodium ion by

gaining / losing / sharing

an electron.

(1)

(ii)

a negative

A sodium ion has

no	charge.
a positive	

(1)

(iii)

The ions in sodium chloride are held together by strong

covalent	
electrostatic	forces.
magnetic	

(1)

(d) Sodium chloride is an ionic compound.

Tick (✓) **two** properties of ionic compounds.

Property	**Tick (✓)**
Do **not** dissolve in water	
High melting points	
Low boiling points	
Strong bonds	

(2)

(e) (i) The formula of sodium chloride is NaCl

Calculate the relative formula mass of sodium chloride.

Relative atomic masses: Na = 23; Cl = 35.5

.....

.....

Relative formula mass = ...

(1)

(ii) Draw a ring around the correct answer to complete each sentence.

The relative formula mass of a substance, in grams, is one

ion	
isotope	of the substance.
mole	

(1)

(f) Nanoparticles of sodium chloride (salt) are used to flavour crisps.

What are nanoparticles?

.....

.....

(1)
(Total 12 marks)

Q7. This question is about the periodic table.

Use the Chemistry Data Sheet to help you answer these questions.

(a) Complete the sentences.

Elements in the periodic table are arranged in order of atomic ..... .

The elements in Group ..... are called the noble gases.

(2)

(b) Calcium (Ca) is in Group 2.

Name **one** other element in Group 2.

.....

(1)

(c) Draw a ring around the correct answer to complete each sentence.

(i)

Sodium (Na) is

- an alkali metal.
- a non-metal.
- a transition metal.

(1)

(ii)

Nickel (Ni) is

- an alkali metal.
- a non-metal.
- a transition metal.

(1)

(d) In 1869 Mendeleev produced his periodic table.

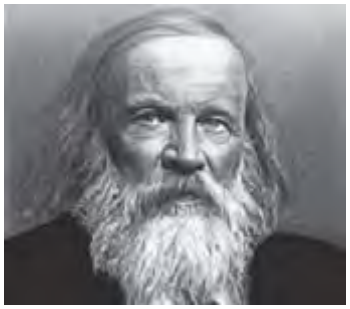
Why did Mendeleev leave gaps in his periodic table?

.....

.....

(1)
(Total 6 marks)

Q8. By 1869, about 60 elements had been discovered.
Mendeleev arranged these elements in a table, in order of their atomic weight.
He put elements with similar chemical properties in the same column.
Mendeleev and part of his table are shown below.



Column						
1	**2**	**3**	**4**	**5**	**6**	**7**
H						
Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl

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Use the periodic table on the Data Sheet to help you to answer these questions.

(a) Draw a ring around the correct answer to complete the sentence.

In the periodic table the columns are known as

groups.

periods.

rows.

(1)

(b) Suggest **one** reason why hydrogen should **not** have been put in column 1.

.....

(1)

(c) In 1895, the first of a new family of elements was discovered.
One of the new elements was called helium.

Where has this new family of elements been placed in the modern periodic table?

.....

(1)

(d) Complete the sentence.

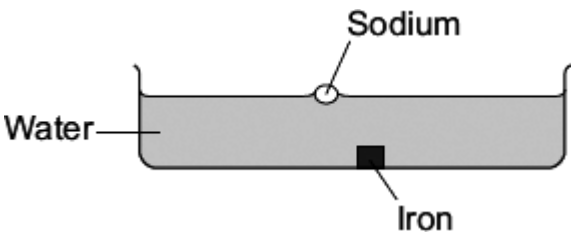
In the periodic table on your Data Sheet, the elements are arranged in order of their atomic ..... .

(1)

(Total 4 marks)

Q9. How a metal is used depends on its properties.

A teacher demonstrated some of the properties of sodium (an alkali metal) and iron (a transition element) by placing a small cube of each metal into water.



A student observed that:

Sodium	Iron
floated on the surface of the water	sank to the bottom of the water
melted to form a molten ball of sodium	did not melt
reacted to produce a gas	did not react
no sodium was left after 5 minutes	the cube of iron remained after 5 minutes

(a) Tick (✓) **two** properties of sodium compared with iron that are shown by the student's observations.

Sodium compared with iron	Tick(✓)
sodium has a higher boiling point	
sodium has a lower density	
sodium is harder	
sodium is more reactive	
sodium is softer	

(2)

(b) Draw a ring around the correct answer to complete the word equation.

sodium + water → sodium hydroxide + [carbon dioxide / hydrogen / oxygen]

(1)

(c) Draw a ring around the correct answer to complete the sentence.

Sodium hydroxide is an alkali because it produces [$H^+(aq)$ / $OH^-(aq)$ / $Na^+(aq)$] ions

in aqueous solution.

(1)
(Total 4 marks)