ST MARY'S SCIENCE DEPARTMENT:

CHEMISTRY

F

GCSE CHEMISTRY **HOMEWORK BOOK**
TOPIC 3: QUANTITATIVE CHEMISTRY
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 10

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 Conservation of Mass			
Task 2 Relative Formula Mass			
Task 3 Concentration			
Task 4 Titrations			
Task 5 Percentage Yield			

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: CONSERVATION OF MASS

SPEC CHECK

Content	Achieved?
The law of conservation of mass states that no atoms are lost or made during a chemical reaction, so the mass of the products equals the mass of the reactants. This means that chemical reactions can be represented by symbol equations which are balanced in terms of the numbers of atoms of each element involved on both sides of the equation. Students should understand the use of the multipliers in equations in normal script before a formula and in subscript within a formula.	
Some reactions may appear to involve a change in mass but this can usually be explained because a reactant or product is a gas and its mass has not been taken into account. For example: when a metal reacts with oxygen the mass of the oxide produced is greater than the mass of the metal or in thermal decompositions of metal carbonates carbon dioxide is produced and escapes into the atmosphere leaving the metal oxide as the only solid product. Students should be able to explain any observed changes in mass in non-enclosed systems during a chemical reaction given the balanced symbol equation for the reaction and explain these changes in terms of the particle model.	
Whenever a measurement is made there is always some uncertainty about the result obtained. Students should be able to: • Represent the distribution of results and make estimations of uncertainty • Use the range of a set of measurements about the mean as a measure of uncertainty.	

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.

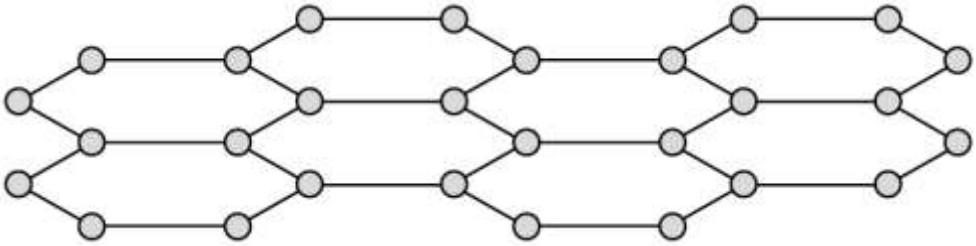
You should aim to spend **10 minutes** answering this section.

1. This question is about graphene and graphite.

Graphene is a single layer of graphite.

Figure 2 represents part of the structure of graphene.

Figure 2



1.1 Graphene is one atom thick. The diameter of the atom is 3.4×10^{-10} m

What is the thickness of a graphene layer in nanometres?

1 nm = 10^{-9} m

[1 mark]

Tick **one** box.

- 0.034 nm ☐
- 0.34 nm ☐
- 3.4 nm ☐
- 34 nm ☐

1.2 Which is one use of graphene?

[1 mark]

Tick **one** box.

As a detergent	☐
As a solvent	☐
In composites	☐
To produce polymers	☐

1.3 Graphene and graphite are used in electronics.

Suggest **one** reason why graphene is a more suitable material for use in electronics than graphite.

[1 mark]

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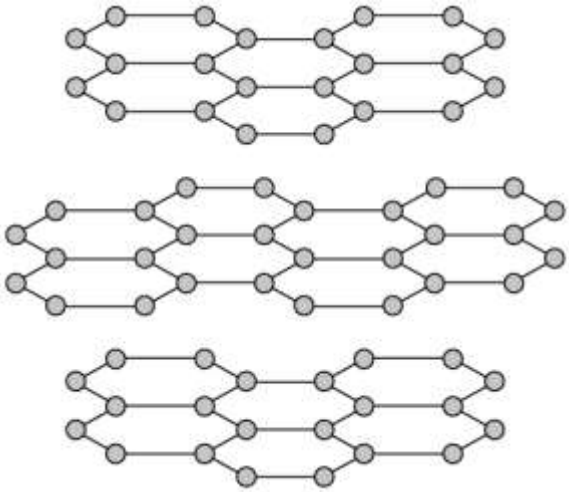
.....

1.4 Figure 3 represents part of the structure of graphite.

Figure 3



Graphite is used as a contact in electric motors because graphite:

- conducts electricity
- is slippery.

Explain why graphite has these properties.

You should refer to the structure and bonding of graphite in your answer.

[6 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. A student investigated the reaction of magnesium with oxygen.

The student calculated that 4.8 g of magnesium would make 8.0 g of magnesium oxide.

The equation for the reaction is:

$$2Mg + O_2 \rightarrow 2MgO$$

1.1 What mass of oxygen is required to produce 8.0 g of magnesium oxide from 4.8 g of magnesium?

[1 mark]

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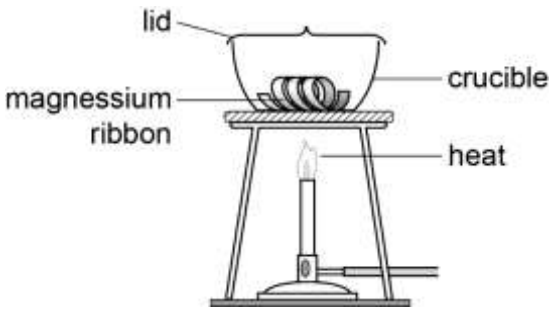
1.2 The student heated magnesium to produce magnesium oxide.

Figure 1 shows the apparatus the student used.

Figure 1



The student:

Weighed 2.40 g of magnesium.

Heated the crucible and magnesium.

When heating lifted up the lid slightly to let oxygen in but stopped magnesium oxide escaping.

Heated until all the magnesium formed a white powder.

Weighed the magnesium ribbon formed.

Table 1 shows the student's results.

Table 1

	Trial 1	**Trial 2**	**Trial 3**	**Trial 4**
Mass of magnesium in g	2.40	2.40	2.40	2.40
Mass of magnesium oxide in g	7.36	7.06	7.38	7.38

Calculate the mean mass of magnesium oxide produced. Give your answer to 2 decimal places

[3 marks]

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1.3 The student produced less magnesium oxide than expected.

Suggest **two** reasons why.

[2 marks]

Reason **1**

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Reason **2**

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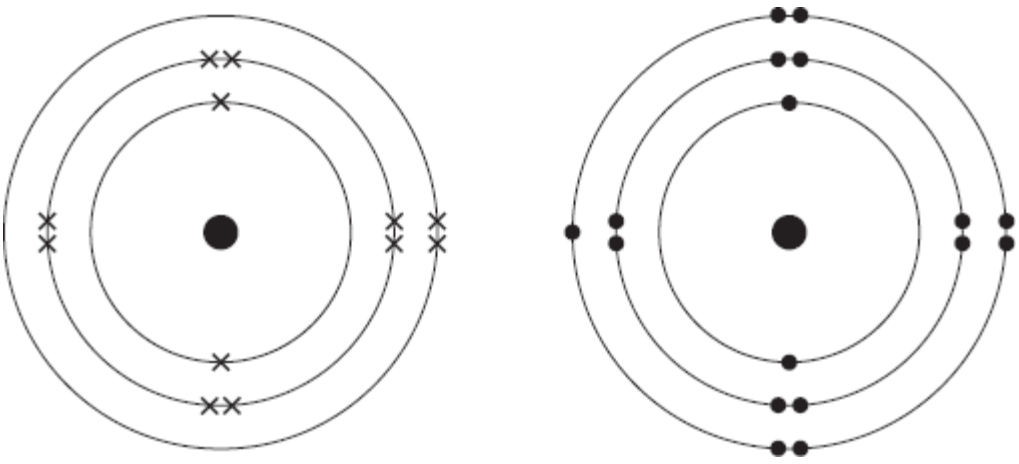
SECTION C

This is a revision question to consolidate your understanding.

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

1. The diagram shows an atom of magnesium and an atom of chlorine.



Magnesium **Chlorine**

1.1 Describe, in terms of electrons, how magnesium atoms and chlorine atoms change into ions to produce magnesium chloride ($MgCl_2$).

[4 marks]

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1.2 Calculate the relative formula mass (M_r) of magnesium chloride ($MgCl_2$).

Relative atomic masses (A_r): magnesium = 24; chlorine = 35.5

[2 marks]

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Relative formula mass (M_r) = _____

FEEDBACK SHEET

Overall Mark:	**/21**
Section A: Mark	/9
Section B: Mark	/6
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 2: RELATIVE FORMULA MASS

SPEC CHECK

Content	Achieved?
The relative formula mass (M_r) of a compound is the sum of the relative atomic masses of the atoms in the numbers shown in the formula. In a balanced chemical equation, the sum of the relative formula masses of the reactants in the quantities shown equals the sum of the relative formula masses of the products in the quantities shown.	

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 structure of the atom.

1.1 Complete the sentences.

Choose answers from the box.

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

electron	**ion**	**neutron**
nucleus	**proton**	

[5 marks]

The centre of the atom is the …….

The two types of particle in the centre of the atom are the proton

and the …….

James Chadwick proved the existence of the …….

Niels Bohr suggested particles orbit the centre of the atom. This type of particle is the …….

The two types of particle with the same mass are the neutron and the …….

Table 2 shows information about two isotopes of element **X**.

Table 2

	Mass number	Percentage (%) abundance
Isotope 1	63	70
Isotope 2	65	30

1.2 Calculate the relative atomic mass (A_r) of element **X** using the equation:

$$A_r = \frac{\text{(mass number} \times \text{percentage) of isotope 1} + \text{(mass number} \times \text{percentage) of isotope 2}}{100}$$

Use **Table 2.**

Give your answer to 1 decimal place.

[2 marks]

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Ar = ...

1.3 Suggest the identity of element **X**.

Use the periodic table.

[1 mark]

Element **X** is ..... .

1.4 The radius of an atom of element **X** is 1.2×10^{-10} m

The radius of the centre of the atom is 1/10 000 the radius of the atom.

Calculate the radius of the centre of an atom of element **X**.

Give your answer in standard form.

[2 marks]

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Radius =..... m

SECTION B

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

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

1. The relative formula mass (M_r) of a compound is the sum of the relative atomic masses of the atoms in the numbers shown in the formula.

1.1 H_2

[1 mark]

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1.2 CO_2

[1 mark]

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1.3 H_2O

[1 mark]

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1.4 NH_3

[1 mark]

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1.5 CH_4

[1 mark]

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1.6 NaOH

[1 mark]

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1.7 H_2SO_4

[1 mark]

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1.8 Na_2CO_3

[1 mark]

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1.9 $Mg\ (NO_3)_2$.

[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. Describe how you can calculate the relative formula mass of a compound.

[4 Marks]

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FEEDBACK SHEET

Overall Mark:	**/23**
Section A: Mark	/10
Section B: Mark	/9
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 3: CONCENTRATION

SPEC CHECK

Content	Achieved?
Many chemical reactions take place in solutions. The concentration of a solution can be measured in mass per given volume of solution, e.g. grams per dm^3 (g/dm^3). Students should be able to: • Calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution	

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 carbon and gases in the air.

1.1 Carbon atoms have protons, neutrons and electrons.

Complete the table by writing the relative mass of a neutron and an electron.

[2 Marks]

Name of particle	**Relative mass**
proton	1
neutron	
electron	

1.2 What is the total number of protons and neutrons in an atom called?

[1 Mark]

Tick (✓) **one** box.

The atomic number ☐

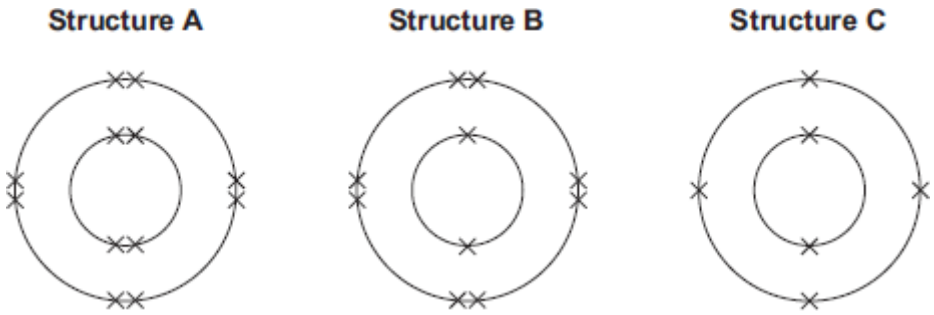
The mass number ☐

One mole of the atom ☐

1.3 An atom of carbon has six electrons.

Which structure, **A, B** or **C**, represents the electronic structure of the carbon atom?

[1 Mark]



The carbon atom is structure ☐

Carbon reacts with oxygen to produce carbon dioxide (CO_2).

1.4 How many different elements are in one molecule of carbon dioxide?

[1 mark]

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1.5 What is the total number of atoms in one molecule of carbon dioxide?

[1 mark]

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Sometimes carbon reacts with oxygen to produce carbon monoxide (CO).

1.6 Calculate the relative formula mass (M_r) of carbon monoxide.

Relative atomic masses (A_r): C = 12; O = 16

[1 mark]

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M_r of carbon monoxide = _____

1.7 Calculate the percentage by mass of carbon in carbon monoxide.

[1 mark]

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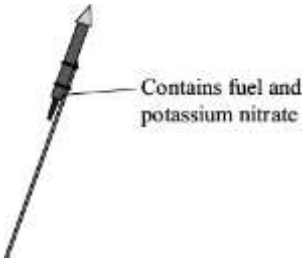
Percentage by mass of carbon in carbon monoxide = _____%

SECTION B

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

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

1. Firework rockets contain fuel and potassium nitrate.



The potassium nitrate provides oxygen for the fuel to react.

The table shows how a student worked out the relative formula mass (M_r) of potassium nitrate.

Some of the numbers are missing.

Relative atomic masses (A_r): N = 14; O = 16; K = 39.

Name of atom (symbol)	**Number of atoms**	**A_r**	**Mass**
potassium (K)	1	39	39
nitrogen (N)	1	14	14
oxygen (O)		16	
		The M_r of potassium nitrate =	101

1.1 The mass of oxygen is not shown in the table.

Draw a ring around the correct mass of oxygen.

[1 Mark]

16 **32** **48**

1.2 Draw a ring around the number of oxygen atoms in the formula of potassium nitrate.

[1 Mark]

1 **2** **3**

1.3 When the fuel reacts with the oxygen an *exothermic* reaction takes place.

What does **exothermic** mean?

[2 Marks]

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1.4 The fuel contains carbon. Carbon reacts with oxygen to make carbon dioxide.

Which **two** statements in the table explain why carbon dioxide is a gas at room temperature?

Tick the **two** statements.

[2 Marks]

Statement	**Tick (✓)**
It has a giant structure	
It has a low boiling point.	
It is made of small molecules.	
It is made of ions.	

SECTION C

This is a revision question to consolidate your understanding.

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

1. A student made two solutions – solution **A** and solution **B**.

Solution **A** contained 5 g of copper sulfate in 50 cm^3 of water.

Solution **B** contains 10 g of copper sulfate in 100 cm^3 of water.

The student added solution **B** to solution **A**.

The student concluded that the new solution is more concentrated because it has more copper sulfate dissolved in it.

Is the student correct? Explain your answer.

[5 marks]

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FEEDBACK SHEET

Overall Mark:	**/17**	**GRADE ACHIEVED:**	
Section A: Mark	/8	**5** ☐	**1** ☐
Section B: Mark	/6	**4** ☐	**U** ☐
Section C: Mark	/3	**3** ☐	
		2 ☐	

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

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

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: TITRATIONS

SPEC CHECK

Content	Achieved?
The volumes of acid and alkali solutions that react with each other can be measured by titration using a suitable indicator. Students should be able to: • describe how to carry out titrations using strong acids and strong alkalis only (sulfuric, hydrochloric and nitric acids only) to find the reacting volumes accurately.	

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. Some pollutants cause acid rain.

A student tested 25.0 cm^3 samples of three types of rainwater, **P, Q** and **R**.
The student titrated the samples with sodium hydroxide solution (an alkali).

The student recorded the volume of sodium hydroxide solution needed to neutralise the rainwater. The student's results are shown in **Table 1**.

Table 1

	Volume of sodium hydroxide needed to neutralise the rainwater in cm^3				
Type of rainwater	**Titration 1**	**Titration 2**	**Titration 3**	**Titration 4**	**Titration 5**
P	18.0	15.5	14.5	15.0	15.0
Q	13.0	10.0	11.0	10.5	10.5
R	23.0	19.5	18.5	19.0	19.0

1.1 The student calculated the mean value for rainwater **R** as 19.0 cm^3.

Show how the student calculated the mean value for rainwater **R**.

[2 marks]

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1.2 Write down **P, Q** and **R** in order of their acidity.

[2 Marks]

Most acidic _____

_____

Least acidic _____

A second student repeated the experiment and recorded the results in **Table 2**.

Table 2

	Volume of sodium hydroxide needed to neutralise the rainwater in cm^3	
Type of rainwater	**Titration 1**	**Titration 2**
P	17	15
Q	11	9
R	20	18

1.3 Use **Table 1** and **Table 2** to suggest **two** improvements the second student could make to obtain more accurate results.

[2 marks]

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1.4 The results of the two students show that the experiment is reproducible.

Give the reason why.

[1 Mark]

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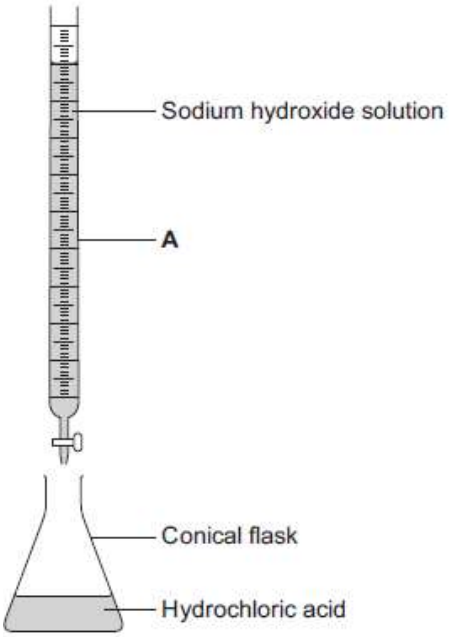
SECTION B

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

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

1. A student used the apparatus in the figure below to do a titration.



1.1 What is the name of the piece of apparatus labelled **A**?

Draw a ring around the correct answer.

[1 Mark]

burette **measuring cylinder** **test tube**

1.2 What should the student add to the acid in the conical flask?

Draw a ring around the correct answer.

[1 Mark]

catalyst **indicator** **water**

1.3 What would the student see when the end point of the titration has been reached?

[1 Mark]

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.....

The student does the titration three times.

1.4 State **one** variable that the student needs to keep the same to make it a fair test.

[1 Mark]

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.....

1.5 The student's results are shown in the table below.

Titration	Volume of sodium hydroxide solution added in cm^3
1	22.40
2	22.20
3	22.30

Calculate the mean volume of sodium hydroxide solution added.

[1 Mark]

.....

.....

Volume = _____ cm^3

SECTION C

This is a revision question to consolidate your understanding.

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

1. A student investigated the volume of sulfuric acid that reacted with 25 cm^3 sodium hydroxide.

Describe a titration method the student could use in this investigation.

[6 marks]

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	☐		

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

Student response

TASK 5: PERCENTAGE YIELD

SPEC CHECK

Content	Achieved?
Even though no atoms are gained or lost in a chemical reaction, it is not always possible to obtain the calculated amount of a product because: • The reaction may not go to completion because it is reversible • Some of the product may be lost when it is separated from the reaction mixture • Some of the reactants may react in ways different to the expected reaction. The amount of a product obtained is known as the yield. When compared with the maximum theoretical amount as a percentage, it is called the percentage yield. $\%\ \text{Yield} = \frac{\text{Mass of product actually made}}{\text{Maximum theoretical mass of product}} \times 100$ Students should be able to: • Calculate the percentage yield of a product from the actual yield of a reaction	
The atom economy (atom utilisation) is a measure of the amount of starting materials that end up as useful products. It is important for sustainable development and for economic reasons to use reactions with high atom economy. The percentage atom economy of a reaction is calculated using the balanced equation for the reaction as follows: $\frac{\text{Relative formula mass of desired product from equation}}{\text{Sum of relative formula masses of all reactants from equation}} \times 100$ Students should be able to: • Calculate the atom economy of a reaction to form a desired product from the balanced equation .	

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 is made in a reversible reaction form ethene and water.

The equation is $C_2H_4 + H_2O \rightleftharpoons C_2H_5OH$

1.1 Which statement correctly describes the yield?

Tick **one** box only.

[1 Mark]

A mass of ethanol and water ☐

B mass of ethanol made ☐

C mass of ethene reacted ☐

D mass of reactants and products ☐

A student calculated that the maximum theoretical mass of ethanol made in the reaction would be 90 g.

In the practical the student actually made 60 g of ethanol.

1.2 Calculate the percentage yield.

Give your answer to 2 significant figures.

Use the equation

$$\text{percentage yield} = \frac{\text{mass of product actually made}}{\text{maximum theoretical mass of product}} \times 100$$

[3 marks]

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1.3 Suggest **one** reason why the mass collected was less than expected.

Tick **one** box only.

[1 Mark]

A ethanol is a liquid ☐

B ethene is too reactive ☐

C reversible reaction ☐

SECTION B

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

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

1. Aspirin, $C_9H_8O_4$, is a common painkiller.

Pharmaceutical companies make aspirin by reacting salicylic acid, $C_7H_6O_3$, with one of two chemicals:

salicylic acid can be reacted with ethanoyl chloride, C_2H_3OCl

$$C_7H_6O_3 + C_2H_3OCl \rightarrow C_9H_8O_4 + HCl$$

or salicylic acid can be reacted with ethanoic anhydride, $C_4H_6O_3$

$$C_7H_6O_3 + C_4H_6O_3 \rightarrow C_9H_8O_4 + C_2H_4O_2$$

Look at the table of relative formula masses:

Substance	**Relative formula mass, M_r**
$C_7H_6O_3$	138
C_2H_3OCl	78.5
$C_4H_6O_3$	102
HCl	36.5
$C_2H_4O_2$	60
$C_9H_8O_4$	180

Calculate the atom economy of making aspirin

1.1 from salicyclic acid and ethanoyl chloride

[2 marks]

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1.2 from salicyclic acid and ethanoic anhydride.

[2 marks]

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Relative atomic masses (A_r): C = 12; H = 1; O = 16

1.3 State which method of production has the higher atom economy.

[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. Industrially ethanol can be produced by two different methods.

Reaction 1: $C_2H_4 + H_2O \rightarrow C_2H_5OH$

Reaction 2: $C_6H_{12}O_6 \rightarrow 2CO_2 + 2C_2H_5OH$

1.1 Explain why the atom economy in **reaction 1** is equal to 100%.

[2 Marks]

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1.2 Calculate the atom economy for **reaction 2**.

Relative atomic masses A_r: C = 12, H = 1, O = 16

[5 Marks]

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FEEDBACK SHEET

Overall Mark:	**/17**	**GRADE ACHIEVED:**	
Section A: Mark	/5	**5** ☐	**1** ☐
Section B: Mark	/5	**4** ☐	**U** ☐
Section C: Mark	/7	**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

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

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