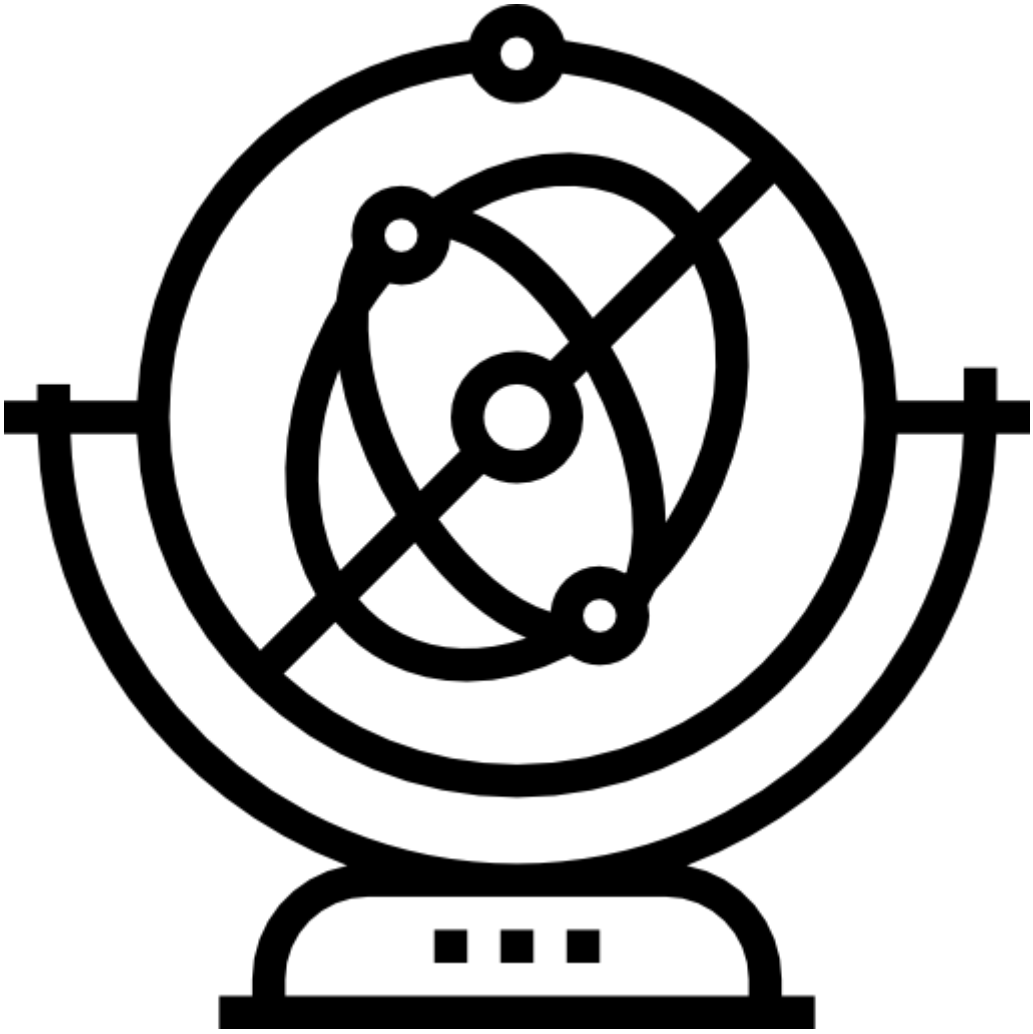
Colmers School and Sixth Form College

Opening Minds, Opening Doors

Name: _____ Group: _____

Year 10 Physics Summer Work 2026



Achieving Excellence, Belonging Together, Challenging Mindsets

Contents

Year 11 September 2025

Instructions

This booklet is designed to help you prepare for your first milestones in September and your internal exams in November.

Each week you will have a topic to review from paper 1. The activities should take **no more than 15 minutes**. Keep on top of your work and do not leave it all to the last week of the summer holiday.

For each week you will use the revision guides. Read through the relevant pages and use the QR codes for the relevant YouTube clips and SAM learning activity.

Each week starts with the revision guide pages, YouTube and SAM learning activities.

See example below.

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Biology	15 + 16 15 + 16 15 + 20
YouTube Clip QR code	https://tinyurl.com/pmkjm87p https://tinyurl.com/muxc48kk	
SAM learning QR Code	https://tinyurl.com/4w3bw6pu https://tinyurl.com/mrysbfjn	

Page number of section in the revision guide

YouTube website and QR code for relevant topics

SAM learning activity on the topic to test your knowledge

Once you have reviewed the topic, complete the exam style questions.

DO NOT LOSE your booklet. When you return in **September you will be reviewing your answers** with your science teacher.

Checklist

Use the following table to track your progress through the activities. Tick the box when you have completed the tasks.

Week	Topics	YouTube	SAM Learning	Exam Questions
1	Efficiency			
2	Specific heat capacity practical			
3	Specific latent heat			
4	Density			
5	Alpha, beta and gamma			
6	Half-life			
7	Resistance			
8	Resistance of a wire			
9	Current voltage graphs			

Week 1: 20th July 2026

Topic: Efficiency

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Physics	173 177 9
YouTube Clip QR code	https://tinyurl.com/bdcp2cj3	
SAM learning QR Code	https://tinyurl.com/mvb2nj6k	

Answer the following questions

Q1. Different energy sources are used to generate electricity.

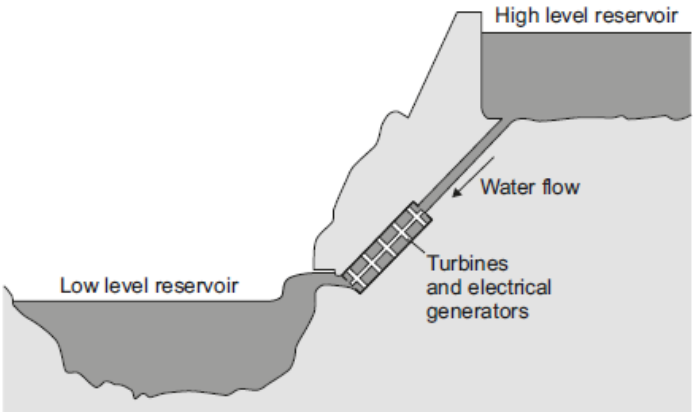
(a) Use words from the box to match the correct energy source to each of the descriptions given in the table.

biofuel	**coal**	**geothermal**	**nuclear**	**waves**

Description	**Energy source**
Energy from the Earth's core is used to heat water.	
Fission of uranium nuclei is used to heat water.	
Gases from rotting plant material are burned to heat water.	

(3)

(b) Energy can be stored in a pumped storage power station. The figure shows a pumped storage power station.



When electricity is needed, the water in the high level reservoir is allowed to flow to the low level reservoir. The flowing water generates electricity.

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

electrical	**gravitational potential**	**kinetic**	**nuclear**	**sound**

The water in the high level reservoir stores _____ energy.

The flowing water has _____ energy.

The water turns the turbine which is connected to the generator.

The generator produces some _____, this is wasted energy.

(3)

(c) The total power input to a pumped storage power station is 600 MW.

The useful power output is 540 MW.

(i) Calculate the efficiency of this pumped storage power station.

_____

_____

_____

Efficiency = _____

(2)

(ii) Calculate how much power is wasted by the pumped storage power station.

_____

_____

Power = _____ MW

(1)

(iii) How is the temperature of the surroundings affected by the energy wasted by the pumped storage power station?

_____

_____

(1)

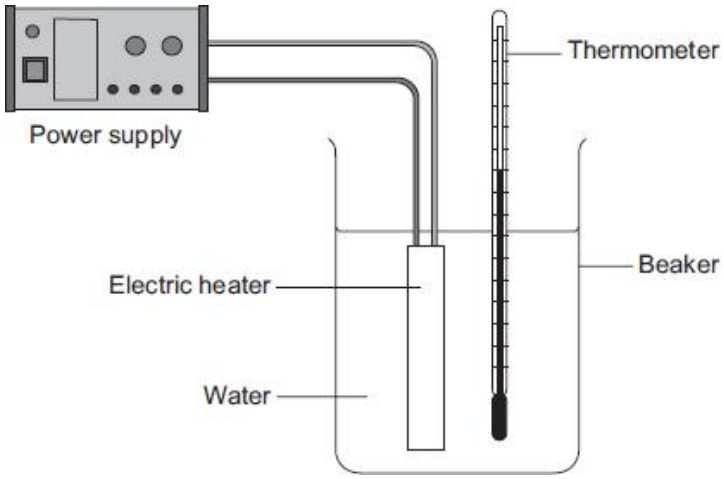
Week 2: 27th July 2026

Topic: Specific heat capacity practical

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Physics	170 174 5
YouTube Clip QR code	https://tinyurl.com/mrxh2h6u	
SAM learning QR Code	https://tinyurl.com/49scuz7k	

Answer the following questions

Q2. A student investigated how the temperature of water changed as it was heated. The figure below shows some of the apparatus used.



The student switched the heater on then recorded the temperature of the water every 5 minutes. The table below shows the results.

Time in minutes	Temperature in °C			
	Test 1	Test 2	Test 3	Mean
0	25	25	25	25
5	31	32	33	32
10	42	45	45	**X**
15	56	54	64	58

(a) What was the resolution of the thermometer used in the investigation? Use the table above.

Tick (✓) **one** box.

0.1 °C ☐ 1 °C ☐ 10 °C ☐ 100 °C ☐

(1)

(b) Calculate mean value **X** in the table above.

_____

X = _____ °C

(2)

(c) Draw a ring around the anomalous result in the table above.

(1)

(d) What should the student have done with the anomalous result?

_____

_____

(1)

(e) Give **two** ways to reduce energy transfer from the apparatus to the surroundings.

1 _____

2 _____

(2)

(f) The water in the beaker had a mass of 0.20 kg.

The temperature increase of the water was 33 °C.

specific heat capacity of water = 4200 J/kg °C

Calculate the change in thermal energy of the water.

Use the equation:

change in thermal energy = mass × specific heat capacity × temperature change

Choose the unit from the box.

°C	**cm^3**	**J**	**kg**

_____

_____

_____

Change in thermal energy = _____ Unit _____

(3)

Week 3: 3rd August 2026

Topic: Specific latent heat

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Physics	196 200 35
YouTube Clip QR code	https://tinyurl.com/5e47zhak	
SAM learning QR Code	https://tinyurl.com/2yuyfxbv	

Answer the following questions

Q3. A scientist cooled the air inside a container.

(a) The temperature of the air changed from 20 °C to 0 °C. The volume of the container of air stayed the same.

Explain how the motion of the air molecules caused the pressure in the container to change as the temperature decreased.

_____

_____

_____

_____

(3)

(b) The air contained water that froze at 0 °C. The change in internal energy of the water as it froze was 0.70 kJ. The specific latent heat of fusion of water is 330 kJ/kg

Calculate the mass of ice produced.

_____

_____

_____

_____

_____

Mass of ice = _____ kg **(3)**

(c) The air also contained oxygen, nitrogen and carbon dioxide.

Oxygen boils at −183 °C and freezes at −218 °C
Nitrogen boils at −195 °C and freezes at −210 °C
Carbon dioxide sublimates at −78 °C

The scientist continued to cool the air to a temperature of −190 °C

What is the state of each substance at −190 °C?

Tick (✓) **one** box for **each** row of the table.

Substance	**Solid**	**Liquid**	**Gas**
Oxygen			
Nitrogen			
Carbon dioxide			

(2)

(d) The air also contained a small amount of argon.

As the temperature of the air decreased from 20 °C to –190 °C the argon changed from a gas to a liquid to a solid.

Explain the changes in the arrangement and movement of the particles of the argon as the temperature of the air decreased.

(6)

Week 4: 10th August 2026

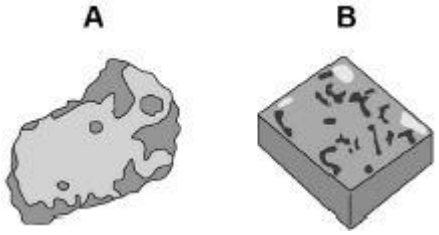
Topic: Density

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Physics	194 198 33
YouTube Clip QR code	https://tinyurl.com/34kz8m5p	
SAM learning QR Code	https://tinyurl.com/2s3bxxs2	

Answer the following questions

Q4. Two large semi-precious stones are discovered. A student is asked to find out what material each of the two stones is made of. The student does this by determining the density of the material of each stone.

Figure below shows the two stones.



(a) The student wants to measure the volume of stone **A**. Stone **A** cannot be measured using a metre rule as the stone is an irregular shape.

Describe how the student could determine the volume of stone **A** by putting it into water.

_____

_____

_____

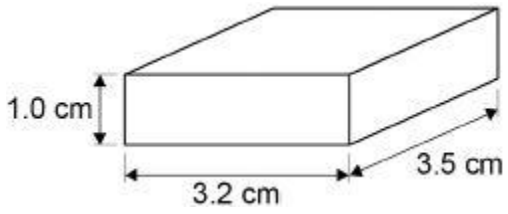
_____

_____

_____

(3)

The student makes measurements of stone **B** using a metre rule. The measurements of stone **B** are shown **in Figure below**.



(b) Which piece of equipment could the student use to get a more accurate measurement of the length of stone **B**? Tick **one** box.

Electronic balance ☐

Microscope ☐

Newtonmeter ☐

Vernier callipers ☐

(1)

(c) Use the following equation to calculate the volume of stone **B** in cm^3

volume = length × width × height

_____

_____

Volume = _____ cm^3

(1)

(d) The mass of stone **B** is 56 grams.

Use your answer from part **(c)** to calculate the density of stone **B** in g/cm^3

Use the following equation.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

_____

_____

_____

_____

Density = _____ g/cm^3

(2)

Week 5: 17th August 2026

Topic: Alpha, beta and gamma radiation

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Physics	199, 200 203, 204 41, 42
YouTube Clip QR code	https://tinyurl.com/mrxufthe	
SAM learning QR Code	https://tinyurl.com/yyytty4h https://tinyurl.com/3fxeskt7	

Answer the following questions

Q5. A scientist investigated the radiation emitted by different radioactive isotopes. The scientist had a sample of polonium-210. The radiation emitted by polonium-210 can be represented by the symbol $^{4}_{2}$He.

(a) Which type of radiation can be represented by the symbol $^{4}_{2}$He? Tick (✓) **one** box.

Alpha ☐ Beta ☐ Gamma ☐

(1)

(b) How many protons are there in a particle of radiation represented by $^{4}_{2}$He? Tick (✓) **one** box.

2 ☐ 4 ☐ 6 ☐ 8 ☐

(1)

(c) A polonium-210 (Po) nucleus changes into a lead (Pb) nucleus by emitting a $^{4}_{2}$He particle. This is shown by the following nuclear equation.

$$^{210}_{84}\text{Po} \rightarrow {}^{206}_{X}\text{Pb} + {}^{4}_{2}\text{He}$$

What is the value of **X**? Tick (✓) **one** box.

80 ☐ 82 ☐ 84 ☐ 86 ☐

(1)

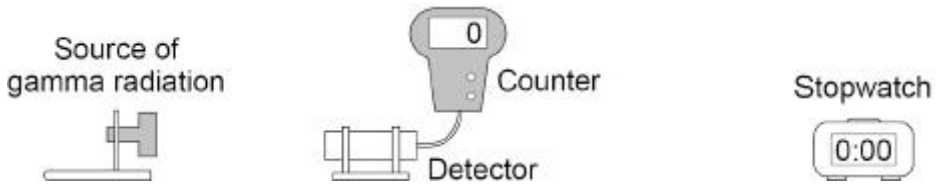
(d) The sample of polonium-210 had an activity of 100 Bq. Complete the sentence. Choose the answer from the box.

25	**50**	**100**	**200**

After one half-life, the activity of polonium-210 in the sample was _____ Bq.

(1)

The scientist investigated another radioactive isotope that is a source of gamma radiation. The **Figure below** shows the equipment used.



(e) The count-rate is the number of counts detected each second. In 30 seconds the number of counts detected was 1500. Calculate the count-rate.

_____

_____

Count-rate = _____ counts per second

(2)

The scientist placed a thick sheet of lead between the source of gamma radiation and the detector.

(f) What was the effect of the sheet of lead on the count-rate? Give a reason for your answer.

Effect _____

_____

Reason _____

_____

(2)

(g) The lead was irradiated by the gamma radiation. What happened to the lead when it was irradiated by the gamma radiation? Tick (✓) **one** box.

The lead atoms became radioactive. ☐

The lead gained atoms from the radioactive source. ☐

The lead was exposed to gamma radiation. ☐

(1)

Week 6: 24th August 2026

Topic: Half-life

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Physics	201 205 43
YouTube Clip QR code	https://tinyurl.com/mnjjbzyz	
SAM learning QR Code	https://tinyurl.com/4xtbvxdh	

Answer the following questions

Q6. Protactinium (Pa) is radioactive.

(a) An atom of one isotope of protactinium contains 91 protons and 143 neutrons.

What is the correct symbol for this atom? Tick (✓) **one** box.

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

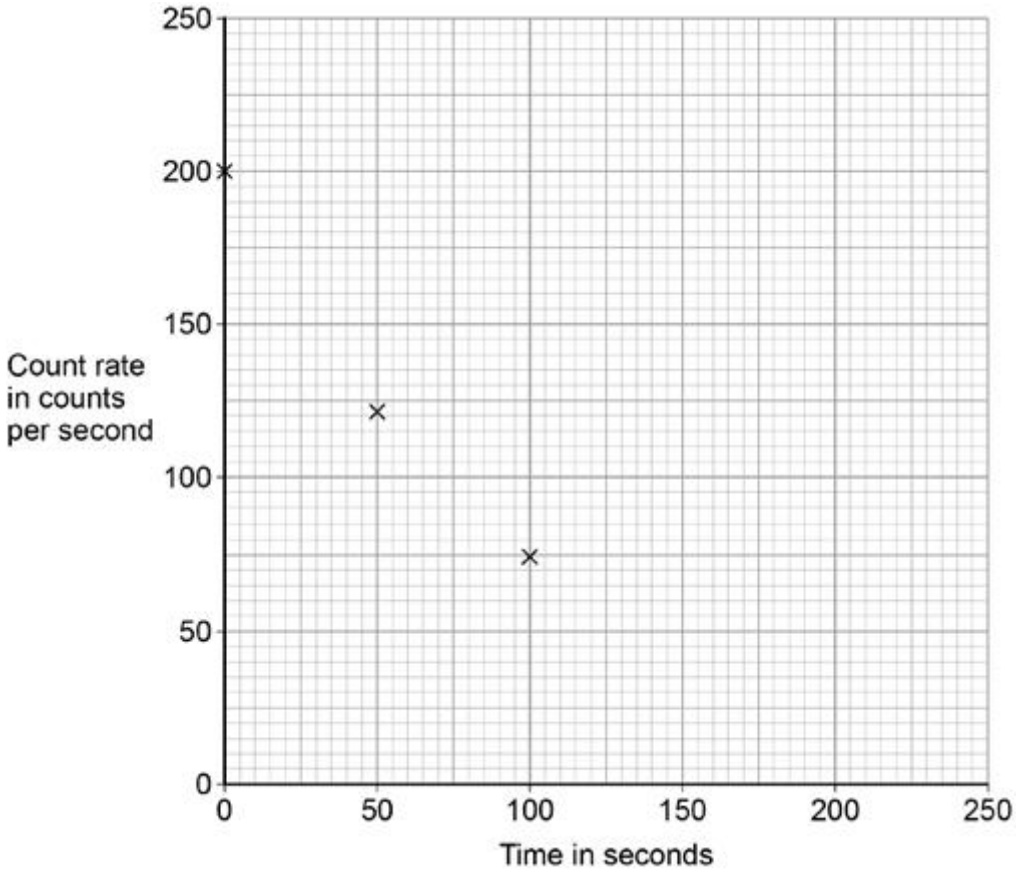
(1)

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

The table shows the results.

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

The graph below shows some of the teacher's results.



(b) Complete the graph. Use data from the table above. Draw the line of best fit. **(2)**

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

_____

Time taken = _____ s

(1)

(d) What is the half-life of protactinium?

Half-life = _____ s

(1)

(e) 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? Tick (✓) **one** box.

Alpha ☐

Beta ☐

Gamma ☐

Neutron ☐

(1)

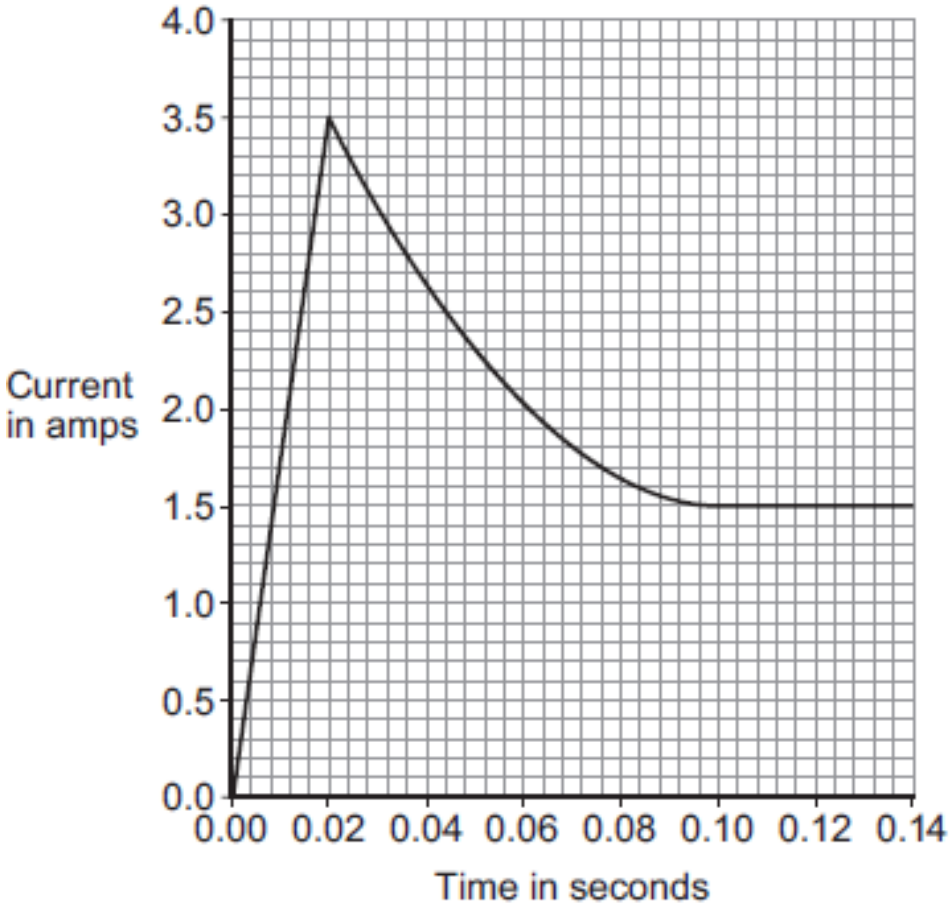
Week 7: 31st August 2026

Topic: Resistance

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Physics	181 185 18
YouTube Clip QR code	https://tinyurl.com/3p5hry6m	
SAM learning QR Code	https://tinyurl.com/mxveweet	

Answer the following questions

Q7. The graph shows how the current through a filament bulb changes after the bulb is switched on.



(a) What happens to the current through the bulb in the first 0.02 seconds after the bulb is switched on?

_____

(1)

(b) Between 0.02 seconds and 0.08 seconds the current through the bulb decreases.

(i) What, if anything, happens to the **resistance** of the bulb between 0.02 seconds and 0.08 seconds?

Draw a ring around the correct answer.

decreases **does not change** **increases**

(1)

(ii) What, if anything, happens to the **temperature** of the bulb between 0.02 seconds and 0.08 seconds?

Draw a ring around the correct answer.

decreases **does not change** **increases**

(1)

(c) The bulb is connected to a 12 V power supply. Calculate the power of the bulb when the current through the bulb is 1.5 A. Choose the unit from the list below.

coulomb **joule** **watt**

_____

_____

_____

_____

Power = _____ unit _____

(3)

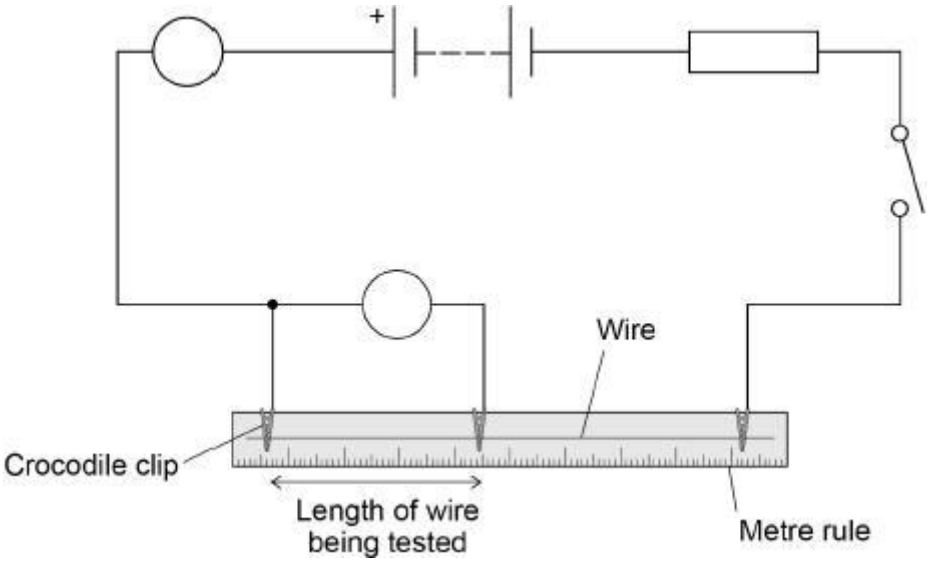
Week 8: 7th September 2026

Topic: Resistance of a wire practical

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Physics	182 186 19
YouTube Clip QR code	https://tinyurl.com/mshdvt87	
SAM learning QR Code	https://tinyurl.com/u639x8y7	

Answer the following questions

Q8. A student investigated how the resistance of a wire varies with the length of the wire. The **Figure below** shows the circuit used.



(a) The symbols for the voltmeter and ammeter in **Figure above** are **not** complete. Complete the symbols for the voltmeter and ammeter in **Figure above.**

(1)

(b) What is the independent variable?

_____ **(1)**

(c) What the dependent variable?

_____ **(1)**

(d) The student took repeat readings of potential difference for a 30 cm length of the wire. The readings were:

0.16 V 0.17 V 0.15 V

Calculate the mean potential difference.

_____

_____

Mean potential difference = _____ V

(2)

The length of the wire was increased to 60 cm

The current in the wire was 0.50 A

The mean potential difference across the wire was 0.32 V

(e) Calculate the resistance of the 60 cm length of wire. Use the equation:

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

_____

_____

_____

Resistance = _____ Ω

(2)

(f) Calculate the power dissipated in the 60 cm length of wire. Use the equation:

power = potential difference × current

_____

_____

_____

Power = _____ W

(2)

(g) Calculate the charge flow when there is a current of 0.50 A in the wire for 17 s. Use the equation:

charge flow = current × time

_____

_____

Charge flow = _____ C **(2)**

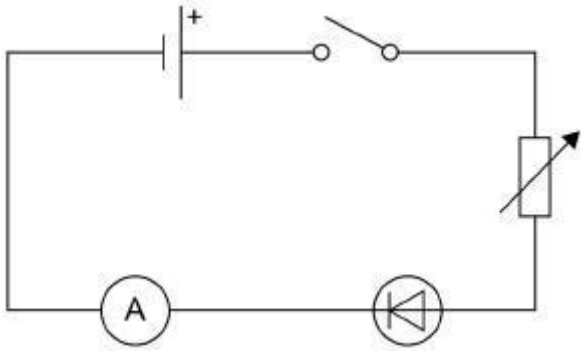
Week 9: 14th September 2026

Topic: Current voltage graphs

Revision guide pages	Combined Science: Trilogy Foundation Combined Science: Trilogy Higher GCSE Physics	183 187 19, 20
YouTube Clip QR code	https://tinyurl.com/mvznpws8	
SAM learning QR Code	https://tinyurl.com/s5enc5de	

Answer the following questions

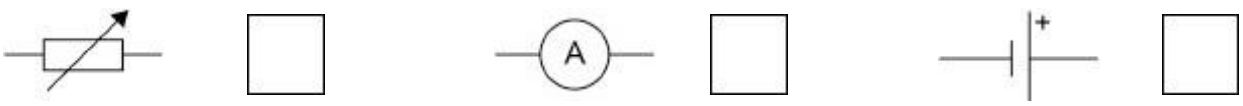
Q9. A student investigated how the current in a diode varies with the potential difference across the diode. **Figure below** shows an incomplete diagram of the circuit used.



(a) The student measured the potential difference across the diode. Complete **Figure 1** by adding the symbol for a voltmeter in the correct position.

(2)

(b) Which component should the student adjust to change the potential difference across the diode? Tick (✓) **one** box.



(1)

The student measured the current three times for each value of potential difference.

(c) Complete the sentence. Choose the answer from the box.

random	systematic	zero

When the potential difference was 1.50 V the current measurements varied between 0.95 A and 1.08 A. This was caused by _____ errors.

(1)

(d) For one value of potential difference, the measurements of current were:

0.27 A 0.32 A 0.31 A

Calculate the mean current.

_____

_____

Mean current = _____ A

(2)

The grpah shows some of the results.

(e) The table below shows the results when the potential difference was greater than 1.00 V.

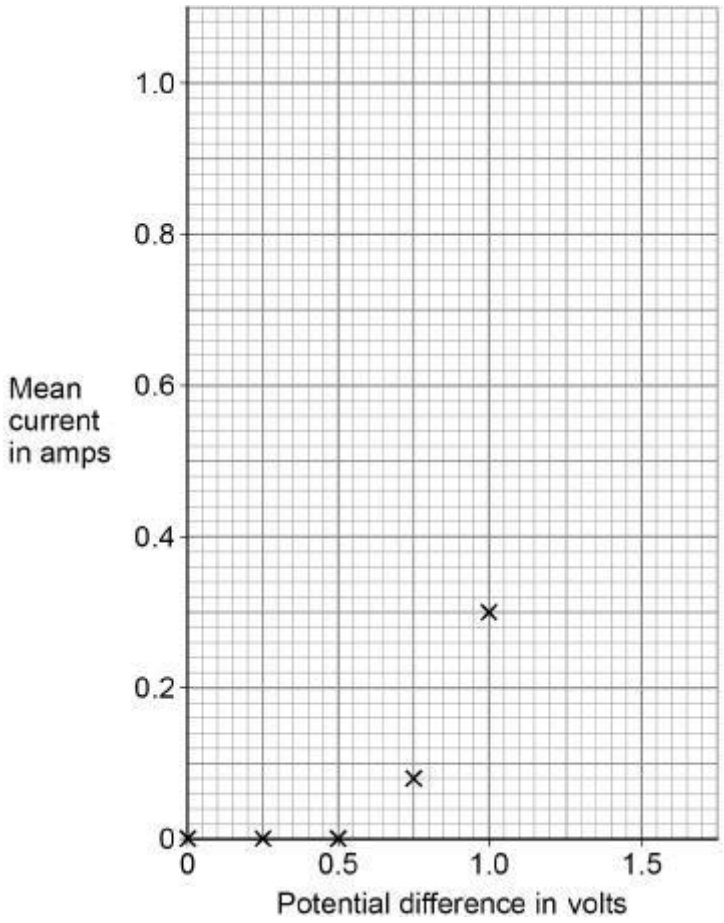
Potential difference in volts	Mean current in amps
1.25	0.60
1.50	1.00

Complete **graph opposites**.

You should:

- plot the results from the table above
- draw a line of best fit.

(2)



(f) Complete the sentence.

The graph shows that the relationship between potential difference and current for the diode is _____ .

(1)