Model Exam Question Booklet Combined Science

This booklet is split into 3 parts.

Part 1
A selection of short response questions and answers that are likely to come in the exam paper. Spend time learning the answers to these questions, for example you could produce flash cards. You should self quiz yourself on these questions regularly!

Part 2
Selection of extended response questions (4 to 6 marks) that are likely to be on your paper this year, either because they have not been assessed in the last couple of years, or because they come up most years in exams. Prepare and practice your responses to these questions.

Part 3
Required practical section. In this section you will find step by step guidance for each practical. This is followed by a page of short response questions and answers to learn for each of the practicals. There are also some extended response questions (4 to 6 marks).

Physics Paper 1	
Topics in the Paper:	
P1	Energy stores and transfers
P2	Thermal energy
P3	Energy resources
P4	Electric circuits
P5	Electricity in the home
P6	Particle model of matter
P7	Radioactivity
RP14	Specific Heat Capacity
RP15	Resistance of a Wire
RP16	Investigating I-V Characteristics
RP17	Density

Part 1
Short Response Questions

P1: Energy Conservation

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1. What is a system?
2. What happens in terms of energy when an object is projected upwards?
3. What happens in terms of energy when a moving object hits an obstacle?
4. What happens in terms of energy when an object is accelerated by a constant force?
5. What happens in terms of energy when a vehicle is slowing down?
6. What happens in terms of energy when water is brought to the boil in an electric kettle?
7. What is the formula for kinetic energy?
8. What is the unit for kinetic energy?
9. What is the unit for mass?
10. What is the unit for speed?
11. What is the unit for elastic potential energy?
12. What is the unit for spring constant?
13. What is the unit for extension?
14. What is the formula for gravitational potential energy?
15. What is the unit for GPE?
16. What is the unit for gravitational field strength?
17. What is the unit for height?
18. What is the definition of power?
19. What formula would you use to calculate power if you had a value for energy transferred?
20. What formula would you use to calculate power if you had a value for work done?
21. What is the unit for power?
22. What is the unit for energy transferred?
23. What is the unit for time?
24. What is the unit for work done?
25. What is an energy transfer of 1 joule per second equal to?

1. Object or group of objects.
2. It gains gravitational potential energy and kinetic energy decreases.
3. The kinetic energy is transferred to heat and sound and kinetic energy of the obstacle that was hit.
4. Work is done by a force on an object. This work is converted to the object's kinetic store.
5. The kinetic energy of the vehicle decreases while energy is dissipated through heat and sound.
6. Energy transfers from the electrical store of the mains power supply to the thermal store of the water.
7. Kinetic Energy = 0.5 x mass x $(\text{speed})^2$
8. Joules, J
9. Kilograms, Kg
10. Metres per second, m/s
11. Joules, J
12. Newtons per metre, N/m
13. Metres, m
14. GPE = mass x gravitational field strength x height
15. Joules, J
16. Newtons per kilogram, N/kg
17. Metres, m
18. The rate at which energy is transferred or the rate at which work is done.
19. Power = Energy Transferred / Time
20. Power = Work Done / Time
21. Watts, W
22. Joules, J
23. Seconds, s
24. Joules, J
25. 1 watt

P2: Energy Transfer

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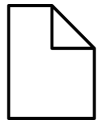
1. What is specific heat capacity?
2. What is the unit for change in thermal energy?
3. What piece of equipment would you use to measure change in thermal energy?
4. What is the unit for mass?
5. What piece of equipment would you use to measure mass?
6. What is the unit for temperature change?
7. What piece of equipment would you use to measure temperature change?
8. What factors affect the rate of cooling of a building?
9. What is a conductor?
10. What materials are good conductors?
11. What is an insulator?
12. What materials are good insulators?
13. How do insulators reduce unwanted energy loss?
14. What happens to energy that is wasted in a home?

1. The amount of energy needed to raise the temperature of one kilogram of a substance by one degree Celsius.
2. Joules (J)
3. Joulemeter
4. Kilograms (kg)
5. Balance
6. °C
7. Thermometer
8. The thickness and thermal conductivity of its walls.
9. This is the process by which energy is transferred through a material.
10. Metals
11. Materials that are poor conductors?
12. Non-metals and air
13. Insulation which has a low thermal conductivity and so less energy is transferred by conduction.
14. It is dissipated into the environment in the form of thermal energy.

P3: Energy Resources



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1. What are the main energy resources available for use on Earth?
2. What are the three fossil fuels?
3. What is renewable energy?
4. What is non-renewable energy?
5. What uses to we have for energy resources?
6. What are examples of renewable energy resources?
7. What are examples of non-renewable energy resources?
8. How is electricity generated through wind?
9. What are the advantages of wind turbines?
10. What are the disadvantages of wind turbines?
11. What are the advantages of tidal turbines?
12. What are the disadvantages of tidal turbines?
13. How is electricity generated through geothermal energy?
14. What is geothermal energy?
15. What is nuclear energy?
16. What is the energy source biofuel?
17. How is electricity generated through hydroelectricity?
18. What are the advantages of hydroelectricity?
19. What are the disadvantages of hydroelectricity?
20. How is water heated to generate electricity in a solar thermal power station?
21. What are the advantages of nuclear fuel?
22. What are the disadvantages of nuclear fuel?

1. Fossil fuels, nuclear, biofuel, wind, hydroelectricity, geothermal, tidal, sun and water waves.
2. Coal, oil and natural gas.
3. A resource that is replenished as it is used.
4. A resource that is used faster than it can be replenished. It will run out eventually.
5. Transport, electricity generation and heating.
6. Biofuel, wind, hydroelectricity, geothermal, tidal, wave and the sun.
7. Coal, oil, natural gas and nuclear.
8. The wind has kinetic energy which turns the blades on a wind turbine. The turbine turns and this turns a turbine.
9. Renewable, conserves fossil fuels, no release of pollutant gases, does not contribute to global warming.
10. Noise pollution, visual pollution, kills birds, don't work when it's not windy.
11. Renewable, conserves fossil fuels, no release of pollutant gases, does not contribute to global warming.
12. Noise pollution, visual pollution, kills fish, low power output.
13. Cold water is pumped into the ground and is heated by hot rocks. The water returns to the surface as stem. The moving steam turns a turbine which turns a generator.
14. Energy from the Earth's core is used to heat water.
15. Fission of uranium nuclei that heats water.
16. Gases from rotting plant material are burned to heat water.
17. Water in high level reservoir stores gravitational potential energy. The water flows downhill and has kinetic energy. The water turns a turbine connected to a generator.
18. Renewable, conserves fossil fuels, no release of pollutant gases, does not contribute to global warming, constant reliable power.
19. Noise pollution, visual pollution, kills fish, low power output.
20. Water is heated in a boiler which turns into steam. The steam turns a tribune which turns a generator.
21. Produces no greenhouse gases, higher energy density in fuel and a longer operating life.
22. Produce radioactive waste, possibility of accidents, long start up time and high decommissioning costs.

P4: Electric Circuits

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1. What is the definition of electrical current?
2. What is the equation that links charge, current and time?
3. What is the unit for charge flow?
4. What is the unit for current?
5. What Is the unit for time?
6. Give the equation that links potential difference, current and resistance.
7. What is the unit for potential difference?
8. What is the unit for resistance?
9. What's the difference between a series and a parallel circuit?
10. What does Ohm's law say?
11. What happens to the resistance of a filament lamp as the temperature increases?
12. What happens to the resistance of a thermistor as it increases in temperature?
13. What happens to the resistance of a LDR as the light intensity increases?
14. In what diode can the current flow through a diode?
15. Name an application of an LDR.
16. Name an application of a thermistor.
17. How does resistance add in series?
18. What happens to current in series/parallel circuits?
19. What happens to potential difference in series/parallel circuits?
20. What happens to the total resistance of two resistors in parallel?
21. What do we use to measure potential difference/current.
22. When do certain insulating materials become electrically charged?
23. What happens when two electrically charged objects are brought together?
24. What happens when two objects are brought together with the same charge?
25. What happens when two objects of opposite charges are brought together?
26. Where is the electric field strongest?
27. What happens to the electric field when you are further away from the charged object?

1. Electric current is the rate of flow of charge.
2. $Q = I \times t$
3. Coulombs, C
4. Amperes, A
5. Seconds, s
6. $V = I \times R$
7. Volts, V
8. Ohms, Ω
9. A series circuit has only one path for the current to flow; a parallel circuit has more than one.
10. The current through an ohmic conductor (at a constant temperature) is directly proportional to the potential difference across the resistor.
11. As the temperature increases, the resistance of a filament lamp also increases.
12. The resistance decreases as the temperature increases.
13. The resistance decreases as the light intensity increases.
14. Current can only flow one way through a diode.
15. In sensing circuits such as lights turning on when dark
16. Thermostat
17. $R_{TOT} = R_1 + R_2$
18. Current is the same everywhere in a series circuit. Current splits in a parallel circuit.
19. Potential difference is the same on different paths of a parallel circuit; it splits across components in a series circuit.
20. The total resistance of two resistors in parallel is less than the resistance of the smallest resistor.
21. We use a voltmeter in parallel across a component and an ammeter in series.
22. When they are rubbed against each other.
23. They exert a force on each other.
24. They repel.
25. They attract.
26. Close to the charged object.
27. The field becomes weaker.

P5: Electricity in the Home

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1. What is the frequency of mains electricity in the UK?
2. What is the voltage of mains electricity in the UK?
3. What colour is the live wire covering?
4. What colour is the neutral wire covering?
5. What colour is the earth wire covering?
6. What does the live wire do?
7. What does the neutral wire do?
8. What does the earth wire do?
9. What is the potential difference between the earth wire and live wire?
10. What is the potential difference of the earth wire?
11. What is the potential differences of the neutral wire?
12. When does the live wire carry the current?
13. What is the equation that links current, potential difference and power?
14. What is the equation that links current, power and resistance?
15. What is the symbol for power?
16. What is the unit for power?
17. What is the symbol for potential difference?
18. What is the unit for potential difference?
19. What is the symbol for current?
20. What is the unit for current?
21. What is the symbol for resistance?
22. What is the unit for resistance?
23. What does the amount of energy an appliance transfers depend on?
24. When work done in a circuit?
25. What is the equation that links energy transferred, power and time?
26. What is the equation that links charge flow, energy transferred and potential difference?
27. What is the unit for energy transferred?
28. What is the unit for time?
29. What is the unit for charge flow?
30. What is the national grid?
31. What do step up transformers do?
32. What do step down transformers do?

1. 50 Hz
2. 230V
3. Brown
4. Blue
5. Green and yellow stripes.
6. Carries the alternating potential different from the supply.
7. Completes the circuit
8. Safety wire to stop the appliance becoming live.
9. 230V
10. 0V
11. 0V
12. When there is a fault.
13. Power = Potential Difference x Current
14. Power = $(\text{Current})^2$ x Resistance
15. *P*
16. Watts, W
17. *V*
18. Volts, V
19. *I*
20. Amperes, A
21. *R*
22. Ohms, Ω
23. The power of the appliance and how long it is switched on for.
24. When charge flows.
25. Energy Transferred = Power x Time
26. Energy Transferred = Charge Flow x Potential Difference
27. Joules, J
28. Seconds, s
29. Coulombs, C
30. A system of cables and transformers linking power stations to consumers.
31. Increase the potential difference from the power station to the transmission cables.
32. Decrease the potential difference for domestic use.

P6: Particles and Matter

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1. What is the equation for density?
2. What are the units for density?
3. What are the units for mass?
4. What are the units for volume?
5. How are the particles in a solid arranged?
6. How are the particles in a liquid arranged?
7. How are the particles in a gas arranged?
8. How are changes in state different to chemical changes?
9. Which state of matter is most dense?
10. What are the names of the five state changes?
11. How do you measure the volume of a regular solid.
12. How do you measure the volume of an irregular solid.
13. What is internal energy?
14. What is the definition of specific heat capacity?
15. What is the definition of latent heat?
16. Why doesn't the temperature of a material change as it's changing state?
17. How do the molecules in a gas move?
18. What happens to the speed of particles in a gas as the gas is heated?
19. What happens to pressure if the size of a container is reduced?
20. The specific latent heat of fusion gives what state change?
21. The specific latent heat of vaporisation gives what state change?
22. What is the equation to calculate energy change from specific heat capacity?
23. What is the equation to calculate energy needed for a state change?

1. $\rho = m \div V$
2. kg/m^3
3. kg
4. m^3
5. The particles are touching and vibrate around a fixed pattern.
6. Particles are touching but not in fixed positions. They are free to flow around.
7. Particles are far apart and move around quickly and randomly.
8. The material recovers its original properties if the change is reversed.
9. Solid.
10. Melting (solid → liquid), evaporating (liquid → gas), freezing (liquid → solid), condensing (gas → liquid), sublimating (solid → gas/gas → solid).
11. Measure the length of the three sides and multiply together.
12. Place the irregular solid in water in a measuring cylinder. Measure how much the water level has gone up by.
13. Internal energy is the total kinetic energy and potential energy of all the particles that make up a system.
14. The energy needed to heat up 1kg of a material by a temperature of 1°C.
15. The energy needed to change state of 1kg of a substance without changing temperature.
16. Energy goes into breaking/making bonds.
17. In random motion.
18. The speed of the particles increases as the gas is heated.
19. The pressure would increase as particles would hit the walls of the container more often.
20. From solid to liquid.
21. From liquid to gas.
22. $\Delta E = m \times c \times \Delta\theta$
23. $E = m \times L$

P7: Radioactivity

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1. What is the basic structure of an atom?
2. Where is most of the mass of an atom concentrated?
3. How can the electron arrangements of the nucleus change?
4. Why do atoms have no overall change?
5. What is atomic number?
6. What is the mass number?
7. What is the radius of an atom?
8. What is the radius of a nucleus?
9. What is the mass of protons and neutrons?
10. What is the mass of electrons?
11. What are isotopes?
12. How do atoms form positive ions?
13. What model of the atom was developed following the discovery of the electron?
14. Describe the plum pudding model of the atom.
15. What was concluded from the alpha particle scattering experiment?
16. What model replaced the plum pudding model?
17. How did Niels Bohr adapt the nuclear model?
18. What did the experimental work of James Chadwick prove?
19. What is radioactive decay?
20. What is activity?
21. What is the unit for activity?
22. What is count rate?
23. What is an alpha particle?
24. What is a beta particle?
25. What is a gamma ray?
26. What is half life?
27. What is contamination?
28. What is irradiation?

1. A positively charged nucleus composed of protons and neutrons surrounded by negatively charged electrons.
2. Nucleus
3. The absorption of electromagnetic radiation causes electrons to move further from the nucleus. The emission of electromagnetic radiation causes electrons to move closer.
4. The number of electrons is equal to the number of protons.
5. The number of protons in the nucleus.
6. The number of protons and neutrons in an atom.
7. 0.1nm or $1x10^{-3}$m
8. $1x10^{-14}$m
9. 1
10. Negligible
11. Atoms of the same element with different numbers of neutrons.
12. They lose one or more electrons.
13. Plum pudding model.
14. Ball of positive charge with negative electrons embedded in it.
15. The mass of the atom was concentrated at the centre and that the nucleus was charged.
16. Nuclear model.
17. He suggested that electrons orbit the nucleus at specific distances.
18. The existence of neutrons in the nucleus.
19. The random process by which the nucleus gives out radiation to become stable..
20. The rate at which a source of unstable nuclei decay.
21. Becquerel, Bq
22. The number of decays recorded each second by a detector
23. A helium nucleus which is two neutrons and two protons.
24. A high-speed electron ejected from the nucleus as a neutron turns into a proton.
25. Electromagnetic radiation from the nucleus.
26. The time it takes for the number of nuclei of the isotope in a sample to half.
27. The unwanted presence of materials containing radioactive atoms on other materials.
28. The process of exposing an object to nuclear radiation. The irradiated object does not become radioactive.

Part 2 Extended Response Questions

Topic	P1 Energy Conservation
Qu	Describe the energy transfer for a ____.
Info	You could be asked this question for a range of scenarios including: A falling object A car driving uphill A catapult A pendulum To answer this question, you will need to do the following: Identify the input energy Identify the output energy Identify the wasted energy Describe the overall energy change
Top Tip	If you are describing energy "wasted" as heat, make sure you say where it is going – e.g., heating the surrounding air.
Model Answer	**Describe the energy transfers for a falling object** 1. *For a falling object the input energy is gravitational potential energy. As the object falls the gravitational potential energy decreases.* 2. *The gravitational potential energy is transferred into kinetic energy and so as the object falls, and the gravitational potential energy decreases the kinetic energy of the object increases.* 3. *Some of the energy is wasted as heat to the surroundings due to air resistance.* 4. *Overall, the gravitational potential energy is transferred into kinetic energy.*
Practice	1. Learn and practice the model answers above. 2. Prepare and learn model answers to describe the energy transfers for a car driving uphill, a catapult and a pendulum.

Topic	P2 Energy Transfer
Qu	1. Describe an experiment to find the specific heat capacity of a metal. 2. What are the control variables when finding specific heat capacity of a metal? 3. Explain why the metal should be wrapped in wool when finding SHC
Info	At least one of these questions is likely to come up. The examiner is going to be looking for a clear answer written in a logical sequence.
Top Tip	Be careful that you use key words/phrases accurately (these are in bold in your model answers below).
Model Answer	**Describe an experiment the student could do to measure the specific heat capacity of a metal.** Measure the mass of metal using a balance. Use an immersion heater to heat the block and fully insulate the block by wrapping it in cotton wool. Record the start temperature of the block and connect the heater to the power supply. Use an energy meter (joulemeter) to measure the energy supplied to the block as it is warmed. Once you have finished warming the block record the energy supplied and the change in temperature Now that you have the mass, temperature change and energy transferred use these values to calculate specific heat capacity.
Model Answer	**What are the control variables when finding the specific heat capacity of a metal?** The control variables when determining the specific heat capacity of a metal include the mass of the block, the size of the block and the material of the block. Other control variables include the thickness and material of the insulation as well as the starting temperature of the block, time the block is heated for and the current through the heater.
Model Answer	**Explain why the metal should be wrapped in wool when finding SHC** The wool acts as an insulator and prevents the loss of heat. This would lead to a much more accurate value for specific heat capacity. Without insulation the specific heat capacity value that you would find would be bigger.
Practice	1. Learn and practice the model answers above.

Topic	P2 Thermal Energy
Qu	Calculating a value using the equation: Change in Thermal Energy= Mass x Specific Heat Capacity x Temperature Change
Info	There is frequently a question in which you will need to use these formulas. Marks vary between 3 and 6 marks depending on how much processing of the information you need to do. If you need to use both formulas to answer the question this will usually be worth 6 marks. To answer this question, you will need to do the following: 1. Check for any unit conversions you may need to do. 2. Write down the formula you will be using. 3. Substitute in the values. 4. Rearrange. 5. Do the calculation. 6. Round to the correct number of significant figures. 7. Add units.
Top Tip	**Always write down the formula you are using, substitute numbers and then rearrange. Avoid writing a rearranged formula as its easy to make mistakes and can lose you marks.**

Model Answer

Calculate the change in thermal energy when a 500g potato with a specific capacity of 3400 J/kg °C is heated from 20°C to 100°C.

500g = 0.5kg	Check for unit conversions.
100-20 = 80°C	Identify temperature change.
$\Delta E = m \times c \times \Delta\vartheta$	Formula to be used.
$\Delta E = 0.5 \times 3400 \times 80$	Substitute values.
-	Rearrange.
$\Delta E = 0.5 \times 3400 \times 80$ *= 136,000*	Do the calculation
-	Round to correct number of sig fig.
136,000J	Answer with units

Topic	P2 Thermal Energy
Practice	Practice using the formula for specific heat capacity by answering the questions below: 1. The water distiller is filled with 5.0 kg of water at 20 °C The specific heat capacity of water = 4 200 J/Kg °C. Calculate the energy needed to raise the temperature of the water to 100 °C. 2. 18 000 J of energy was supplied to a 2 kg cylinder of steel by 18°C. Calculate the specific heat capacity of steel. 3. Calculate the change in thermal energy when a 750g potato with a specific capacity of 3400 J/kg °C is heated from 22°C to 100°C. 4. The mass of water in the pool is 5000 kg. The specific heat capacity of water is 4200 J/kg°C. Calculate how much energy needs to be supplied to increase the water temperature by 5°C and state the correct unit. 5. The air in a room is at a temperature of 12 °C. The house owner switches the heating on until the temperature reaches 22 °C. The amount of energy needed to raise the temperature of the air to 22 °C is 580 000 J. The mass of air in the room is 58 kg. Calculate the specific heat capacity of air and give the unit.

Topic	P2 Thermal Energy
Qu	Multistep equation using another equation alongside the equation: Change in Thermal Energy= Mass x Specific Heat Capacity x Temperature Change

Info

Multi step calculations for specific heat capacity may involve you using other equations to calculate a change in thermal energy first. One possible equation you could need to use includes:

Power = Energy Transferred/Time

If you have a question gives you a power and a time you can use this to calculate energy transferred. You can then use this value for energy transferred in the equation for specific heat capacity.

To answer this question, you will need to do the following:

1. Check for any unit conversions you may need to do.
2. Identify the temperature change (you may need to calculate this)
3. Write down the 1st formula you will be using.
4. Substitute in the values.
5. Rearrange
6. Do the maths
7. Write down the 2nd formula you will be using.
8. Substitute in the values.
9. Rearrange
10. Do the maths
11. Round to the correct number of significant figures
12. Add units to the answer.

Model Answer

Calculate the SHC of water when a 2.6kW kettle heats 0.80kg of water from 18°C to 100°C over 120 seconds. Give your answer to 2 significant figures.

2.6kW = 2600W	Check for unit conversions.
100-18 = 82°C	Identify temperature change.
Power = Energy Transferred/Time	1st formula to be used.
2600 = Energy Transferred / 120	Substitute values.
2600 x 120 = Energy Transferred	Rearrange.
Energy Transferred = 312,000	Do the calculation
$\Delta E = m \times c \times \Delta\theta$	2nd formula to be used.
312,000 = 0.8 x c x 82	Substitute values
312,000 = c x 65.6 *312,000 / 65.5 = c*	Rearrange
4,763.358778626	Do the calculation
4,800	Round to correct number of sig fig.
4800 J/Kg °C	Answer with units

Topic	P2 Thermal Energy
Practice	Practice using the formula for specific heat capacity by answering the questions below: 1. The water distiller is filled with 5.0 kg of water at 20 °C The specific heat capacity of water = 4 200 J/Kg °C. Calculate the energy needed to raise the temperature of the water to 100 °C. 2. 18 000 J of energy was supplied to a 2 kg cylinder of steel by 18°C. Calculate the specific heat capacity of steel. 3. Calculate the change in thermal energy when a 750g potato with a specific capacity of 3400 J/kg °C is heated from 22°C to 100°C. 4. The mass of water in the pool is 5000 kg. The specific heat capacity of water is 4200 J/kg°C. Calculate how much energy needs to be supplied to increase the water temperature by 5°C and state the correct unit. 5. The air in a room is at a temperature of 12 °C. The house owner switches the heating on until the temperature reaches 22 °C. The amount of energy needed to raise the temperature of the air to 22 °C is 580 000 J. The mass of air in the room is 58 kg. Calculate the specific heat capacity of air and give the unit.
Multi Step Practice	Practice using the formula for both power and specific heat capacity by answering the questions below: 1. The SHC of water is 4800J/ kg °C. Calculate the time it will take to heat 0.62kg of water from 21°C to 100°C with a 2.5kW kettle. Give your answer to 2 significant figures. 2. The SHC of water is 4800J/ kg °C. Calculate the time it will take to heat 450g of water from 18°C to 100°C with a 2.5kW kettle. Give your answer to 2 significant figures. 3. The coffee machine heats water from 20 °C to 90 °C. The power output of the coffee machine is 2.53 kW. The specific heat capacity of water is 4200 J/kg °C. Calculate the mass of water that the coffee machine can heat in 14 seconds. 4. The coffee machine heats water from 19 °C to 90 °C. The power output of the coffee machine is 2.53 kW. The specific heat capacity of water is 4200 J/kg °C. Calculate the mass of water that the coffee machine can heat in 32 seconds.

Topic	P3 Energy Resources
Qu	Evaluate the use of _____ to generate electricity.
Info	You could be asked to evaluate any of the energy resources that you learned about in the topic including including fossil fuels, nuclear, biofuels, wind, solar, hydroelectric, geothermal, wave and tidal. To answer this question, you need to: 1. Describe the process used to generate electricity for the energy resource in one clear sentence. 2. Describe the advantages. 3. Describe the disadvantages.
Top Tip	When discussing the advantages and disadvantages consider the reliability of the energy resource, if it is renewable or not as well as its impact on the environment
Model Answer	**Evaluate the use of fossil fuels to generate electricity.** 1. *In a fossil fuel power station, a fuel is burned, this turns water into steam which turns a turbine to generate electricity.* 2. *The advantages of a fossil fuel power station include that is has a high energy output and it is a reliable energy source.* 3. *The disadvantages of using fossil fuels include that it uses a non-renewable energy resource, and it produces carbon dioxide which is a greenhouse gas.*
Practice	1. Learn and practice the model answer above. 2. Evaluate the use of nuclear power stations. 3. Evaluate the use of wind turbines. 4. Evaluate the use of solar energy. 5. Evaluate the use of hydroelectric.

Topic	P4 Electric Circuits
Qu	Calculating a value using the equations: *Charge Flow = Current × Time* ***OR*** *P.D= Current × Resistance*
Info	There is frequently a question in which you will need to use these formulas. Marks vary between 3 and 6 marks depending on how much processing of the information you need to do. If you need to use both formulas to answer the question this will usually be worth 6 marks. To answer this question, you will need to do the following: 1. Check for any unit conversions you may need to do. 2. Write down the formula you will be using. 3. Substitute in the values. 4. Rearrange. 5. Do the calculation. 6. Round to the correct number of significant figures. 7. Add units.
Top Tip	**Always write down the formula you are using, substitute numbers and then rearrange. Avoid writing a rearranged formula as its easy to make mistakes and can lose you marks.**
Model Answer	**Calculate the resistance when there is a potential difference of 3.22 V and a current of 2.18 A**

-	Check for unit conversions.
P.D= Current × Resistance	Formula to be used.
3.22 = 2.18 x Resistance	Substitute values.
3.22 / 2.18 = Resistance	Rearrange.
1.4770642202 = Resistance	Do the calculation
1.48	Round to correct number of sig fig.
1.48Ω	Answer with units

Topic	P4 Electric Circuits
Practice	Practice using the formulas for charge flow and potential difference by answering the questions below: 1. A set of lights consists of 20 lamps connected in series to the 230 V mains electricity supply. When the lights are switched on and working correctly, the current through each lamp is 0.25 A. Calculate the charge passing through **one** of the lamps in 5 minutes. 2. A 1.7A bulb works at normal brightness for 30 seconds before it is switched off. Calculate the charge that flows through the bulb in the 30 seconds before it is switched off. Give the unit. 3. The current in the wire was 0.50 A. The mean potential difference across the wire was 0.32 V. Calculate the resistance. 4. Calculate the charge flow when there is a current of 0.50 A in the wire for 17 s. 5. Determine the resistance of the lamp when the current in the lamp is 0.22 A and the potential difference is 5V.

Topic	P5 Electricity in the Home
Qu	1. Explain the difference between current supplied by mains and by a battery. 2. Explain why touching the live wire of an appliance is dangerous. 3. Explain why step-up transformed are used in the National Grid.
Info	At least one of these questions is likely to come up. The examiner is going to be looking for a clear answer written in a logical sequence.
Top Tip	Be careful that you use key words/phrases accurately (these are in bold in your model answers below).
Model Answer	**Explain the differences between the current supplied by the mains supply and the current supplied by a battery.** A battery supplies **a direct current** which flows in **one direction** only while the mains supply supplies an **alternating current** which is **constantly changing direction**.
Model Answer	**Touching the live wire of an appliance is dangerous when the appliance is connected to the mains electricity supply. Explain why.** The potential of a live wire is **230V**, while a person's potential is **0V**. This means that there is a **large potential difference** between the wire and the person and so the current passes through the person's body.
Model Answer	**Explain why step-up transformers are used in the National Grid** To **increase the voltage** across the cables and to **decrease the current** through the cables. This **reduces energy loss** in the cables and increases the **efficiency** of transmission.
Practice	1. Learn and practice the model answers above.

Topic	P5 Electricity in the Home
Qu	Calculating a value using the equations: *Energy Transferred = Power x Time* ***OR*** *Energy Transferred = Charge Flow x P..D*
Info	There is frequently a question in which you will need to use these formulas. Marks vary between 3 and 6 marks depending on how much processing of the information you need to do. If you need to use both formulas to answer the question this will usually be worth 6 marks. To answer this question, you will need to do the following: 1. Check for any unit conversions you may need to do. 2. Write down the formula you will be using. 3. Substitute in the values. 4. Rearrange. 5. Do the calculation. 6. Round to the correct number of significant figures. 7. Add units.
Top Tip	**Always write down the formula you are using, substitute numbers and then rearrange. Avoid writing a rearranged formula as its easy to make mistakes and can lose you marks.**
Model Answer	**Calculate the power when 1.2kJ is transferred in a minute.**

1.2kJ = 1200J *1 minute = 60 seconds*	Check for unit conversions.
Energy Transferred = Power x Time	Formula to be used.
1200 = Power x 60	Substitute values.
1200 / 60 = Power	Rearrange.
Power = 20	Do the calculation
-	Round to correct number of sig fig.
20W	Answer with units

Topic	P5 Electricity in the Home
Qu	Calculating a value using the equations: *Energy Transferred = Power x Time* ***AND*** *Energy Transferred = Charge Flow x P..D*

Info

Sometimes you can be asked to calculate a value that would require you to use two equations. If you need to use both formulas to answer the question this will usually be worth 6 marks. In these examples we are going to be looking at using the 2 equations for energy transferred however you could need to use lots of different equations that are on your data sheet.

To answer this question, you will need to do the following:

1. Check for any unit conversions you may need to do.
2. Write down the 1st formula you will be using.
3. Substitute in the values.
4. Rearrange
5. Do the maths
6. Write down the 2nd formula you will be using.
7. Substitute in the values.
8. Rearrange
9. Do the maths
10. Round to the correct number of significant figures
11. Add units to the answer.

Model Answer

Calculate the potential difference when a 2.5kW kettle that has a charge flow of 1200C is turned on for 120 seconds.

2.5kW = 2500W	Check for unit conversions.
Energy Transferred = Power x Time	1st formula to be used.
Energy Transferred = 2300 x 120	Substitute values.
-	Rearrange.
Energy Transferred = 276,000	Do the calculation
Energy Transferred = Charge x P..D	2nd formula to be used.
276,000 = 1200 x P.D	Substitute values
276,000 / 1200 = P.D	Rearrange
Potential Difference = 230	Do the calculation
-	Round to correct number of sig fig.
230V	Answer with units

Topic	P5 Electricity in the Home
Practice	Practice using the formulas for charge flow and potential difference by answering the questions below: 1. Batteries provide a potential difference of 36V and the total charge stored in the batteries is 670,000C. Calculate the maximum energy that could have been transferred from the batteries. 2. An electric bike has a battery with a potential difference of 36V and during the ride 28,000C of charge is transferred. Calculate the energy transferred by the battery in kilojoules. 3. A heater has a power of 65W. Calculate the energy transferred by the heater in 400s. 4. A 1500W heater is turned on for 5 hours. Calculate the energy transferred in this time in kJ. 5. A wind turbine supplies a power output of 9000kW for 9 seconds. Calculate the energy transferred by the wind turbine in kJ. 6. An electric bike has a motor that transfers 1800J of energy over 15 seconds. Calculate the power of the bikes motor.
Multi Step Practice	Practice using the formulas as part of a multistep question by answering the questions below. Some of the questions may need you to use other formulas (such as the ones for power): 1. Calculate the charge flow for when a 12V bulb is turned on for 25 seconds and has 25W of power. (5 marks) 2. Calculate the charge flow for when a 12V bulb is turned on for 1 minute and has 25W of power. (5 marks) 3. When the charger is connected to the battery, the potential difference across the battery is 15.0 V. The total energy stored when the battery is fully charged is 0.81 MJ. The average current used to charge the battery is 3.00 A. Calculate the time taken to fully charge the battery. 4. Calculate the potential difference when a 0.8W RAIO that has a charge flow of 5520C is turned on for 10 minutes.

Topic	P6 Particles and Matter
Qu	Identify and explain the properties of _____
Info	You could be asked this question for solids, liquids and gases. To answer this question, you need to: 1. Describe its shape and if it can flow 2. Link the state of matters shape and ability to flow to the forces of attraction between the particles. 3. Describe its density and if it can be squashed or compressed. 4. Link the density and ability to be compressed of the state of matter to the closeness of the particles.
Top Tip	Link the properties of the states of matter to the arrangement of particles.
Model Answer	**Identify and explain the properties of a gas.** *1. A gas can flow and will completely fill a container that they are in.* *2. This is because there are very little forces of attraction between the molecules and so they are able to move freely.* *3. A gas has a very low density and can be squashed and compressed.* *4. This is because the particles are very far apart and so there is lots of space between them.*
Practice	1. Learn and practice the model answer above. 2. Prepare and learn model answers to identify and explain the properties of solids and gases.

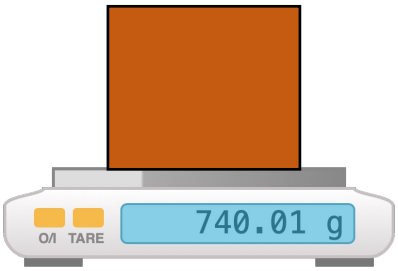
Topic	P7 Radioactivity
Qu	Explain how the properties of ____ radiation affect the level of hazard at different distances.
Info	You could be asked this question alpha, beta or gamma radiation. To answer this question, you need to: 1. Describe how penetrating the radiation is 2. Describe the range of radiation. 3. Describe the ionising power of radiation. 4. Describe the risk at a short range and give a reason why 5. Describe the risk at a long range and give a reason why
Top Tip	The examiner may not use the key terms alpha, beta or gamma but use the symbols α ,β, γ watch out for this. Be clear in your work how far the radiation can travel and what materials it is unable to penetrate.
Model Answer	**Explain how the properties of alpha radiation affect the level of hazard at different distances.** 1. Alpha radiation is the least penetrating and is unable to pass through a sheet of paper. 2. It also has the least range in air and can only travel 5cm through the air. 3. Alpha radiation is the most ionising. 4. At a short range alpha radiation is very dangerous because of how ionising it is. 5. At a long range alpha radiation is not dangerous because it does not have a long range.
Practice	1. Learn and practice the model answer above. 2. Prepare and learn model answers to explain how dangerous beta and gamma radiation are at different distances.

Part 3 Required Practical's

RP14 Specific Heat Capacity

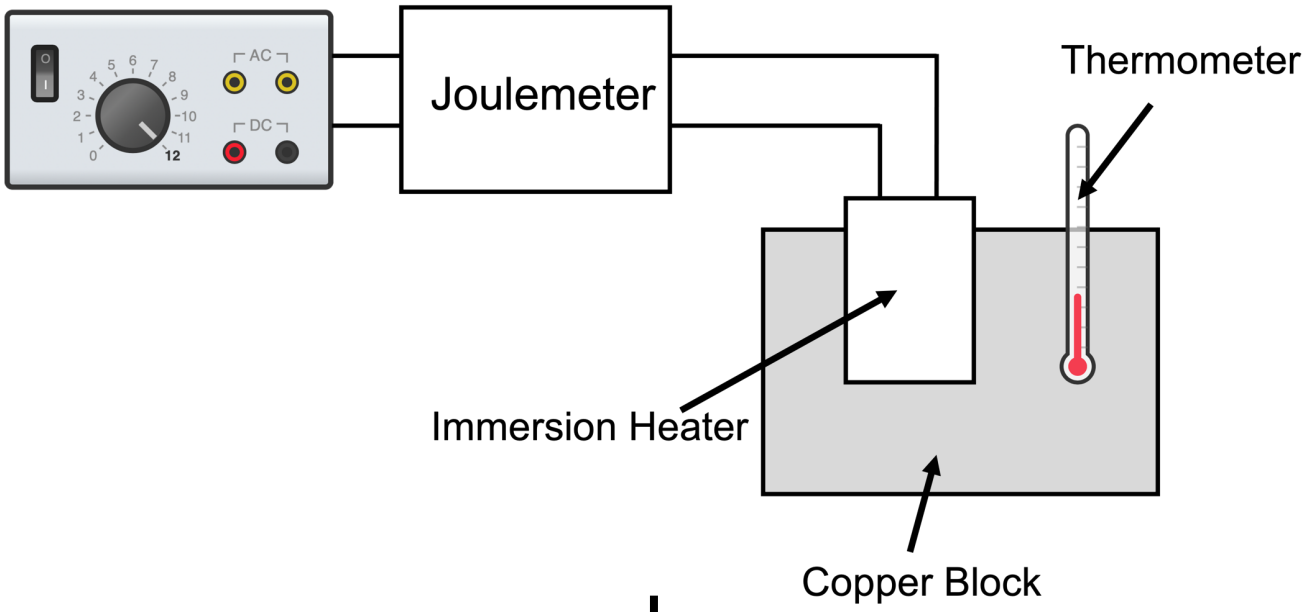
1

Measure and record the mass of the metal block



2

Set up the equipment as shown in the diagram below.



3

Record the start temperature, turn the power pack on and start the timer.

4

Record the temperature and energy transferred after 10 minutes.

5

Calculate the temperature change.

6

Use the mass, temperature change and energy transferred to calculate specific heat capacity.

RP14: Specific Heat Capacity

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1. What piece of equipment do you use to measure mass?
2. What piece of equipment do you use to measure temperature?
3. What piece of equipment do you use to make the energy transferred?
4. What piece of equipment do you use to heat a metal block?
5. What piece of equipment do you use to measure time?
6. What unit is energy transferred measured in?
7. What unit is temperature measured in?
8. What unit is mass measured in?
9. Why may the result you obtain for specific heat capacity be different to the true value?
10. Why should the material the SHC is being determined for be insulated?
11. When determining SHC of a material what variables should be controlled?
12. What is specific heat capacity?
13. What could be used to insulate the metal block?
14. What measurements do you need when calculating specific heat capacity?
15. What piece of equipment do we use as a power supply when determining SHC?
16. What voltage should a powerpack be set to when determining SHC?
17. What are the possible risks when using the heater?

1. Balance
2. Thermometer
3. Joulemeter
4. Heater
5. Stopwatch
6. Joules
7. °C
8. Kilograms
9. Heat loss, turned off power supply too early, incorrectly measured mass of substance, incorrectly measured temperature, incorrectly measured energy transferred.
10. Prevents heat loss and so the specific heat capacity will be more accurate.
11. Mass of the block, dimensions of the block, material of the block, current through heater, thickness of insulation, material of insulation, starting temperature and time interval.
12. The amount of energy required to raise the temperature of one kilogram of the substance by one degree Celsius.
13. Bubble wrap, cotton wool.
14. Mass, temperature change, energy supplied.
15. Powerpack
16. 12V
17. Burns.

Topic	RP14 Specific Heat Capacity
Qu	Explain how to determine the specific heat capacity of _____.
Info	You could be asked this question for different metals and liquids. Some that have come up in the past include: • Copper Block • Oil To answer this question, you will need to do the following: 1. Describe how to set up equipment. 2. Identify the measurements you will make 3. Identify control variables. 4. Describe how you will use your results.
Top Tip	**Use the formula for specific heat capacity on the data sheet you have been given for your writing frame.**
Model Answer	**Explain how to determine the specific heat capacity of an iron block.** 1. *Measure the mass of the block by using a balance.* 2. *Add a heater to the block and connect this to a powerpack that is connected to a joulemeter.* 3. *Add a thermometer and record the start temperature.* 4. *Turn the powerpack on.* 5. *After 10 minutes turn the powerpack off, record the energy transferred and the temperature.* 6. *Calculate specific heat capacity of the block using formula* change in thermal energy = mass × specific heat capacity × temperature change 7. Control the material and thickness of the insulation wrapped around the block.
Practice	1. Learn and practice the model answer above. 2. Prepare and learn model answers to explain how to determine the specific heat capacity of a copper block and a beaker of oil.

Topic	RP14 Specific Heat Capacity
Qu	Describe an experiment to find the specific heat capacity of a metal. What are the control variables when finding specific heat capacity of a metal? Explain why the metal should be wrapped in wool when finding SHC
Info	At least one of these questions is likely to come up. The examiner is going to be looking for a clear answer written in a logical sequence.
Top Tip	Be careful that you use key words/phrases accurately (these are in bold in your model answers below).
Model Answer	**Describe an experiment the student could do to measure the specific heat capacity of a metal.** *Measure the mass of metal using a balance. Use an immersion heater to heat the block and fully insulate the block by wrapping it in cotton wool. Record the start temperature of the block and connect the heater to the power supply. Use an energy meter (joulemeter) to measure the energy supplied to the block as it is warmed. Once you have finished warming the block record the energy supplied and the change in temperature Now that you have the mass, temperature change and energy transferred use these values to calculate specific heat capacity.*
Model Answer	**What are the control variables when finding the specific heat capacity of a metal?** The control variables when determining the specific heat capacity of a metal include the mass of the block, the size of the block and the material of the block. Other control variables include the thickness and material of the insulation as well as the starting temperature of the block, time the block is heated for and the current through the heater.
Model Answer	**Explain why the metal should be wrapped in wool when finding SHC** The wool acts as an insulator and prevents the loss of heat. This would lead to a much more accurate value for specific heat capacity. Without insulation the specific heat capacity value that you would find would be bigger.
Practice	1. Learn and practice the model answers above.

RP15 Investigating Resistance of a Wire

Investigating the Relationship Between Length of Wire and Resistance

1

Set up equipment as shown in the diagram.

2

Place the crocodile clips 10cm apart on the length of wire.

3.

Record the current and voltage.

4.

Calculate resistance using the formula:

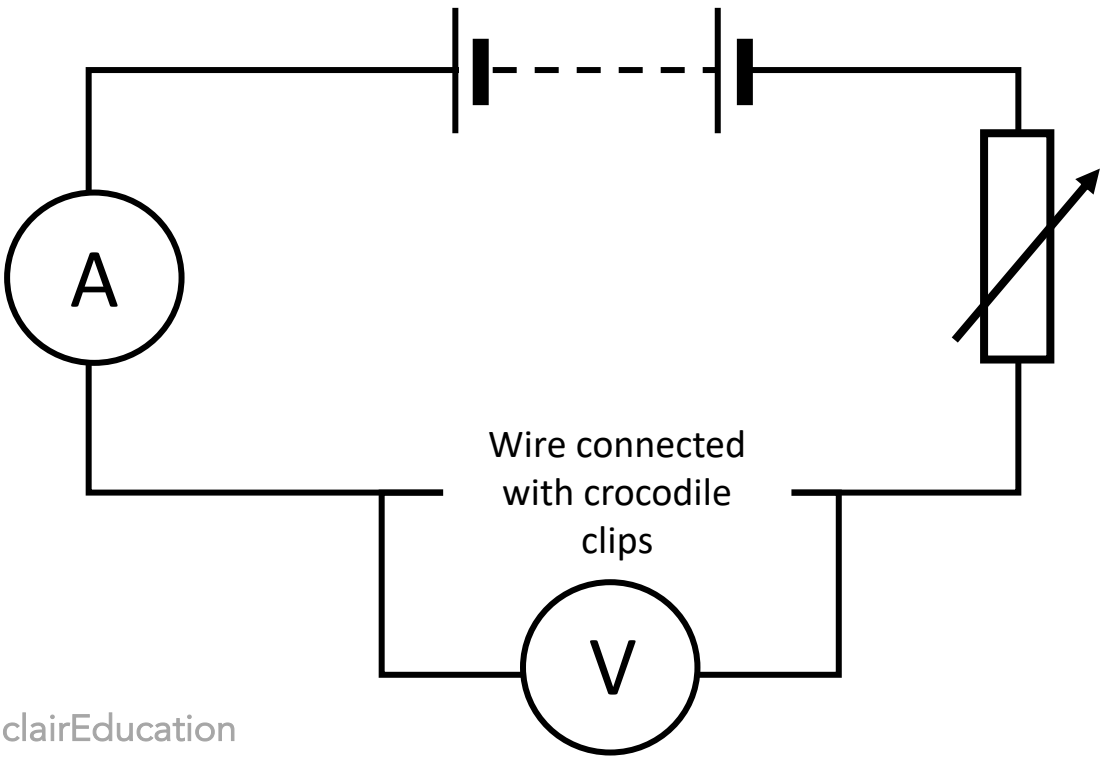
Resistance = Potential Difference / Current

5.

Repeat for different lengths of wire at 10cm intervals.

6.

Plot a graph of resistance against length.



RP15: Resistance of a Wire

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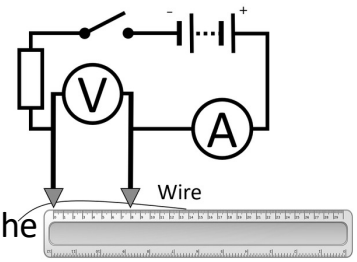
1. What unit is current measured in?	1. Amps (A)
2. What unit is potential difference measured in?	2. Volts (V)
3. Which piece of equipment is used to measure current?	3. Ammeter
4. What piece of equipment is used to measure potential difference?	4. Voltmeter
5. How should an ammeter be connected to determine the current through a component?	5. In series
6. How should an voltameter be connected to determine the potential difference across a component?	6. In parallel
7. How could you tell if an ammeter or voltameter have zero error.	7. They would show a reading when not connected in a circuit.
8. When investigating length of wire and resistance what should be controlled?	8. Temperature, material of wire, thickness of wire.
9. How could temperature be controlled when investigating resistance?	9. Turn the power supply off between readings to prevent components warming up.
10. What is the equation that links current, potential difference and resistance?	10. Resistance = Potential Difference/Current
11. What is the unit for resistance?	11. Ohms (Ω)
12. How would you know if your results were precise?	12. Measurements would be closely grouped together.
13. What are the hazards in the experiment?	13. The high current can cause the wire to get hot and melt. It can also cause burns.
14. What is the dependent variable in this investigation?	14. The resistance of the wire.
15. What is the independent variable in this investigation?	15. Length of wire
16. What are the measurements taken in the investigation?	16. The current and potential difference.
17. Why should the variable resistor be adjusted each time the length of wire is changed?	17. Changes the resistance of the wire so that current remains the same so that the temperature of the wire is kept constant.
18. What effect does temperature have on resistance of a wire?	18. Increases resistance.
19. What effect would a thicker wire have on resistance?	19. Resistance would decrease.

Topic	RP15 Resistance of a Wire
Qu	Explain how to use circuit diagram to determine how a change in _____ affects the resistance of a wire
Info	You could be asked this question for length, temperature, thickness and material of wire. To answer this question, you need to: 1. Describe the circuit that you would set up. This can be written or a diagram. 2. Identify the independent variable – what you will be changing. 3. Select 5 different values for this variable. 4. Describe what you will do. 5. Identify what you will measure 6. Describe how you will calculate resistance 7. State that you will repeat this for your different values 8. State that you will construct a graph of resistance against your independent variable
Top Tip	Make sure your diagram has an ammeter and a voltmeter. Remember your ammeter should be in series and the voltmeter should be in parallel across the component you are investigating. When selecting your values to test for the independent variable select **5** at regular intervals.
Model Answer	**Explain how to use circuit diagram to determine how a change in temperature affects the resistance of a wire.**  1. Set up the equipment as shown in the diagram. 2. Length of wire will be the independent variable. 3. I will investigate 10cm, 20cm, 30cm,40cm and 50cm. 4. I will measure the length with a ruler, connect the wire with crocodile clips and turn the power on. 5. Record current and voltage 6. Calculate resistance by dividing voltage by current 7. Repeat for the different lengths of wire. 8. Construct a graph of resistance against length of wire.
Practice	1. Learn and practice the model answer above. 2. Prepare and learn model answers to explain how you would investigate how temperature, material and thickness of wire affect resistance.

Investigating IV Characteristics of a Resistor

1
Set up equipment as shown in the diagram.

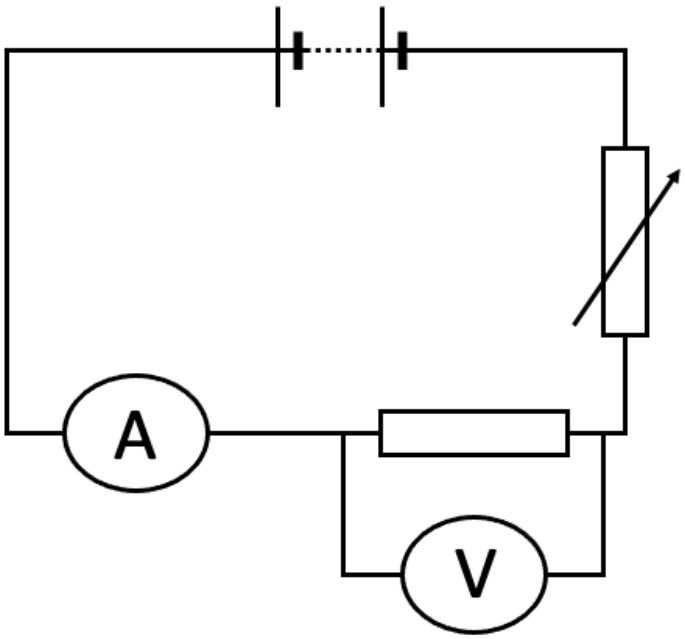
2
Record the current and voltage.

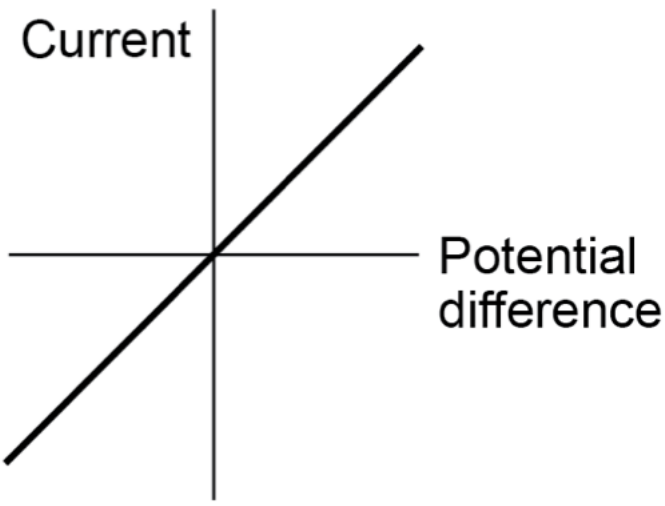
3
Adjust the variable resistor 4 more times recording the new current and voltage each time.

4
Swap the leads on the battery so that the reading on the ammeter and voltmeter is negative.

5
Record the current and voltage 5 times adjusting the variable resistor between each reading.

6
Plot a graph of current against potential difference.





Investigating IV Characteristics of a Lamp

1
Set up equipment as shown in the diagram.

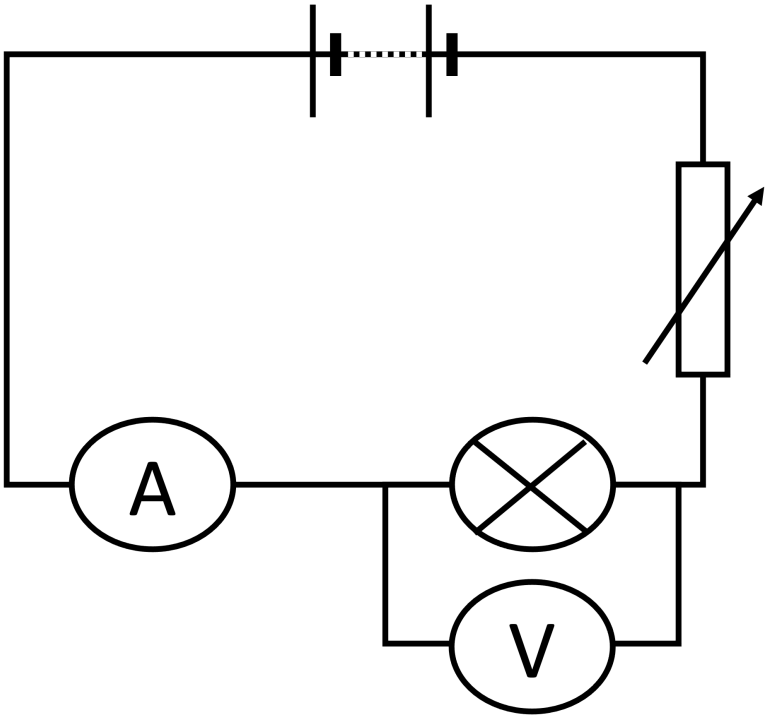
2
Record the current and voltage.

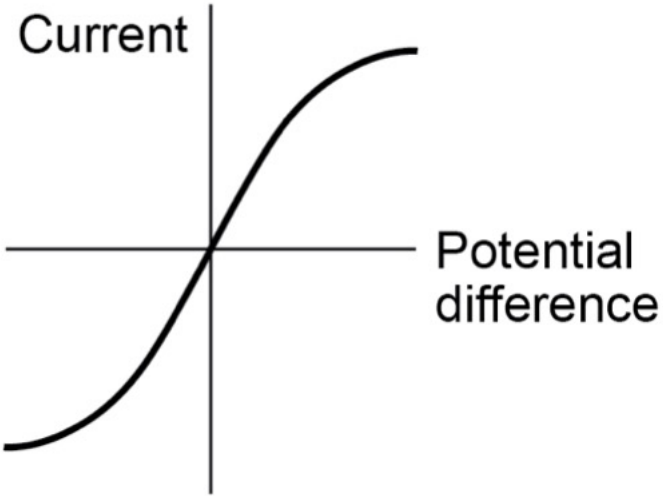
3
Adjust the variable resistor 4 more times recording the new current and voltage each time.

4
Swap the leads on the battery so that the reading on the ammeter and voltmeter is negative.

5
Record the current and voltage 5 times adjusting the variable resistor between each reading.

6
Plot a graph of current against potential difference.





Investigating IV Characteristics of a Diode

1
Set up equipment as shown in the diagram with a battery no higher than 5V.

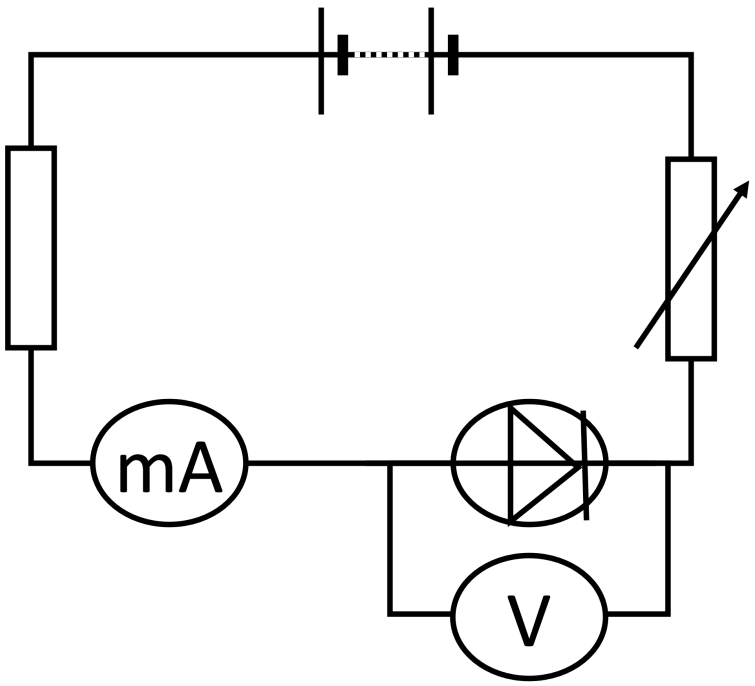
2
Record the current and voltage.

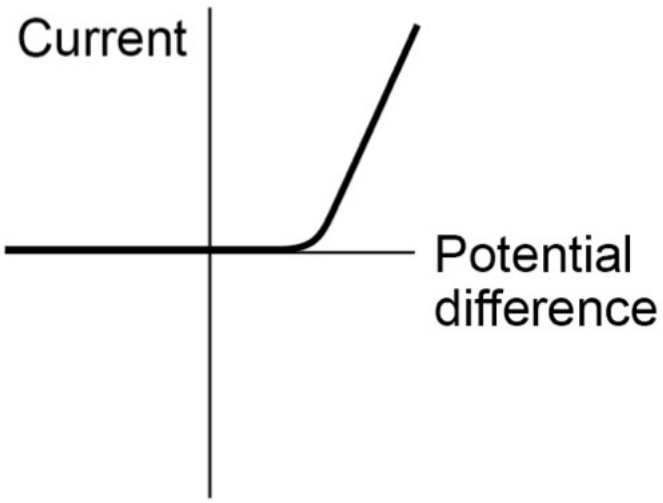
3
Adjust the variable resistor 4 more times recording the new current and voltage each time.

4
Swap the leads on the battery so that the reading on the ammeter and voltmeter is negative.

5
Record the current and voltage 5 times adjusting the variable resistor between each reading.

6
Plot a graph of current against potential difference.





RP16: Investigating IV Characteristics

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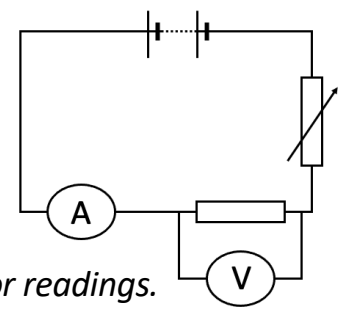
1. What unit is current measured in?
2. What unit is potential difference measured in?
3. Which piece of equipment is used to measure current?
4. What piece of equipment is used to measure potential difference?
5. How should an ammeter be connected to determine the current through a component?
6. How should an voltameter be connected to determine the potential difference across a component?
7. What piece of equipment should you use to measure current when investigating the IV characteristics of a diode?
8. What should the potential difference of the power supply be when investigating IV characteristics of a diode?
9. How do you get negative current and voltage readings?
10. Why is a variable resistor used when investigating IV characteristics?
11. How many positive pairs of readings should you collect?
12. How many negative pairs of readings should you collect?
13. What do you do with your currents and voltages that have been recorded?
14. When plotting a graph of current against potential difference which goes on the X-axis?
15. When plotting a graph of current against potential difference which goes on the Y-axis?
16. How could you tell if an ammeter or voltameter have zero error.
17. When investigating IV characteristics what should be controlled?
18. How could temperature be controlled when investigating IV characteristics?

1. Amps (A)
2. Volts (V)
3. Ammeter
4. Voltmeter
5. In series
6. In parallel
7. Milliammeter
8. 5V or less
9. Swap the leads connecting the power supply.
10. To change the resistance in the circuit so that more current and voltage pairs can be determined.
11. 5
12. 5
13. Plot a graph of current against potential difference
14. Potential Difference
15. Current
16. They would show a reading when not connected in a circuit.
17. Temperature
18. Turn the power supply off between readings to prevent components warming up.

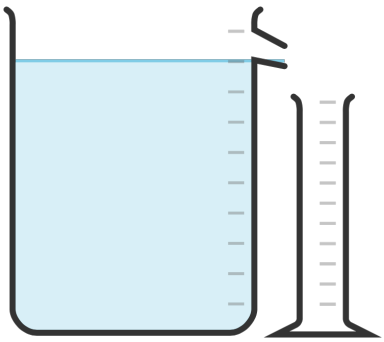
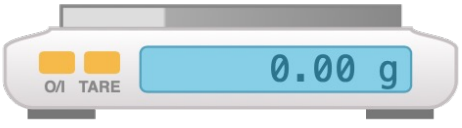
Topic	RP16 Investigating IV Characteristics
Qu	Explain how to investigate the IV characteristics of a _____
Info	You could be asked this question for different components. Some that have come up in the past include: • Resistor • Filament Lamp • Diode To answer this question, you will need to do the following: 1. Draw a diagram of how to set up equipment. 2. Identify the readings you will collect. 3. Describe what you will do with results.
Top Tip	**Be careful drawing your components. Draw the ammeter in series while a voltmeter should be connected in parallel.**
Model Answer	Explain how to investigate the IV characteristics of a _____ *1. Set up the equipment as shown in the diagram.* *2. Record the current and voltage.* *3. Adjust the variable resistor.* *4. Record the new current and voltage.* *5. Repeat this until you have 5 pairs of readings.* *6. Swap the connections to the battery.* *7. Repeat steps 3-4 until you have 5 negative pairs or readings.* *8. Draw a graph of current against potential difference.* 
Practice	1. Learn and practice the model answer above. 2. Prepare and learn model answers to explain how you would investigate the IV characteristics of diodes and filament lamps.

RP17 Determining Density

Determining Density of a Regularly Shaped Object

Finding Volume	Measure the length height and width of the object. Multiply these values together to calculate volume	
Finding Mass	Measure the mass of the object using a balance.	
Determining Density	Divide the mass by the volume to calculate density.	**Density = Mass / Volume**

Determining Density of an Irregularly Shaped Object

Finding Volume	Fill a displacement can with water. Place an empty measuring cylinder under the spout. Add the object to the can. Measure and record the volume displaced into the measuring cylinder.	
Finding Mass	Measure the mass of the object using a balance.	
Determining Density	Divide the mass by the volume to calculate density.	**Density = Mass / Volume**

RP17: Determining Density

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1. What piece of equipment can be used to measure the dimensions of an object?
2. How do you determine volume of a regularly shaped object?
3. How do you determine the volume of an irregularly shaped object?
4. What apparatus is used to measure mass?
5. To calculate density what 2 measurements do you need?
6. What is the formula to calculate density?
7. How do you determine the volume of an irregularly shaped object?
8. What is the unit for mass?
9. What is the unit for volume?
10. What is the unit for density?
11. How do you determine the mass of a liquid?
12. What is the density of water?
13. What piece of equipment could be used to measure lengths more accurately than a ruler?
14. What is the resolution of a ruler?
15. What happens to accuracy when higher resolution apparatus is used?
16. What is zero error?
17. How can a zero error on a balance be corrected?
18. When measuring the volume of an irregularly shaped object how may an error occur?

1. Ruler, micrometre or Vernier callipers
2. Measure dimensions.
3. A displacement technique.
4. Balance
5. Mass and volume
6. Mass / Volume
7. Add it to a displacement can filled with water. Add the object, collecting the displaced water in a measuring cylinder. The volume of water collected is the volume of the object.
8. Grams (g)
9. Cm^3
10. g/cm^3
11. Add a beaker to a balance and set to 0. Then add the liquid recording the mass.
12. $1g/cm^3$
13. Vernier callipers or a digital micrometer
14. 1mm
15. Increases
16. When a piece of apparatus gives a false reading when the true value is 0.
17. Record the value on the balance when it should be zero, subtract this value from each mass recorded.
18. The water level not at the same level as the spout, not all the displaced water is collected in the measuring cylinder, eye position too high or low when measuring the volume.

Topic	RP17 Determining Density
Qu	Explain how to determine the density of _____
Info	You could be asked this question for any object that is either a regular shape, or irregular shape. Some that have come up in the past include: • A small rock • A metal cube • A small statue • A chess piece • A rock cut into a cuboid To answer this question, you will need to do the following: 1. Identify if the object is a regular or irregular shape. 2. Describe how to measure mass. 3. Describe how to measure volume. 4. Explain how you will use results to determine density.
Top Tip	**For each measurement required identify the equipment you will use and describe how to use it.**
Model Answer	**Explain how to determine the density of a small rock.** *1. Measure the mass of a rock by placing it on a balance.* *2. To find the volume of the rock set a displacement can filled up to be level with the spout. Place a measuring cylinder underneath. Add the small rock to the displacement can. Record the volume of water that was displaced into the measuring cylinder.* *3. Calculate the density by dividing the mass by the volume.*
Practice	1. Learn and practice the model answer above. 2. Prepare and learn a model answer to explain how you will determine the density of a metal cube, a small statue, a chess piece and a rock cut into a cuboid.