ST MARY'S SCIENCE DEPARTMENT:

CHEMISTRY

F

GCSE CHEMISTRY **HOMEWORK BOOK**
TOPIC 1: ATOMIC STRUCTURE
STUDENT BOOK

YOU MUST ANSWER ALL THREE SECTIONS IN EACH PART OF THE HOMEWORK TASKS

NAME	
CLASS	
TEACHER	
FORM	

TASK	MARK	GRADE
1		
2		
3		
4		
5		
OVERALL		

GCSE CHEMISTRY

YEAR 9

TOPIC 1

HOMEWORK SCHEDULE

Please use the following table to ensure each homework task is completed and submitted on time.

Carrying out these homework tasks can only increase your ability to gain a high grade in the GCSE examinations.

Failure to hand in work on time will lead to sanctions to complete this work.

Task	Submission Date	Completed?	On Time?
Task 1 Atoms, Elements and Compounds			
Task 2 Mixtures			
Task 3 Model of the Atom			
Task 4 The Periodic Table			
Task 5 Groups			

SCIENCE DEPARTMENT MARKING CODE

ID = Insufficient detail in answer
W = Wrong understanding of science
IR = Irrelevant information given.
V = This is too vague to get a mark.
AQ = Answer the question asked
R = Read the question/information
M = Maths mistake
BOD = Benefit of the doubt given.
E = Explain the answer further please.
U = Wrong units used.
SF = Wrong significant figures used.
SP = Wrong spelling of a technical term
SR = Same reason given more than once.
A circle means this lost you marks
An underline means this gained you marks

PLEASE READ

This homework booklet has made with custom selected examination questions and activities to assess your understanding in the concepts covered in class. This will increase your familiarity with the style of examination questions.

Carrying out these questions can only increase your ability to gain a high grade in the GCSE examination.

Thank you for your hard work in completing this book, and good luck.

Mr. Turnbull

TASK 1: ATOMS, ELEMENTS AND COMPOUNDS

SPEC CHECK

Content	Achieved?
All substances are made of atoms. An atom is the smallest part of an element that can exist. Atoms of each element are represented by a chemical symbol, e.g. O represents an atom of oxygen, Na represents an atom of sodium. There are about 100 different elements. Elements are shown in the periodic table. Compounds are formed from elements by chemical reactions. Chemical reactions always involve the formation of one or more new substances, and often involve a detectable energy change. Compounds contain two or more elements chemically combined in fixed proportions and can be represented by formulae using the symbols of the atoms from which they were formed. Compounds can only be separated into elements by chemical reactions. Chemical reactions can be represented by word equations or equations using symbols and formulae. Students will be supplied with a periodic table for the exam and should be able to: • Use the names and symbols of the first 20 elements in the periodic table, the elements in Groups 1 and 7, and other elements in this specification • Name compounds of these elements from given formulae or symbol equations • Write word equations for the reactions in this specification • Write formulae and balanced chemical equations for the reactions in this specification.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. An atom of beryllium can be represented as $^{9}_{4}\text{Be}$.

Describe the structure of the beryllium atom.

In your answer make reference to the number of sub-atomic particles and where they are found in the atom.

[5 Marks]

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SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Dalton was a scientist in the early 19th century. He gave each element a symbol.

Figure 1 shows some of Dalton's symbols.

element	symbol
carbon	●
hydrogen	⊙
nitrogen	◑
oxygen	○
sulfur	⊕

Figure 2 shows the symbol Dalton used for a substance.

1.1 What is the modern chemical formula for this substance?

[1 mark]

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1.2 Give **two** advantages of using modern symbols rather than Dalton's symbols.

[2 marks]

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Dalton thought that the atoms of each element were the same. Now we know that elements can have different atoms, for example, chlorine has two different atoms, $^{35}_{17}Cl$ and $^{37}_{17}Cl$.

1.3 What name is given to different types of atom of the same element?

[1 mark]

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1.4 How are the structures of the chlorine atoms $^{35}_{17}Cl$ and $^{37}_{17}Cl$ different?

[1 mark]

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SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1.1 The radius of a magnesium atom is 0.160 nm.

The radius of a nucleus is about $\frac{1}{10000}$ that of an atom.

Calculate the radius of a magnesium nucleus.

Give your answer in standard form.

[2 marks]

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Radius of a magnesium nucleus = ... nm

1.2 The radius of a magnesium ion is 7.2×10^{-11} m.

Explain the difference in size between the magnesium atom and magnesium ion.

[2 marks]

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FEEDBACK SHEET

Overall Mark:	**/14**
Section A: Mark	/5
Section B: Mark	/5
Section C: Mark	/4

GRADE ACHIEVED:

5	☐	**1**	☐
4	☐	**U**	☐
3	☐		
2	☐		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision.	☐ Revise the equations.
☐ Complete outstanding work.	☐ Check the units on answers.
☐ Make corrections as indicated by the teacher.	☐ Check the correct amount of sig figs on answers.
☐ Attend intervention for this topic	☐ Check to convert values correctly.
☐ Include more information in responses.	☐ Show your full working out.
☐ Include more key words in responses.	☐ Check your calculations.
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response

TASK 2: MIXTURES

SPEC CHECK

Content	Achieved?
A mixture consists of two or more elements or compounds not chemically combined together. The chemical properties of each substance in the mixture are unchanged. Mixtures can be separated by physical processes such as filtration, crystallisation, simple distillation, fractional distillation and chromatography. These physical processes do not involve chemical reactions and no new substances are made. Students should be able to: • describe, explain and give examples of the specified processes of separation • suggest suitable separation and purification techniques for mixtures when given appropriate information.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Ethanol and water can be separated using the apparatus shown in **Figure 1**.

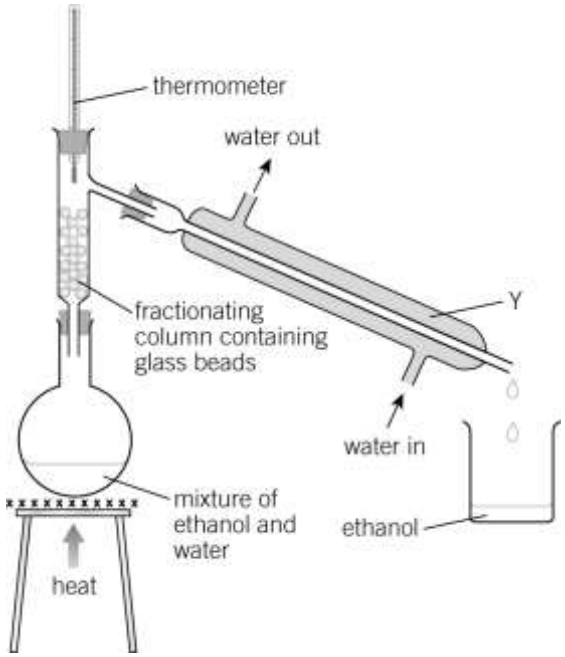


Figure 1

1.1 What is the name of the process?

Tick **one** box.

[1 Mark]

- crystallisation ☐
- fractional distillation ☐
- paper chromatography ☐
- water purification ☐

1.2 Name the change happening at **Y**.

Tick **one** box.

[1 Mark]

- condensation ☐
- evaporation ☐
- freezing ☐
- melting ☐

1.3 What is the boiling point of ethanol?

Tick **one** box.

[1 Mark]

0 °C ☐

78 °C ☐

100 °C ☐

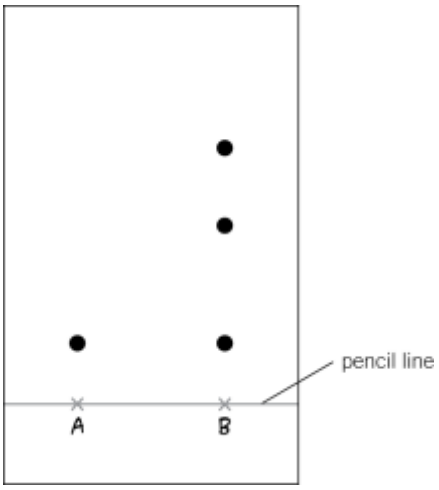
278 °C ☐

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. A student investigated the food colouring used in two fizzy orange drinks labelled A and B. The student produced the chromatogram shown below.



1.1 Why is the line at the bottom of a chromatogram drawn in pencil rather than in pen?

[1 Mark]

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1.2 Suggest three conclusions that can be made from the student's results.

[3 Marks]

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1.3 Suggest why it is important to be able to identify the food colouring additives used in fizzy drinks.

[1 Mark]

.....

.....

SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. This question is about mixtures.

1.1 Substances are separated from a mixture using different methods.

Draw **one** line from each substance and mixture to the best method of separation.

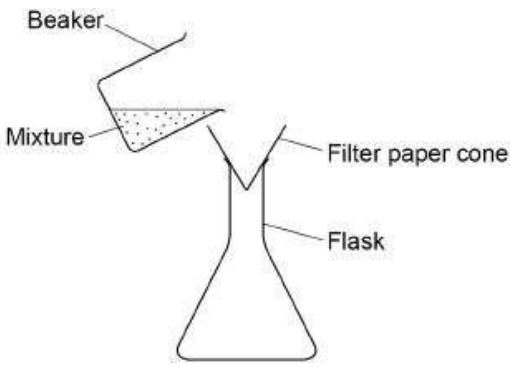
[3 Marks]

Substance and mixture	Method of separation
	Chromatography
Ethanol from ethanol and water	Crystallisation
Salt from sea water	Electrolysis
The different colours in black ink	Filtration
	Fractional distillation

1.2 A student filters a mixture.

Figure 1 shows the apparatus.

Figure 1



Suggest **one** improvement to the apparatus.

[1 Mark]

.....

.....

1.3 Complete the sentences.

Choose answers from the box.

[2 Marks]

condense	**evaporate**	**freeze**	**melt**	**solidify**

In simple distillation, the mixture is heated to make the liquid _____ .

The vapour is then cooled to make it _____ .

FEEDBACK SHEET

Overall Mark:	**/16**
Section A: Mark	3
Section B: Mark	/5
Section C: Mark	/6

GRADE ACHIEVED:

5	☐	**1**	☐
4	☐	**U**	☐
3	☐		
2	☐		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision.	☐ Revise the equations.
☐ Complete outstanding work.	☐ Check the units on answers.
☐ Make corrections as indicated by the teacher.	☐ Check the correct amount of sig figs on answers.
☐ Attend intervention for this topic	☐ Check to convert values correctly.
☐ Include more information in responses.	☐ Show your full working out.
☐ Include more key words in responses.	☐ Check your calculations.
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response

TASK 3: MODEL OF THE ATOM

SPEC CHECK

Content	Achieved?
New experimental evidence may lead to a scientific model being changed or replaced. Before the discovery of the electron, atoms were thought to be tiny spheres that could not be divided. The discovery of the electron led to the plum pudding model of the atom. The plum pudding model suggested that the atom is a ball of positive charge with negative electrons embedded in it. The results from the alpha particle scattering experiment led to the conclusion that the mass of an atom was concentrated at the centre (nucleus) and that the nucleus was charged. This nuclear model replaced the plum pudding model. Niels Bohr adapted the nuclear model by suggesting that electrons orbit the nucleus at specific distances. The theoretical calculations of Bohr agreed with experimental observations. Later experiments led to the idea that the positive charge of any nucleus could be subdivided into a whole number of smaller particles, each particle having the same amount of positive charge. The name proton was given to these particles. The experimental work of James Chadwick provided the evidence to show the existence of neutrons within the nucleus. This was about 20 years after the nucleus became an accepted scientific idea.	
Students should be able to describe: Why the new evidence from the scattering experiment led to a change in the atomic model. the difference between the plum pudding model of the atom and the nuclear model of the atom.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Ammonia is a compound. The chemical formula of ammonia is NH_3

1.1 How many elements are in ammonia?

[1 mark]

.....

.....

1.2 What is the total number of atoms in ammonia?

[1 mark]

.....

.....

Dalton was a scientist in the early 19th century.

He gave each element a symbol.

Figure 3 shows some of Dalton's symbols.

element	symbol
carbon	●
hydrogen	⊙
oxygen	○
sulfur	⊕

Figure 3

He wrote ammonia, NH_3, as ◑⊙.

1.3 Which element is represented by the symbol ◑?

[1 mark]

.....

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1.4 Give **two** disadvantages of using Dalton's symbols to represent elements and compounds.

[2 Marks]

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Dalton proposed the first model of an atom.

Figure 4 shows his model.

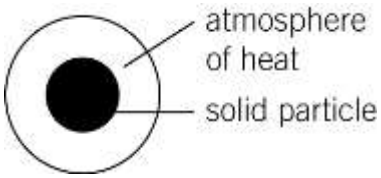

Figure 4

At the end of the 19th century, JJ Thomson proposed the plum pudding model.

Figure 5 shows the plum pudding model.

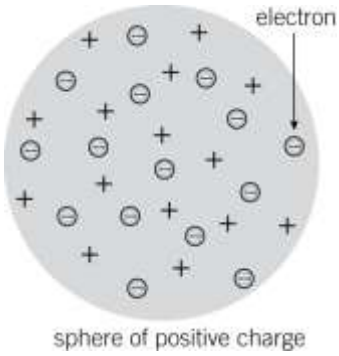

Figure 5

1.5 Describe **three** ways in which the plum pudding model is a more accurate representation of the atom.

[3 Marks]

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SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. An atom of chlorine is represented as $^{35}_{17}Cl$.

1.1 What is the atomic number of chlorine?

[1 mark]

Tick **one** box.

17 ☐

18 ☐

35 ☐

52 ☐

1.2 What is the mass number of chlorine?

[1 mark]

Tick **one** box.

17 ☐

18 ☐

35 ☐

52 ☐

1.3 How many protons does the chlorine atom contain?

[1 mark]

Tick **one** box.

17 ☐

18 ☐

35 ☐

52 ☐

1.4 The chlorine atom contains 17 electrons.

What is the electronic structure of the chlorine atom?

[1 mark]

Tick **one** box.

2,7,8 ☐

2,8,7 ☐

7,8,2 ☐

8,2,7 ☐

1.5 Another type of chlorine atom is represented as $^{37}_{17}Cl$.

How many neutrons does this chlorine atom contain?

[1 mark]

Tick **one** box.

17 ☐

20 ☐

35 ☐

37 ☐

1.6 What name is given to different atoms of one element?

[1 mark]

Tick **one** box.

compounds ☐

ions ☐

isotopes ☐

molecules ☐

SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. This question is about atomic structure.

1.1 Atoms contain subatomic particles.

Table 2 shows properties of two subatomic particles.

Complete **Table 2.**

[2 marks]

Table 2

Name of particle	Relative mass	Relative charge
neutron		
		+1

An element **X** has two isotopes.

The isotopes have different mass numbers.

1.2 Define mass number.

[1 mark]

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1.3 Why is the mass number different in the two isotopes?

[1 mark]

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1.4 The model of the atom changed as new evidence was discovered.

The plum pudding model suggested that the atom was a ball of positive charge with electrons embedded in it.

Evidence from the alpha particle scattering experiment led to a change in the model of the atom from the plum pudding model.

Explain how.

[4 marks]

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FEEDBACK SHEET

Overall Mark:	**/22**
Section A: Mark	/8
Section B: Mark	/6
Section C: Mark	/8

GRADE ACHIEVED:

5	☐	**1**	☐
4	☐	**U**	☐
3	☐		
2	☐		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision.	☐ Revise the equations.
☐ Complete outstanding work.	☐ Check the units on answers.
☐ Make corrections as indicated by the teacher.	☐ Check the correct amount of sig figs on answers.
☐ Attend intervention for this topic	☐ Check to convert values correctly.
☐ Include more information in responses.	☐ Show your full working out.
☐ Include more key words in responses.	☐ Check your calculations.
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response

TASK 4: THE PERIODIC TABLE

SPEC CHECK

Content	Achieved?
The elements in the periodic table are arranged in order of atomic (proton) number and so that elements with similar properties are in columns, known as groups. The table is called a periodic table because similar properties occur at regular intervals. Elements in the same group in the periodic table have the same number of electrons in their outer shell (outer electrons) and this gives them similar chemical properties.	
Students should be able to: • Explain how the position of an element in the periodic table is related to the arrangement of electrons in its atoms and hence to its atomic number • Predict possible reactions and probable reactivity of elements from their positions in the periodic table.	
Before the discovery of protons, neutrons and electrons, scientists attempted to classify the elements by arranging them in order of their atomic weights. The early periodic tables were incomplete and some elements were placed in inappropriate groups if the strict order of atomic weights was followed. Mendeleev overcame some of the problems by leaving gaps for elements that he thought had not been discovered and in some places changed the order based on atomic weights. Elements with properties predicted by Mendeleev were discovered and filled the gaps. Knowledge of isotopes made it possible to explain why the order based on atomic weights was not always correct. Students should be able to describe these steps in the development of the periodic table.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. This question is about the periodic table.

In the 19th century, some scientists tried to classify the elements by arranging them in order of their atomic weights.

Figure 1 shows the periodic table Mendeleev produced in 1869.

His periodic table was more widely accepted than previous versions.

Figure 1

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
Period 1	H						
Period 2	Li	Be	B	C	N	O	F
Period 3	Na	Mg	Al	Si	P	S	Cl
Period 4	K Cu	Ca Zn	* *	Ti *	V As	Cr Se	Mn Br
Period 5	Rb Ag	Sr Cd	Y In	Zr Sn	Nb Sb	Mo Te	* I

1.1 The atomic weight of tellurium (Te) is 128 and that of iodine (I) is 127

Why did Mendeleev reverse the order of these two elements?

[1 mark]

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1.2 Mendeleev left spaces marked with an asterisk *

He left these spaces because he thought missing elements belonged there.

Why did Mendeleev's periodic table become more widely accepted than previous versions?

[3 marks]

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1.3 Mendeleev arranged the elements in order of their atomic weight.

What is the modern name for atomic weight?

[1 mark]

Tick **one** box.

Atomic number	☐
Mass number	☐
Relative atomic mass	☐
Relative formula mass	☐

1.4 Complete the sentence.

[1 mark]

In the modern periodic table, the elements are arranged in order of .....

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. This question is about atomic structure and elements.

Complete the sentences.

1.1 The atomic number of an atom is the number of _____

[1 mark]

1.2 The mass number of an atom is the number of _____

_____

[1 mark]

1.3 Explain why an atom has no overall charge.

Use the relative electrical charges of sub-atomic particles in your explanation.

[2 marks]

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1.4 Explain why fluorine and chlorine are in the same group of the periodic table.

Give the electronic structures of fluorine and chlorine in your explanation.

[2 marks]

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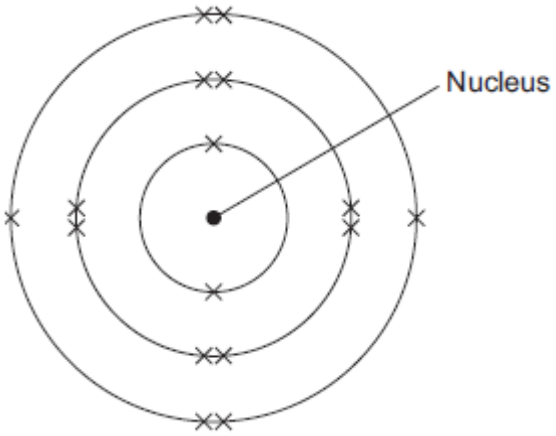
1.5 The diagram shows the electronic structure of an atom of a non-metal.



What is the chemical symbol of this non-metal?

Tick (✓) **one** box.

[1 mark]

Ar ☐

O ☐

S ☐

Si ☐

When elements react, their atoms join with other atoms to form compounds.

Complete the sentences.

1.6 Compounds formed when non-metals react with metals consist of particles called

_____ .

[1 mark]

1.7 Compounds formed from only non-metals consist of particles called _____ .

[1 mark]

SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. John Newlands was the chief chemist in a sugar factory.

In 1864, he placed all the elements known in 1864 into a table, using their relative atomic mass.

He thought every eighth element was similar, so he named the table after the musical term 'octave'.

Figure 5 shows part of Newlands' table of octaves.

H 1	F 8	Cl 15	Co and Ni 22	Br 29	Pd 36	I 42	Pt and Ir 50
Li 2	Na 9	K 16	Cu 23	Rb 30	Ag 37	Cs 44	Tl 53
Gl 3	Mg 10	Ca 17	Zn 25	Sr 31	Cd 34	Ba and V 45	Pb 54

Figure 5

In 1864, scientists did **not** accept Newlands work.

1.1 Suggest **two** reasons why.

[2 marks]

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1.2 Give **two** differences between Newlands' Table of octaves and the modern periodic table.

[2 marks]

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Five years later Mendeleev produced his version of the periodic table.

Figure 6 shows part of Mendeleev's version.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
H Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl
K Cu	Ca Zn		Ti	V As	Cr Se	Mn Br

Figure 6

1.3 Why did Mendeleev leave gaps in his periodic table?

[1 mark]

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1.4 Why did Mendeleev not include Group 0 in his table?

[1 mark]

.....

.....

Figure 7 shows the modern periodic table.

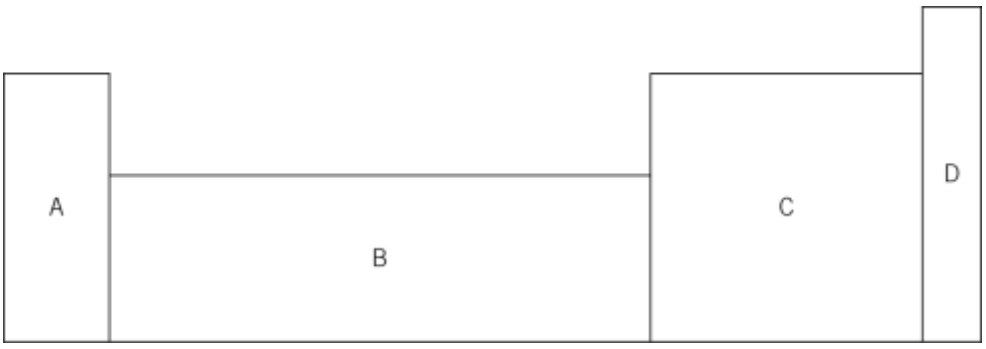

Figure 7

1.5 Copper is a transition metal. Which part of the modern periodic table is copper placed in?

[1 mark]

.....

.....

FEEDBACK SHEET

Overall Mark:	**/22**
Section A: Mark	/6
Section B: Mark	/9
Section C: Mark	/7

GRADE ACHIEVED:

5 ☐ **1** ☐

4 ☐ **U** ☐

3 ☐

2 ☐

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
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☐ Include more information in responses.	☐ Show your full working out.
☐ Include more key words in responses.	☐ Check your calculations.
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response

TASK 5: GROUPS

SPEC CHECK

Content	Achieved?
The elements in Group 0 of the periodic table are called the noble gases. They are unreactive and do not easily form molecules because their atoms have stable arrangements of electrons. The noble gases have eight electrons in their outer shell, except for helium, which has only two electrons. The boiling points of the noble gases increase with increasing relative atomic mass (going down the group).	
Students should be able to: • Explain how properties of the elements in Group 0 depend on the outer shell of electrons of the atoms • Predict properties from given trends down the group.	
The elements in Group 1 of the periodic table are known as the alkali metals and have characteristic properties because of the single electron in their outer shell. Students should be able to describe the reactions of the first three alkali metals with oxygen, chlorine and water. In Group 1, the reactivity of the elements increases going down the group.	
Students should be able to: • Explain how properties of the elements in Group 1 depend on the outer shell of electrons of the atoms • Predict properties from given trends down the group.	
The elements in Group 7 of the periodic table are known as the halogens and have similar reactions because they all have seven electrons in their outer shell. The halogens are non-metals and consist of molecules made of pairs of atoms. Students should be able to describe the nature of the compounds formed when chlorine, bromine and iodine react with metals and non-metals. In Group 7, the further down the group an element is the higher its relative molecular mass, melting point and boiling point. In Group 7, the reactivity of the elements decreases going down the group. A more reactive halogen can displace a less reactive halogen from an aqueous solution of its salt.	
Students should be able to: • Explain how properties of the elements in Group 7 depend on the outer shell of electrons of the atoms • Predict properties from given trends down the group.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A

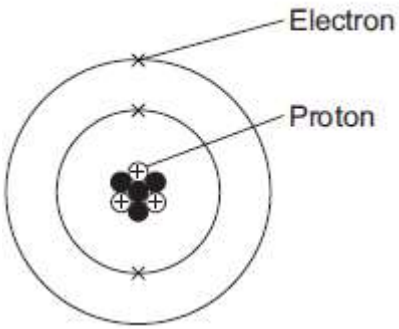
This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

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

Figure 1 shows a lithium atom.

Figure 1



1.1 What is the mass number of the lithium atom in **Figure 1**?

[1 mark]

Tick (✔) **one** box.

3 ☐

4 ☐

7 ☐

1.2 What is the charge of an electron?

[1 mark]

Tick (✔) **one** box.

–1 ☐

0 ☐

+1 ☐

1.3 Protons are in the nucleus.

Which other sub-atomic particles are in the nucleus?

[1 mark]

Tick (✔) **one** box.

ions ☐

molecules ☐

neutrons ☐

1.4 What is **always** different for atoms of different elements?

[1 mark]

Tick (✔) **one** box.

number of neutrons ☐

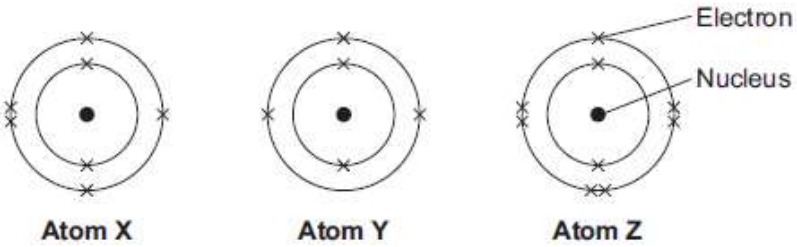
number of protons ☐

number of shells ☐

1.5 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.

Figure 2



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

[1 mark]

Tick (✔) **one** box.

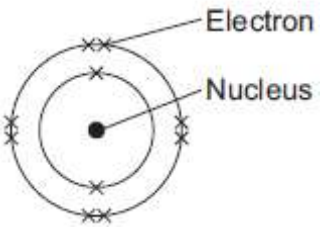
Atom X ☐

Atom Y ☐

Atom Z ☐

Figure 3 shows the electron arrangement of a different atom from an element in the second row of the periodic table.

Figure 3



1.6 Give the chemical symbol of this element.

[1 mark]

.....

.....

1.7 Why is this element unreactive?

[1 mark]

.....

.....

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. This question is about the elements in Group 0.

1.1 What name are Group 0 elements also known by?

Tick **one** box.

[1 Mark]

alkali gases ☐

greenhouse gases ☐

halogen gases ☐

noble gases ☐

Figure 3 shows a graph of relative atomic mass against boiling point for elements in Group 0.

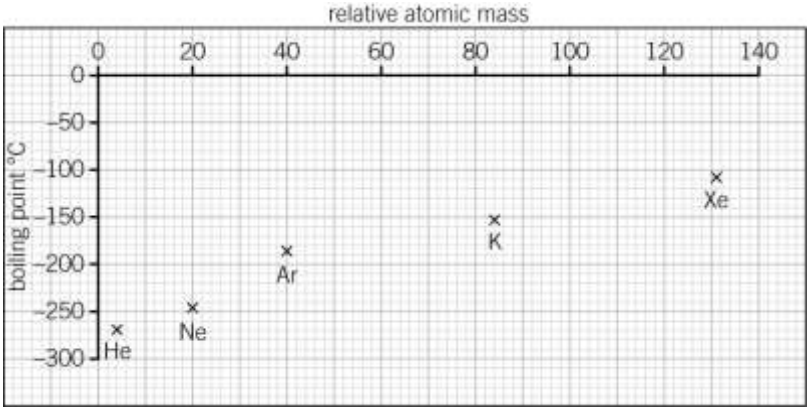


Figure 3

1.2 From the graph, what is the relative atomic mass of argon?

[1 mark]

.....

.....

1.3 Describe the trend between the relative atomic mass and the boiling point of elements in Group 0 shown by the graph.

[1 mark]

.....

.....

Figure 4 shows the outer shell of electrons in an atom of neon.

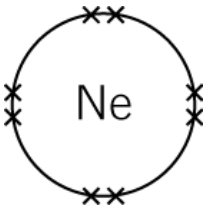


Figure 4

1.4 Explain why neon is unreactive.

Use **Figure 4** to help you answer this question.

[2 marks]

.....

.....

.....

.....

SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. Figure 1 shows the melting and boiling points of Group 7 elements.

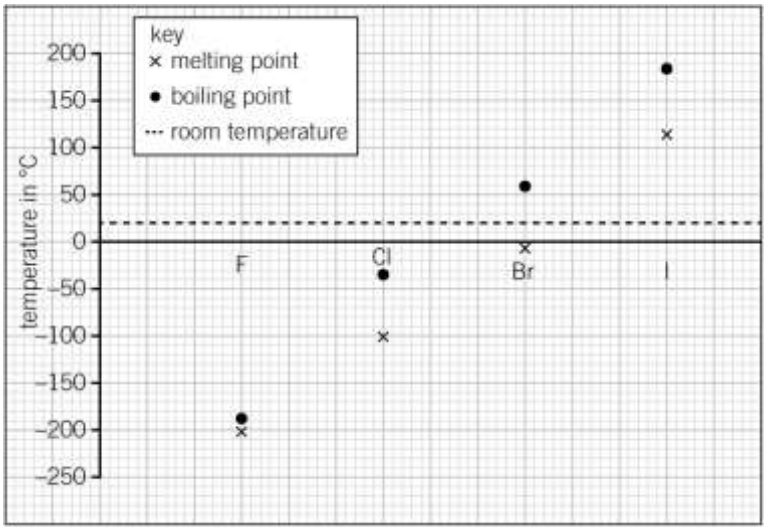


Figure 1

1.1 Which Group 7 element has the lowest boiling point?

Tick **one** box.

[1 Mark]

Fluorine ☐

chlorine ☐

bromine ☐

iodine ☐

1.2 Which Group 7 element is a solid at room temperature?

Tick **one** box.

[1 Mark]

Fluorine ☐

chlorine ☐

bromine ☐

iodine ☐

1.3 Which Group 7 element has the smallest temperature difference between its boiling point and melting point?

Tick **one** box.

[1 Mark]

Fluorine ☐

Chlorine ☐

Bromine ☐

Iodine ☐

Fluorine has 9 electrons.

1.4 Complete **Figure 2** to show the electronic structure of fluorine.

[1 Mark]

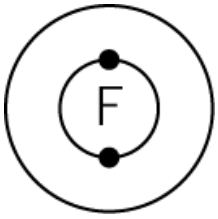


Figure 2

Chlorine reacts with potassium bromide to produce potassium chloride and bromine.

1.5 Complete the word equation for this reaction.

[2 Marks]

chlorine + ... → ..... + ...

1.6 Iodine does not react with potassium bromide because

Tick **one** box.

[1 Mark]

iodine is equal in reactivity to bromine ☐

iodine is less reactive than bromine ☐

iodine is more reactive than bromine ☐

the temperature is too low ☐

FEEDBACK SHEET

Overall Mark:	**/18**
Section A: Mark	/7
Section B: Mark	/5
Section C: Mark	/6

GRADE ACHIEVED:

5	☐	**1**	☐
4	☐	**U**	☐
3	☐		
2	☐		

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Student response

The Periodic Table of Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
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** sulfur 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	63.5 **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	[97] **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	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[267] **Rf** rutherfordium 104	[270] **Db** dubnium 105	[269] **Sg** seaborgium 106	[270] **Bh** bohrium 107	[270] **Hs** hassium 108	[278] **Mt** meitnerium 109	[281] **Ds** darmstadtium 110	[281] **Rg** roentgenium 111	[285] **Cn** copernicium 112	[286] **Nh** nihonium 113	[289] **Fl** flerovium 114	[289] **Mc** moscovium 115	[293] **Lv** livermorium 116	[293] **Ts** tennessine 117	[294] **Og** oganesson 118

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.

Acknowledgements

This document has been produced by Mr J Turnbull.

All relevant information has been credited in the document.

This document has been produced for educational purposes only.

This document has been produced for the AQA GCSE Science Specification.