ST MARY'S SCIENCE DEPARTMENT:

PHYSICS

F

GCSE PHYSICS **HOMEWORK BOOK**
TOPIC 4: ATOMIC STRUCTURE
PART 2: NUCLEAR PHYSICS
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		
OVERALL		

GCSE PHYSICS

YEAR 10

TOPIC 2

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 Half Life			
Task 2 Uses of Radiation			
Task 3 Nuclear Fission			
Task 4 Nuclear Fusion			

PHYSICS DEPARTMENT MARKING CODE

ID = Insufficient detail in answer
W = Wrong understanding of physics
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 twice.
A circle means this lost you marks
An underline means this gained you marks

IMPORTANT NOTE

All sections in each task must be **FULLY ATTEMPTED.**

If students fail to achieve an acceptable mark on each task, they will be made to carry out supervised intervention the following week.

Each week, intervention sessions will be provided to help assist with answering the questions in the homework booklet if students are struggling with the difficulty of the problems.

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: HALF LIFE

SPEC CHECK

Content	Achieved?
Radioactive decay is random. The half-life of a radioactive isotope is the time it takes for the number of nuclei of the isotope in a sample to halve, or the time it takes for the count rate (or activity) from a sample containing the isotope to fall to half its initial level. Students should be able to explain the concept of half-life and how it is related to the random nature of radioactive decay. Students should be able to determine the half-life of a radioactive isotope from given 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

Electricity Revision

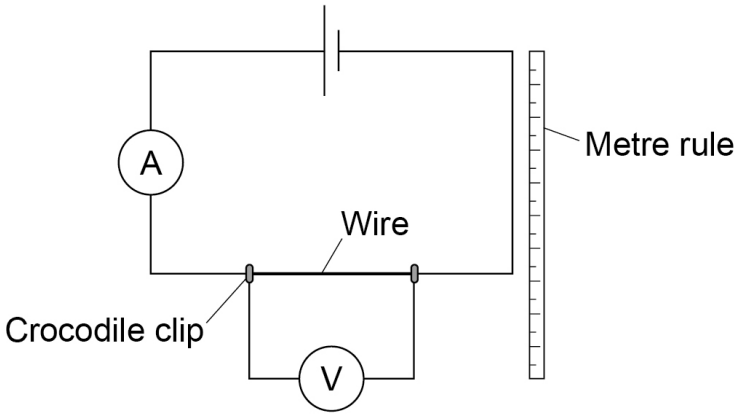
This is a revision question on a previous topic.

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

1. A student investigated how the resistance of a wire varies with the length of the wire.

Figure 5 shows the circuit the student used. The student also had a metre rule.

Figure 5



1.1 Plan an experiment to investigate how the resistance of a wire varies with the length of the wire.

[6 marks]

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Another student investigated how the current in a resistor varied with the potential difference across it.

Table 2 shows the student's results.

Table 2

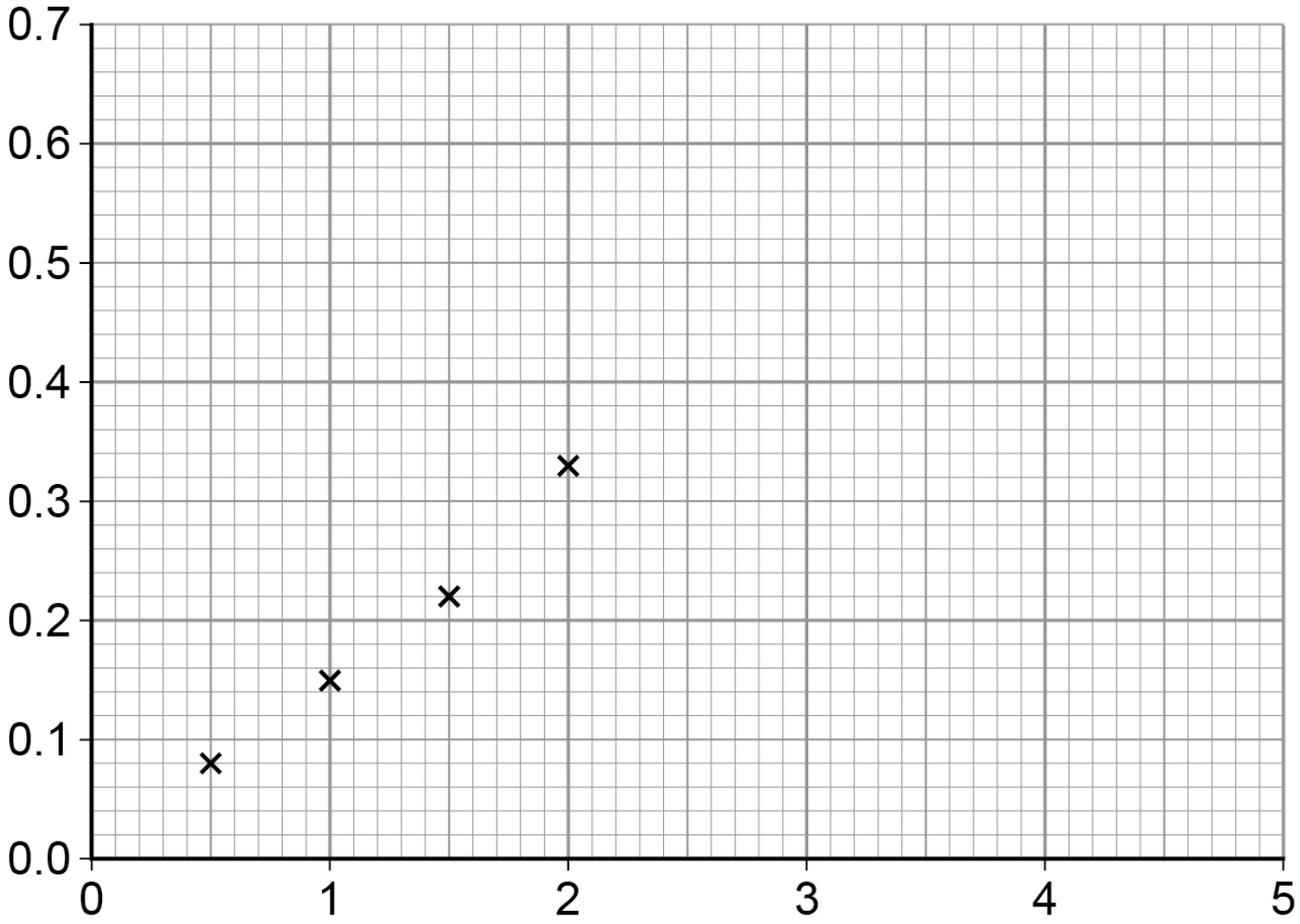
Potential difference in volts	Current in amps
0.50	0.08
1.0	0.15
1.5	0.22
2.0	0.33
2.5	0.43
3.0	0.48
3.5	0.54
4.0	0.62
4.5	0.66

1.2 Complete **Figure 6**. You should:

- Label the x-axis and the y-axis
- Plot the remaining five points
- Add a line of best fit.

[4 marks]

Figure 6



SECTION B

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

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

1. Protactinium (Pa) is radioactive.

1.1 An atom of one isotope of protactinium contains 91 protons and 143 neutrons.

What is the correct symbol for this atom?

[1 mark]

Tick **one** box.

$^{143}_{91}Pa$ ☐ $^{234}_{91}Pa$ ☐ $^{234}_{143}Pa$ ☐ $^{91}_{52}Pa$ ☐

A teacher investigated how the count rate from a sample of protactinium changed over time.

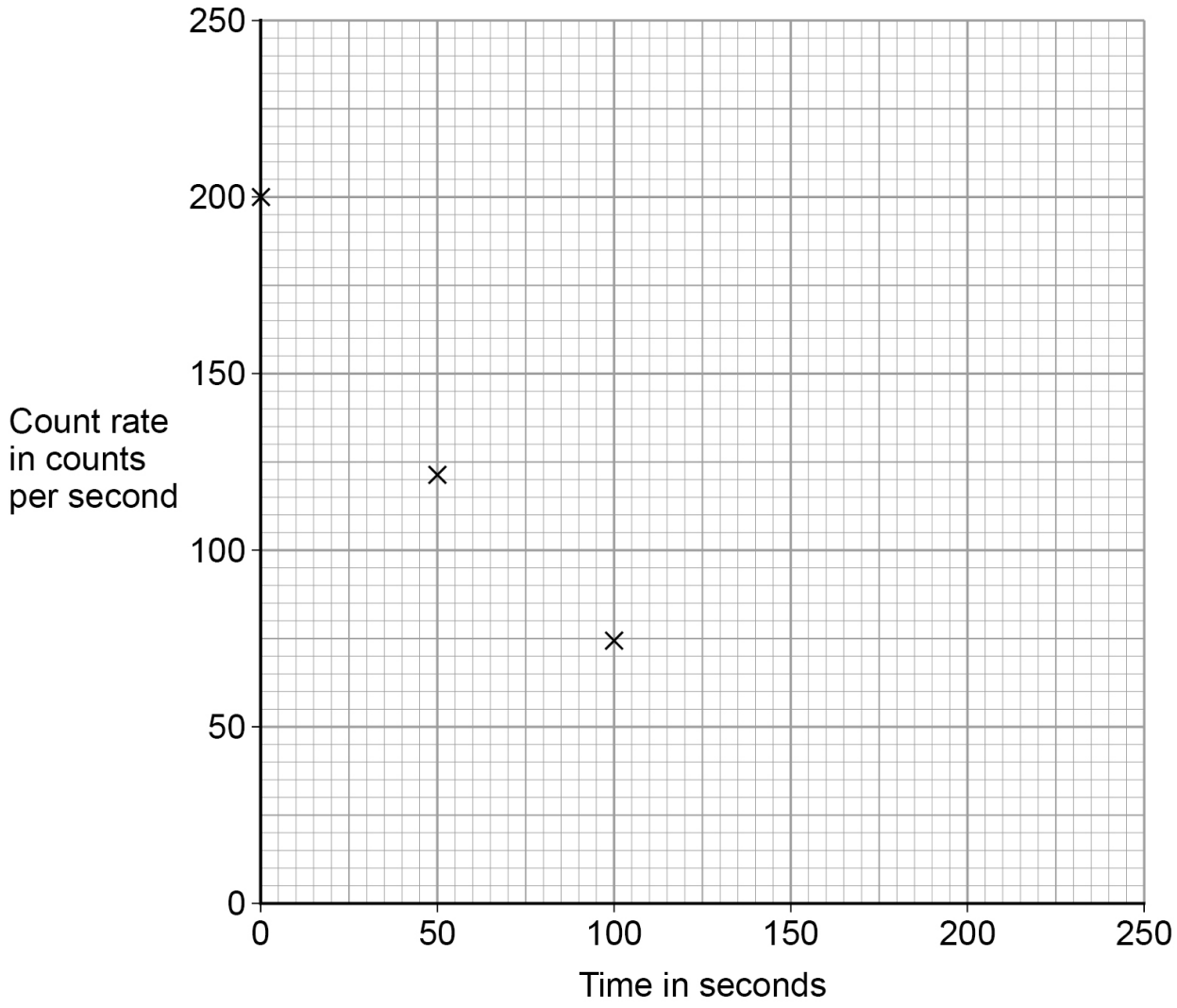
Table 2 shows the results.

Table 2

Time in seconds	Count rate in counts per second
0	200
50	122
100	74
150	45
200	27

Figure 6 shows some of the teacher's results.

Figure 6



1.2 Complete the graph in **Figure 6**.

Use data from **Table 2.**

Draw the line of best fit.

[2 marks]

1.3 How much time did it take for the count rate to change from 200 counts per second to 100 counts per second?

[1 mark]

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Time taken = ... s

1.4 What is the half-life of protactinium?

[1 mark]

Half-life = ... s

1.5 The nuclear radiation from the protactinium can pass through paper.

This radiation can only be detected up to 1 metre away from the protactinium.

What type of radiation is emitted by the protactinium?

[1 mark]

Tick **one** box.

Alpha	☐
Beta	☐
Gamma	☐
Neutron	☐

1.6 The teacher read an article about the effects of radiation on the human body.

Why are articles in scientific journals generally more trustworthy than articles in newspapers?

[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. Radioactive nuclei can emit alpha, beta or gamma radiation.

1.1 Which type of radiation is the most penetrating?

[1 mark]

Tick **one** box.

Alpha (α) ☐

Beta (β) ☐

Gamma (γ) ☐

1.2 Which type of radiation is the most ionising?

[1 mark]

Tick **one** box.

Alpha (α) ☐

Beta (β) ☐

Gamma (γ) ☐

1.3 Which type of radiation has the longest range in air?

[1 mark]

Tick **one** box.

Alpha (α) ☐

Beta (β) ☐

Gamma (γ) ☐

When radioactive isotopes in the Earth's crust decay they release energy.
1.4 Figure 8 shows the decay of uranium–238 (U–238) into thorium–234 (Th–234).

Figure 8

$$^{238}_{92}U \longrightarrow {}^{234}_{90}Th + {}^{4}_{2}He$$

Complete **Table 2** to show the number of neutrons and protons in the nuclei.

[2 marks]

Table 2

Isotope	Number of neutrons	Number of protons
uranium–238	146	
thorium–234		90

1.5 Geothermal power stations pump water through heated rocks.
The temperature of the water increases from 20 °C to its boiling point of 100 °C
Calculate the change in thermal energy when the mass of water heated is 150 kg
Specific heat capacity = 4 200 J/kg °C
Use the Physics Equations Sheet.

[3 marks]

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Change in thermal energy =..... J

FEEDBACK SHEET

Overall Mark:	**/25**
Section A:	/10
Section B:	/7
Section C:	/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. ☐ 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 2: USES OF RADIATION

SPEC CHECK

Content	Achieved?
Radioactive isotopes have a very wide range of half-life values. Students should be able to explain why the hazards associated with radioactive material differ per the half-life involved.	
Radioactive isotopes have a very wide range of half-life values. Students should be able to explain why the hazards associated with radioactive material differ per the half-life involved.	
Background radiation is around us all of the time. It comes from: Natural sources such as rocks and cosmic rays from space Man-made sources such as the fallout from nuclear weapons testing and nuclear accidents. The level of background radiation and radiation dose may be affected by occupation and/or location. Radiation dose is measured in Sieverts (Sv) 1000 millisieverts (mSv) = 1 Sievert (Sv)	

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

Electricity Revision

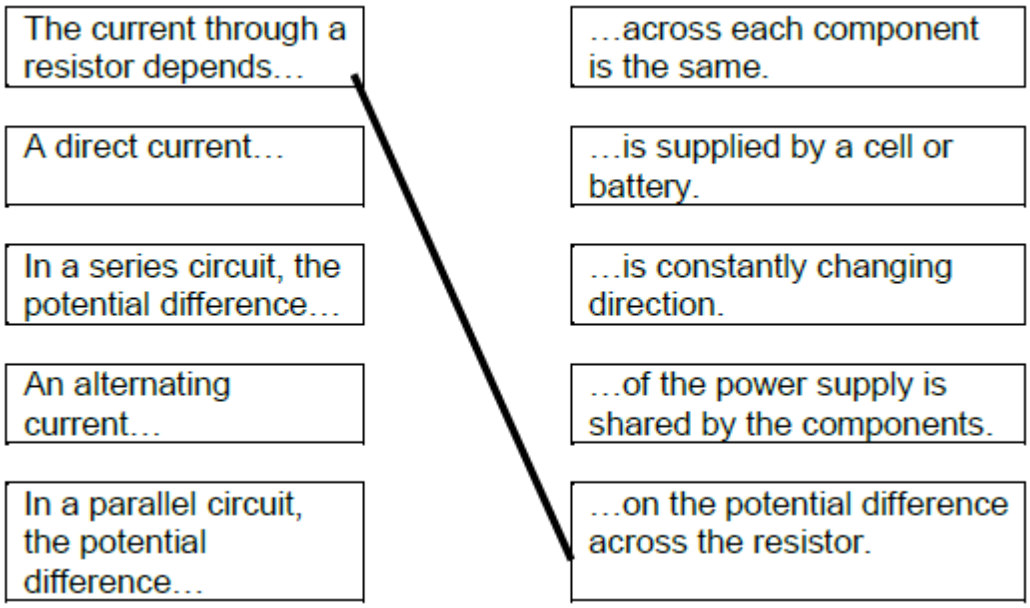
This is a revision question on a previous topic.

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

1.1 Draw **four** lines between the boxes to complete the sentences.

One sentence has already been completed.

[3 marks]



1.2 State what is meant by an electric current?

[1 mark]

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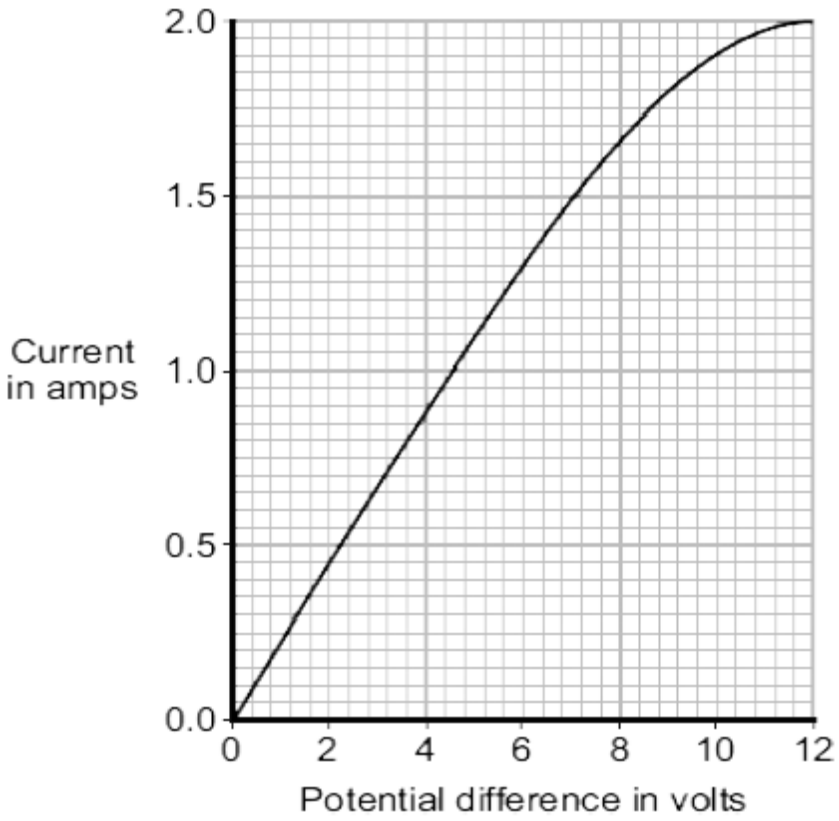
The graph shows how the electric current through a 12 V filament bulb varies with the potential difference across the bulb.



1.3 Explain why the resistance of the metal filament inside the bulb changes as the potential difference across the bulb increases.

[3 marks]

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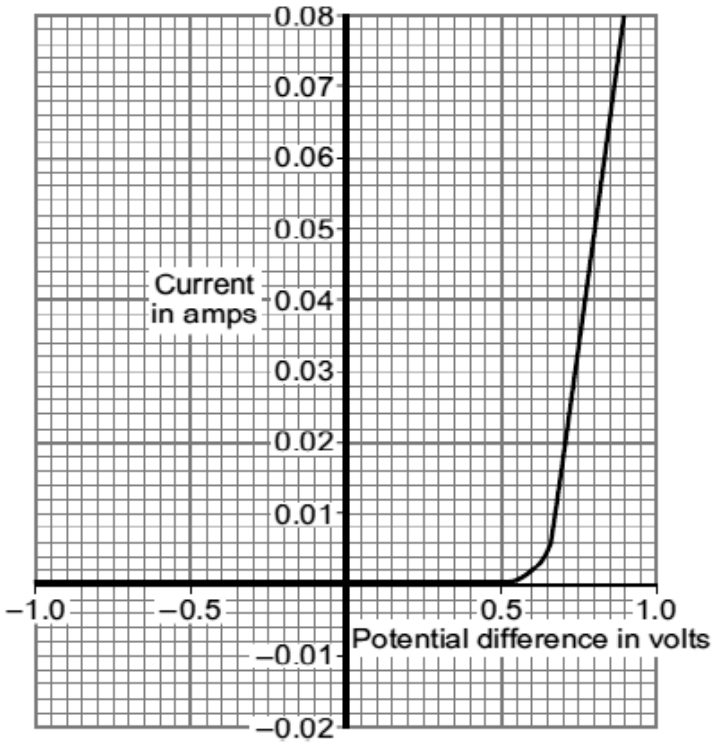
The current–potential difference graph for one type of electrical component is shown below.



1.4 What is the component?

Tick **one** box.

[1 mark]

Diode	☐
Light-dependent resistor	☐
Thermistor	☐
Variable resistor	☐

1.5 Calculate the resistance of the component when the potential difference across it is 0.8 volts.

Use data from the graph.

[2 marks]

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Resistance = _____ Ω

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 Voyager 2 space probe was launched in 1977.

It is powered by the energy released when the radioactive isotope plutonium-238 decays.

1.1 Plutonium-238 (Pu) decays into uranium-234 (U) by emitting an alpha particle.

Complete the nuclear equation for the decay of plutonium-238.

[2 marks]

$$^{238}_{94}Pu \longrightarrow \underline{\quad}^{234}U + \underline{\quad}\alpha$$

1.2 The space probe contains a lot of very sensitive equipment that would be damaged by nuclear radiation.

Explain why a radiation source that emits alpha particles is suitable for the space probe.

[2 marks]

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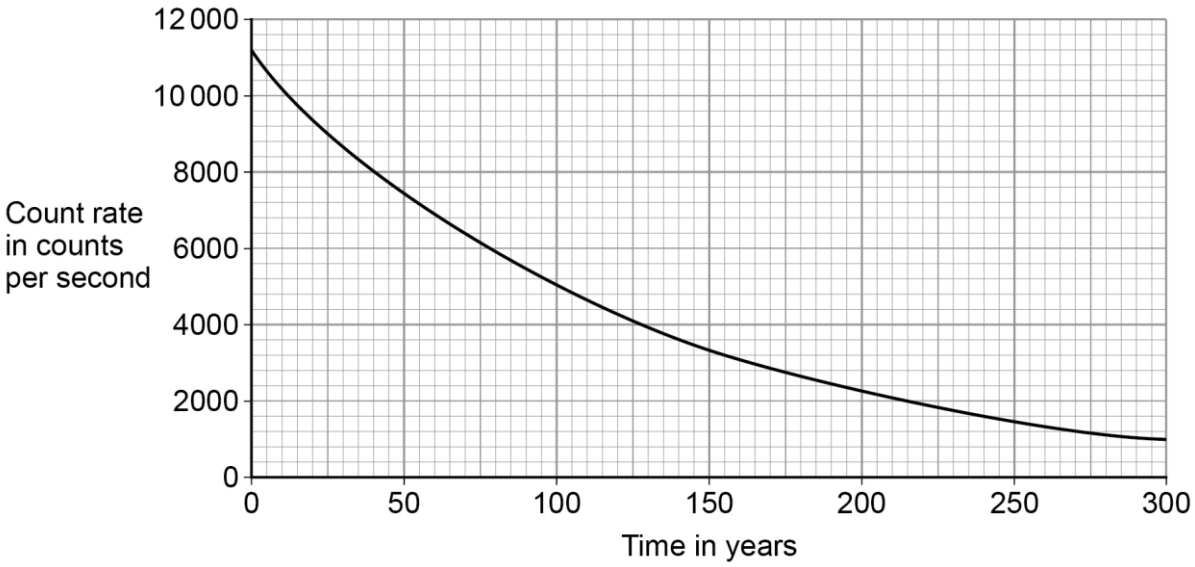
Figure 11 shows how the count rate of a sample of plutonium-238 varies with time.

Figure 11



1.3 Determine the half-life of plutonium-238.

[2 marks]

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Half-life = ... years

1.4 The space probe is still operating in space today.

When the space probe was launched in 1977 the power source had an output of 158 W.

Determine the power output of the power source today.

Use information from **Figure 11**.

[3 marks]

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Power Output = ... W

1.5 Explain why an isotope with a longer half-life than plutonium was not chosen to power the space probe.

[2 marks]

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1.6 The space probe is currently at the edge of our solar system. Scientists use a unit called the astronomical unit (AU) to measure the large distances in the solar system.

1 AU = 1.5×10^{11} m

The signals that the space probe sends back to Earth travel at a speed of 3.0×10^{8} m/s.

The space probe is currently 120 AU from Earth.

Calculate the time it takes for a signal from the space probe to reach Earth.

Give your answer in hours.

[4 marks]

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Time =..... hours

SECTION C

This is a revision question to consolidate your understanding.

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

1.1 Atoms contain three types of particle.
Which of the following particles are found in the nucleus of an atom?
Tick **one** box.

[1 mark]

- Electrons and neutrons ☐
- Electrons and protons ☐
- Neutrons and protons ☐
- Protons, electrons and neutrons ☐

1.2 Complete the table below to show the relative charges of the subatomic particles.

[1 mark]

Particle	Relative charge
Electron	–1
Neutron	
Proton	

1.3 The table below gives information about four radioactive isotopes.

Isotope	Type of radiation emitted	Half-life
iridium-192	gamma ray	74 days
polonium-210	alpha particle	138 days
polonium-213	alpha particle	less than 1 second
technetium-99	gamma ray	6 hours

Two isotopes of polonium are given in the table. In terms of particles in the nucleus:
Describe how these two isotopes of polonium are the same.

[1 mark]

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1.4 Describe how these two isotopes of polonium are different.

[1 mark]

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1.5 A doctor injects a patient with a very small dose of technetium-99 to monitor the blood flow through the patient's heart.
The radiation detected outside of the patient's body can be used to see if the heart is working correctly.
Explain why technetium-99 is more suitable for this use than polonium-210.

[2 marks]

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1.6 Explain why technetium-99 is more suitable for this use than iridium-192.

[2 marks]

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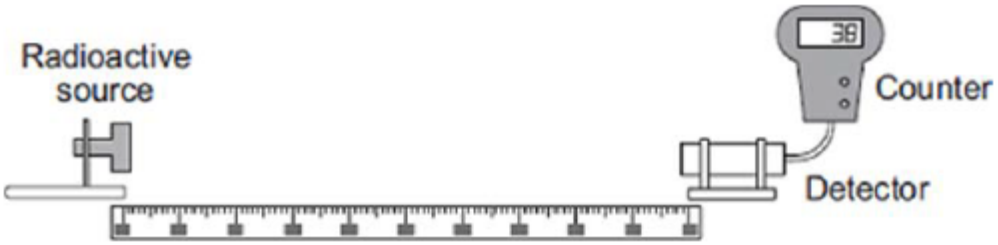
1.7 A teacher used the equipment shown in the diagram to measure the count rate at different distances from a radioactive source.



The results are shown in the table below.

Distance in metres	Count rate in counts per minute	Corrected count rate in counts per minute
0.4	143	125
0.6	74	56
0.8	49	31
1.0	38	20
1.2	32	14
1.4	28	10
1.6	18	0
1.8	18	0
2.0	18	0

The background count rate has been used to calculate the corrected count rate.
Calculate, using data from the table, the value of the background count rate.

[1 mark]

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Background count rate = _____ counts per minute

1.8 Why does the teacher need to calculate a corrected count rate?

[1 mark]

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1.9 The radioactive source used in the demonstration emits only one type of radiation.
Explain how can you tell from the data in the table that the radioactive source is not an alpha emitter

[1 mark]

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FEEDBACK SHEET

Overall Mark:	**/36**	**GRADE ACHIEVED:**	
Section A:	/10	**5** ☐	**1** ☐
Section B:	/15	**4** ☐	**U** ☐
Section C:	/11	**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. ☐ 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:

TASK 3: NUCLEAR FISSION

SPEC CHECK

Content	Achieved?
Nuclear fission is the splitting of a large and unstable nucleus (e.g. uranium or plutonium). Spontaneous fission is rare. Usually, for fission to occur the unstable nucleus must first absorb a neutron. The nucleus undergoing fission splits into two smaller nuclei, roughly equal in size, and emits two or three neutrons plus gamma rays. Energy is released by the fission reaction. All of the fission products have kinetic energy. The neutrons may go on to start a chain reaction. The chain reaction is controlled in a nuclear reactor to control the energy released. The explosion caused by a nuclear weapon is caused by an uncontrolled chain reaction. Students should be able to draw/interpret diagrams representing nuclear fission and how a chain reaction may occur.	

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

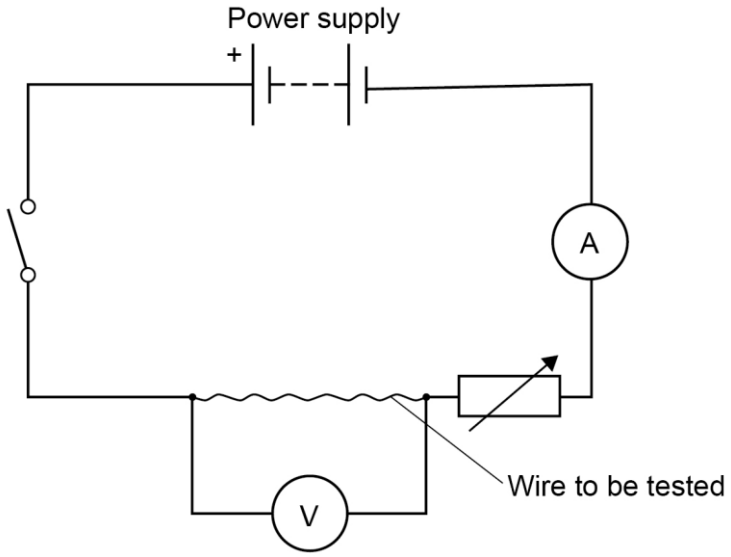
Electricity Revision

This is a revision question on a previous topic.

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

1. The circuit in **Figure 5** is used to take measurements to determine the resistance of a wire.

Figure 5



The method for the experiment is:

- Use the variable resistor to set the potential difference (pd) across the wire to 0.5 V
- Record the current in amps
- Increase the pd to 1.0 V and record the current in amps
- Repeat the process at 0.5 V intervals up to a pd of 4.0 V.

1.1 What are the control variables in the experiment?

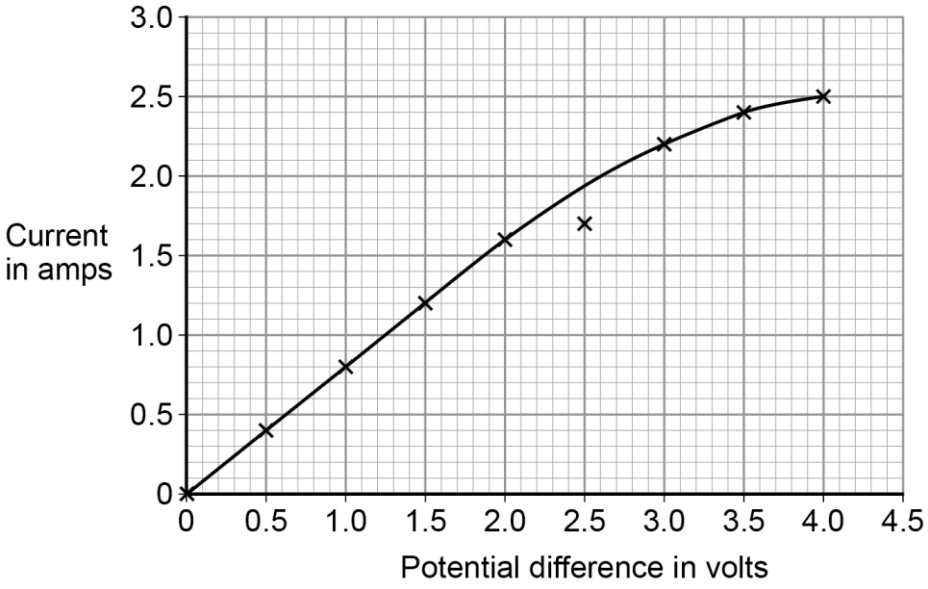
Tick **two** boxes.

[2 marks]

- Current through the wire ☐
- Length of the wire ☐
- Material of the wire ☐
- pd across the wire ☐
- Resistance of the variable resistor ☐

Figure 6 shows the results of the experiment.

Figure 6



1.2 One result is anomalous.

Suggest **one** reason for this anomalous result.

[1 mark]

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1.3 Explain how **Figure 6** shows that resistance does not remain constant.

[2 marks]

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1.4 Resistance is calculated using the equation:

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$

Calculate the **change** in resistance of the wire between a pd of 2.0 V and a pd of 4.0 V.

Use data from **Figure 6**.

[4 marks]

Resistance at 2.0 V =

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Resistance at 4.0 V =

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Change in resistance = ... Ω

1.5 Why has the resistance changed?

Tick **one** box.

[1 mark]

The wire has become thinner. ☐

The wire has cooled down. ☐

The wire has expanded. ☐

The wire has heated up. ☐

SECTION B

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

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

1. Nuclear fission and nuclear fusion are two processes that release energy.

1.1 Use the correct answer from the box to complete each sentence.

[2 marks]

Geiger counter	**nuclear reactor**	**star**

Nuclear fission takes place within a _____.

Nuclear fusion takes place within a _____.

1.2 State **one** way in which the process of nuclear fusion differs from the process of nuclear fission.

[1 mark]

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The following nuclear equation represents the fission of uranium-235 (U-235).

$$^{1}_{0}n + {}^{235}_{92}U \longrightarrow {}^{236}_{92}U \longrightarrow {}^{141}_{56}Ba + {}^{92}_{36}Kr + 3\,{}^{1}_{0}n + \text{energy}$$

Chemical symbols:

Ba - barium

Kr - krypton

1.3 Use the information in the equation to describe the process of nuclear fission.

[4 marks]

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1.4 An isotope of barium is Ba-139.
Ba-139 decays by beta decay to lanthanum-139 (La-139).

Complete the nuclear equation that represents the decay of Ba-139 to La-139.

[3 marks]

$$^{139}Ba \longrightarrow {}^{139}La + \quad .....$$

SECTION C

This is a revision question to consolidate your understanding.

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

1. The table gives information about the three types of particle that make up an atom.

Particle	Relative mass	Relative charge
Proton		+1
Neutron	1	
Electron	very small	–1

1.1 Complete the table by adding the **two** missing values.

[2 marks]

1.2 Use the information in the table to explain why an atom has no overall electrical charge.

[2 marks]

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Uranium has two natural isotopes, uranium-235 and uranium-238.
Uranium-235 is used as a fuel inside a nuclear reactor.
Inside the reactor, atoms of uranium-235 are split and energy is released.

1.3 How is the structure of an atom of uranium-235 different from the structure of an atom of uranium-238?

[1 mark]

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1.4 The nucleus of a uranium-235 atom must absorb a particle before the atom is able to split.

What type of particle is absorbed?

[1 mark]

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1.5 The nucleus of an atom splits into smaller parts in a reactor.

What name is given to this process?

[1 mark]

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FEEDBACK SHEET

Overall Mark:	/27
Section A:	/10
Section B:	/10
Section C:	/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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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 4: NUCLEAR FUSION

SPEC CHECK

Content	Achieved?
Nuclear fusion is the joining of two light nuclei to form a heavier nucleus. In this process, some of the mass may be converted into the energy of radiation.	

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

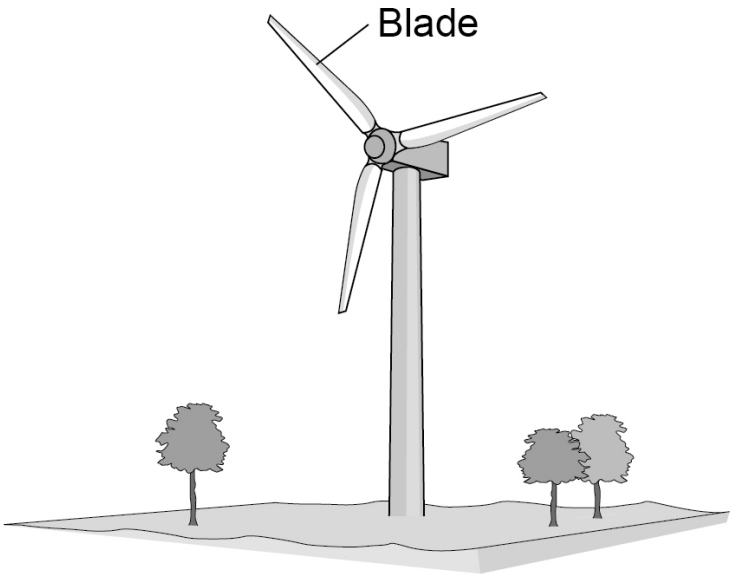
Electricity Revision

This is a revision question on a previous topic.

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

1. Figure 7 shows a wind turbine.

Figure 7



1.1 Which of the following statements about using wind turbines to generate electricity are true?

Tick **two** boxes.

[2 marks]

Wind turbines are a reliable source of energy. ☐

Wind turbines are silent when working. ☐

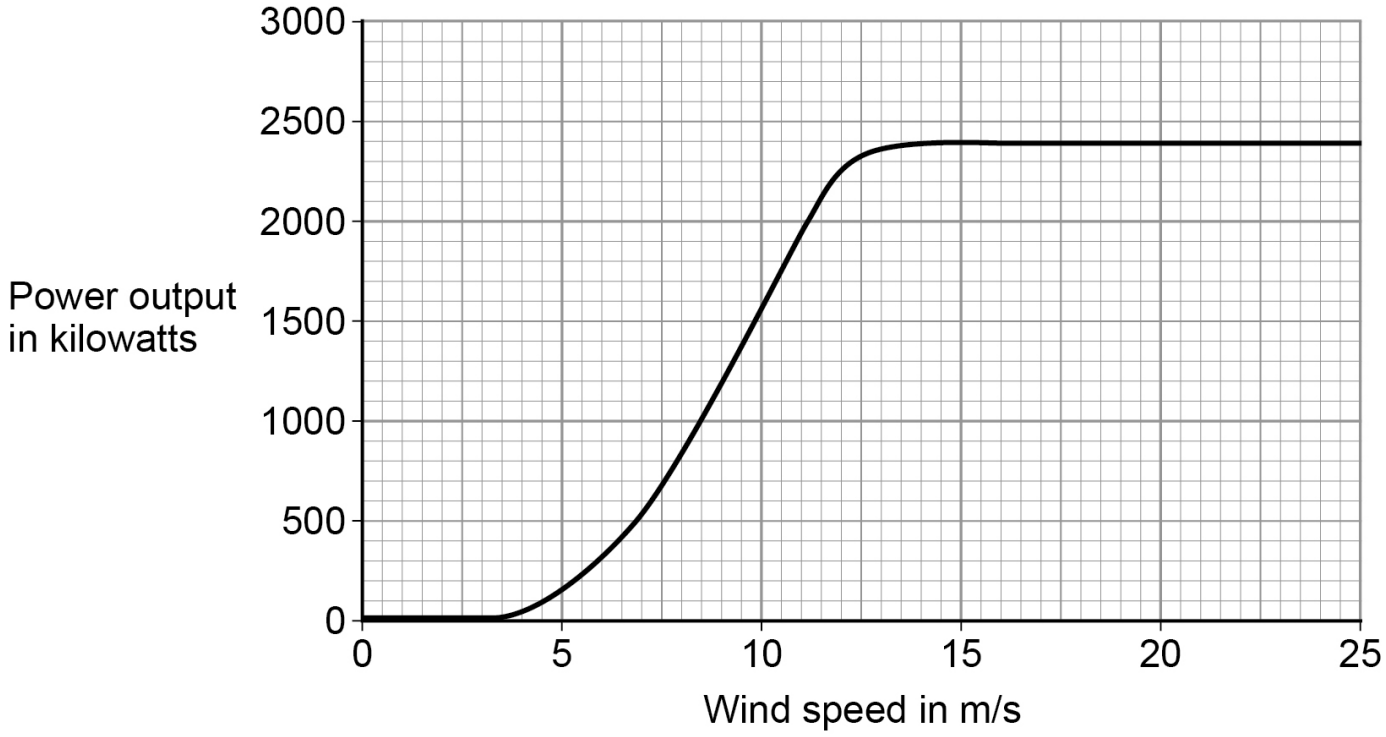
Wind turbines do not emit greenhouse gases. ☐

Wind turbines have no fuel costs when working. ☐

Wind turbines have no impact on the environment. ☐

Figure 8 shows how the power output from a wind turbine varies with wind speed.

Figure 8



1.2 Describe how the wind speed affects the power output from the wind turbine.

Your answer should include data from **Figure 8**.

[3 marks]

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1.3 During 1 hour, the average power output for the wind turbine was 2.0×10^6 W.

Calculate the electrical energy generated by the wind turbine during this hour.

[4 marks]

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Energy Generated =..... J

SECTION B

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

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

The process of nuclear fusion releases energy.

1.1 Describe the process of nuclear fusion.

[2 marks]

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.....

1.2 Why is energy released in a fusion reaction?

[1 mark]

.....

.....

1.3 Where does nuclear fusion occur naturally?

[1 mark]

.....

.....

1.4 Nuclear fusion reactors use two isotopes of hydrogen as fuel.

Complete **Table 1.**

[2 marks]

Table 1

Isotope	Number of protons	Number of neutrons
$^{2}_{1}H$	1	1
$^{3}_{1}H$		

1.5 Explain why fusion reactions can only happen if the temperature is very high.

[2 marks]

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.....

Some countries are building experimental nuclear fusion reactors.

1.6 Give **two** reasons why these countries may work together.

[2 marks]

1

.....

.....

2

.....

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1.7 Working nuclear fusion reactors could provide an almost limitless supply of energy.

All commercial nuclear power stations currently use a different process called nuclear fission.

This process produces waste.

Explain why the waste produced is a problem.

[3 marks]

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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. Nuclear fission is used in nuclear power stations to generate electricity. Nuclear fusion happens naturally in stars.

1.1 Explain briefly the difference between nuclear fission and nuclear fusion.

[2 marks]

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1.2 What is released during both nuclear fission and nuclear fusion?

[1 mark]

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Plutonium-239 is used as a fuel in some nuclear reactors.

1.3 Name another substance used as a fuel in some nuclear reactors.

[1 mark]

.....

.....

1.4 There are many isotopes of plutonium.

What do the nuclei of different plutonium isotopes have in common?

[1 mark]

.....

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FEEDBACK SHEET

Overall Mark:	**/27**
Section A:	/9
Section B:	/13
Section C:	/5

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:

EQUATIONS SHEET

AQA
Realising potential

GCSE Physics Equation Sheet

1	**pressure due to a column of liquid = height of column × density of liquid × gravitational field strength (g)**	$p = h \rho g$
2	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2 a s$
3	**force = change in momentum / time taken**	$F = \frac{m \Delta v}{\Delta t}$
4	elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2} k e^2$
5	change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta \theta$
6	period = 1 / frequency	
7	magnification = image height / object height	
8	**force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length**	$F = B I l$
9	thermal energy for a change of state = mass × specific latent heat	$E = m L$
10	**potential difference across primary coil / potential difference across secondary coil = number of turns in primary coil / number of turns in secondary coil**	$\frac{V_p}{V_s} = \frac{n_p}{n_s}$
11	**potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil**	$V_s I_s = V_p I_p$
12	For gases: pressure × volume = constant	$p V = constant$

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 Physics Specification.