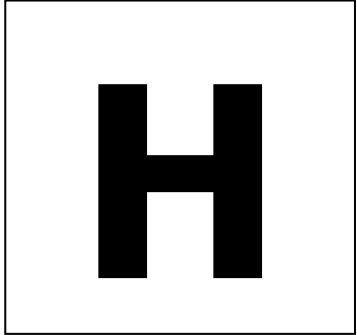




**ST MARY'S SCIENCE  
DEPARTMENT:  
PHYSICS**



**GCSE PHYSICS HOMEWORK BOOK**  
**TOPIC 1: ADVANCED ENERGY**  
**STUDENT BOOK**

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

<b>NAME</b>	
<b>CLASS</b>	
<b>TEACHER</b>	
<b>FORM</b>	

<b>TASK</b>	<b>MARK</b>	<b>GRADE</b>
<b>1</b>		
<b>2</b>		
<b>3</b>		
<b>4</b>		
<b>OVERALL</b>		

**GCSE  
PHYSICS  
YEAR 9  
TOPIC 1**



## HOMEWORK SCHEDULE

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

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

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

<b>Task</b>	<b>Submission Date</b>	<b>Completed?</b>	<b>On Time?</b>
<b>Task 1</b> Specific Heat Capacity 1			
<b>Task 2</b> Specific Heat Capacity 2			
<b>Task 3</b> Insulation			
<b>Task 4</b> Elastic Energy			



## **SCIENCE DEPARTMENT MARKING CODE**

**ID** = Insufficient detail in answer

**W** = Wrong understanding of science.

**IR** = Irrelevant information given.

**V** = This is too vague to get a mark.

**AQ** = Answer the question asked

**R** = Read the question/information

**M** = Maths mistake

**BOD** = Benefit of the doubt given.

**E** = Explain the answer further please.

**U** = Wrong units used.

**SF** = Wrong significant figures used.

**SP** = Wrong spelling of a technical term

**SR** = Same reason given 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: SPECIFIC HEAT CAPACITY 1****SPEC CHECK**

Content	Achieved?
The amount of energy stored in or released from a system as its temperature changes can be calculated using the equation: change in thermal energy = mass $\times$ specific heat capacity $\times$ temperature change $\Delta E = m c \Delta \theta$ change in thermal energy, $\Delta E$ , in joules, J mass, $m$ , in kilograms, kg specific heat capacity, $c$ , in joules per kilogram per degree Celsius, J/kg $^{\circ}\text{C}$ temperature change, $\Delta\theta$ , in degrees Celsius, $^{\circ}\text{C}$	
The specific heat capacity of a substance is the amount of energy required to raise the temperature of one kilogram of the substance by one degree Celsius.	

**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.

<b>What Topics Do I Know Well?</b>
------------------------------------

<b>What Topics Do I Need to Revise?</b>
---

**SECTION A**

**This is a revision question on a previous topic.**

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

**1.0** A weightlifter picks up a barbell.



**1.1** Which type of energy is stored in the barbell when it is held above the weightlifter's head?

Tick **one** box only.

[1 mark]

Chemical potential

Elastic potential

Gravitational potential

Kinetic

**1.2** The weightlifter drops the barbell.

The barbell's store of which type of energy increases as the barbell falls.

Tick **one** box only.

[1 mark]

Chemical potential

Elastic potential

Gravitational potential

Kinetic

**1.3** The weightlifter drops the barbell.

The barbell's store of which type of energy decreases as the barbell falls.

Tick **one** box only.

[1 mark]

Chemical potential

Elastic potential

Gravitational potential

Kinetic

**1.4** The weightlifter drops the barbell.

What happens to the overall energy of the system as it falls. Assume the system is closed

Tick **one** box only.

[1 mark]

Increases

Decreases

Stays the same

Goes to zero.

**1.5** The weightlifter drops the barbell.

What happens to the internal energy of the surroundings as it falls. Assume the system is open.

Tick **one** box only.

[1 mark]

Increases

Decreases

Stays the same

Goes to zero.



**1.6** State the unit of energy.

Tick **one** box only.

[1 mark]

Joules

Newtons

Watts

Kilograms

**1.7** State the efficiency value which is impossible to achieve in the Universe.

Tick **one** box only.

[1 mark]

95%

0.78

1.21

22%

**1.8** A motor transfers 10,000J of energy in 25 seconds. What is the power?

Tick **one** box only.

[1 mark]

10,000W

250,000W

400W

40,000W



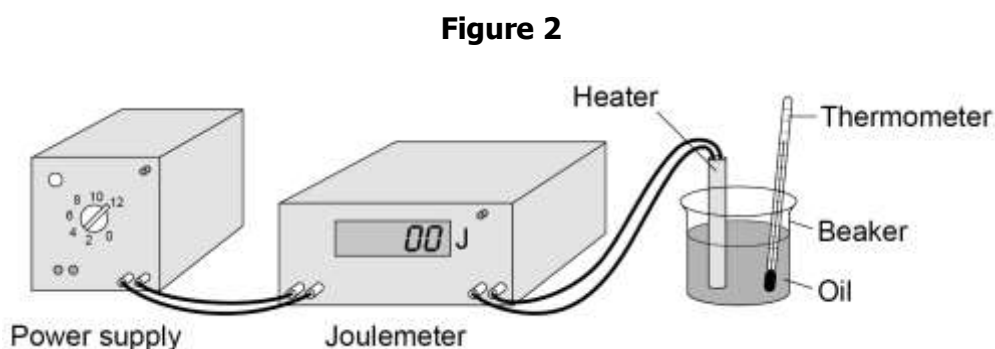
**SECTION B**

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

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

**1.** Students investigated the specific heat capacity of different oils.

**Figure 2** shows the equipment used.



This is the method used:

- 1.** Put 200 g of an oil in a beaker.
- 2.** Record the temperature of the oil.
- 3.** Switch on the heater.
- 4.** After 5 minutes, record the temperature of the oil and the reading on the joulemeter.
- 5.** Repeat steps **1–4** with different oils.

**1.1** Give one variable the students controlled in the investigation.

**[1 mark]**

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.....

**Table 2** shows the students' results for one oil.

**Table 2**

Temperature at start in °C	Temperature after 5 minutes in °C
21	68

**1.2** What is the resolution of the thermometer used in the investigation?

**[1 mark]**

Resolution = ..... °C



The students calculated the specific heat capacity of the oil as 2100 J/kg °C

The correct value for the specific heat capacity for the oil is 1630 J/kg °C

**1.3** Calculate the percentage difference between the two values.

**[2 marks]**

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Percentage difference = ..... %

**1.4** Suggest **two** improvements the students could make to obtain a more accurate value for the specific heat capacity.

**[2 marks]**

Improvement **1**

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Improvement **2**

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**1.5** A company is considering what metal to use to make saucepans.

They use data about the:

Cost of each metal

Specific heat capacity of each metal.

Suggest **two other** properties the company needs to consider when deciding which metal to use.

**[2 marks]**

Property **1**

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Property **2**

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**SECTION C**

**This is a challenge question to extend your understanding.**

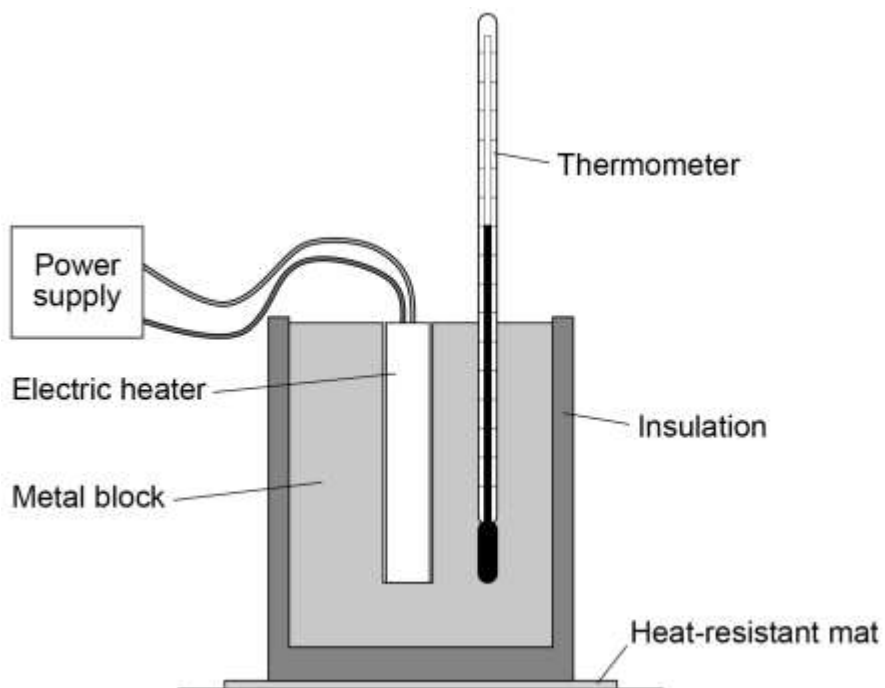
You should aim to spend **10 minutes** answering this section.

**1.** A student investigated how the temperature of a metal block changed with time.

An electric heater was used to increase the temperature of the block.

The heater was placed in a hole drilled in the block as shown in **Figure 2**.

**Figure 2**



The student measured the temperature of the metal block every 60 seconds.

**Table 2** shows the student's results.

**Table 2**

Time in s	Temperature in °C
0	20.0
60	24.5
120	29.0
180	31.0
240	31.5

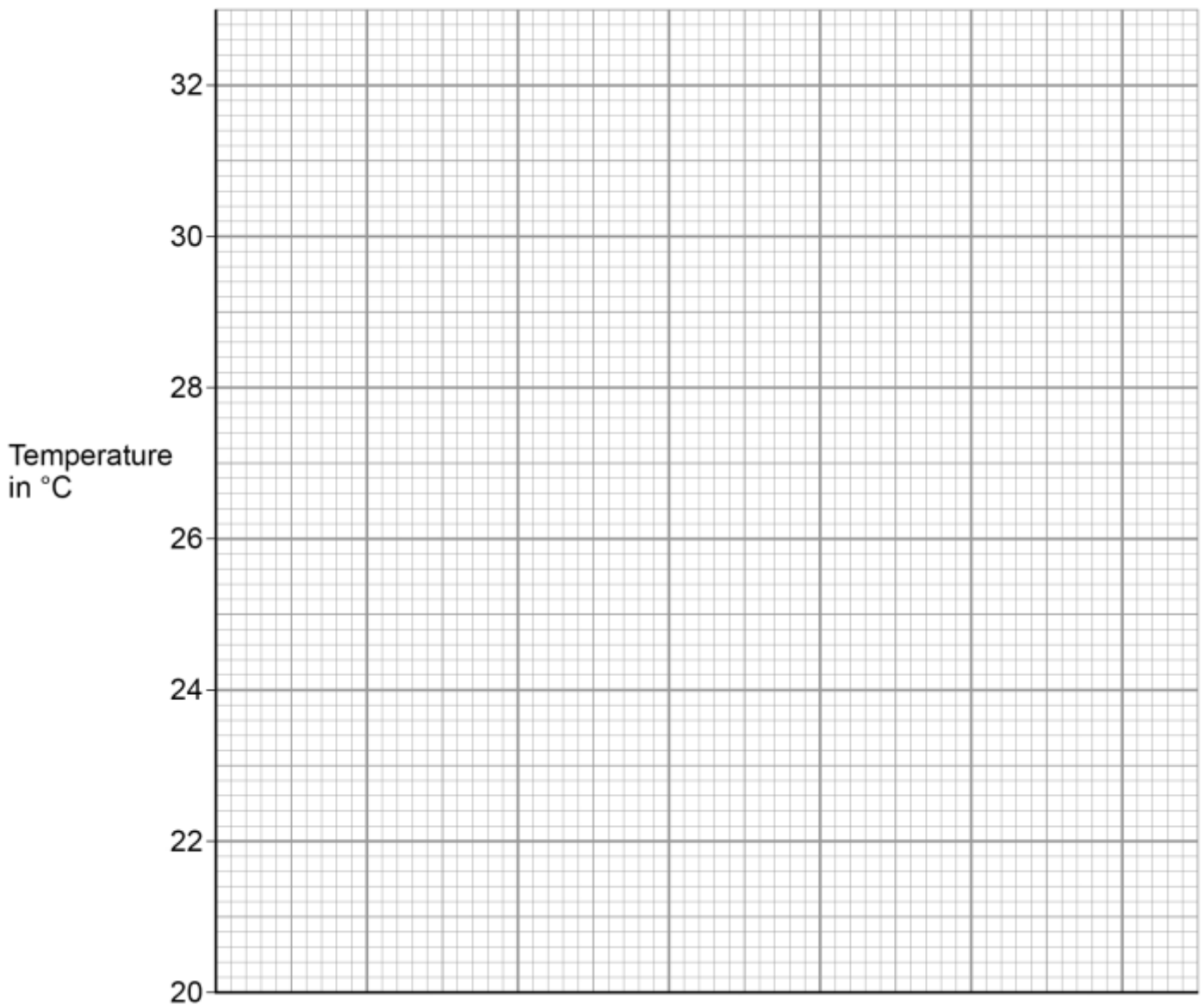


**1.1** Complete the graph of the data from **Table 2** on **Figure 3**.

- Choose a suitable scale for the x-axis.
- Label the x-axis.
- Plot the student's results.
- Draw a line of best fit.

**[4 marks]**

**Figure 3**





**1.2** The rate of change of temperature of the block is given by the gradient of the graph.

Determine the gradient of the graph over the first 60 seconds.

**[2 marks]**

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Gradient = \_\_\_\_\_

**1.3** The metal block had a mass of 1.50 kg

The specific heat capacity of the metal was 900 J/kg °C

Calculate the change in thermal energy of the metal during 240 seconds.

Use the Physics Equations Sheet.

Give your answer in kilojoules.

**[4 marks]**

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Change in Thermal Energy = \_\_\_\_\_ kJ



**1.4** Another student repeated the investigation.

Give two variables this student would need to control to be able to compare their results with the results in **Table 2**.

**[2 marks]**

Variable 1

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Variable 2

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## FEEDBACK SHEET

<b>Overall Mark:</b>	<b>/28</b>	<b>GRADE ACHIEVED:</b>	
<b>Section A :</b>	<b>/8</b>	<b>9</b> <input type="checkbox"/>	<b>5</b> <input type="checkbox"/>
<b>Section B :</b>	<b>/8</b>	<b>8</b> <input type="checkbox"/>	<b>4</b> <input type="checkbox"/>
<b>Section C :</b>	<b>/12</b>	<b>7</b> <input type="checkbox"/>	<b>3</b> <input type="checkbox"/>
		<b>6</b> <input type="checkbox"/>	<b>U</b> <input type="checkbox"/>

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding
<b>Strengths:</b>	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills <b>Others</b> (Topic Specific)			
<b>Areas to Improve:</b>	<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving <input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills <b>Others</b> (Topic Specific)			
<b>Progress:</b>	Unsatisfactory	Satisfactory	Good	Outstanding
<b>Working:</b>	Below	In line with	Above	<b>(your target)</b>
<b>Effort:</b>	Poor	Inconsistent	Good	Excellent

### To improve further you need to:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Carry out <b>independent</b> revision.</li> <li><input type="checkbox"/> Complete outstanding work.</li> <li><input type="checkbox"/> Make corrections as indicated by the teacher.</li> <li><input type="checkbox"/> Attend intervention for this topic</li> <li><input type="checkbox"/> Include more information in responses.</li> <li><input type="checkbox"/> Include more key words in responses.</li> <li><input type="checkbox"/> Attend departmental revision sessions.</li> <li><input type="checkbox"/> Read the questions carefully.</li> <li><input type="checkbox"/> Explain your answers in more detail.</li> <li><input type="checkbox"/> Carry out revision on Seneca Learning.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Revise the equations.</li> <li><input type="checkbox"/> Check the units on answers.</li> <li><input type="checkbox"/> Check the correct amount of sig figs on answers.</li> <li><input type="checkbox"/> Check to convert values correctly.</li> <li><input type="checkbox"/> Show your full working out.</li> <li><input type="checkbox"/> Check your calculations.</li> <li><input type="checkbox"/> Revise the science investigative skills.</li> <li><input type="checkbox"/> Revise the key concepts of the topics.</li> <li><input type="checkbox"/> Thoroughly check your work for mistakes.</li> </ul> <p>Other:</p> |
|--|--|

### Student response







**1.2** The UK produces most of its electricity from fossil fuels.

Many people in the UK leave their televisions in 'stand by' mode when not in use, instead of switching them off.

It is better for the environment if people switch off their televisions, instead of leaving them in 'stand by' mode.

Explain why.

**[3 Marks]**

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**1.3** A scientist wrote in a newspaper:

'Appliances that do not automatically switch off when they are not being used should be banned.'

Suggest why scientists alone cannot make the decision to ban these appliances.

**[1 Mark]**

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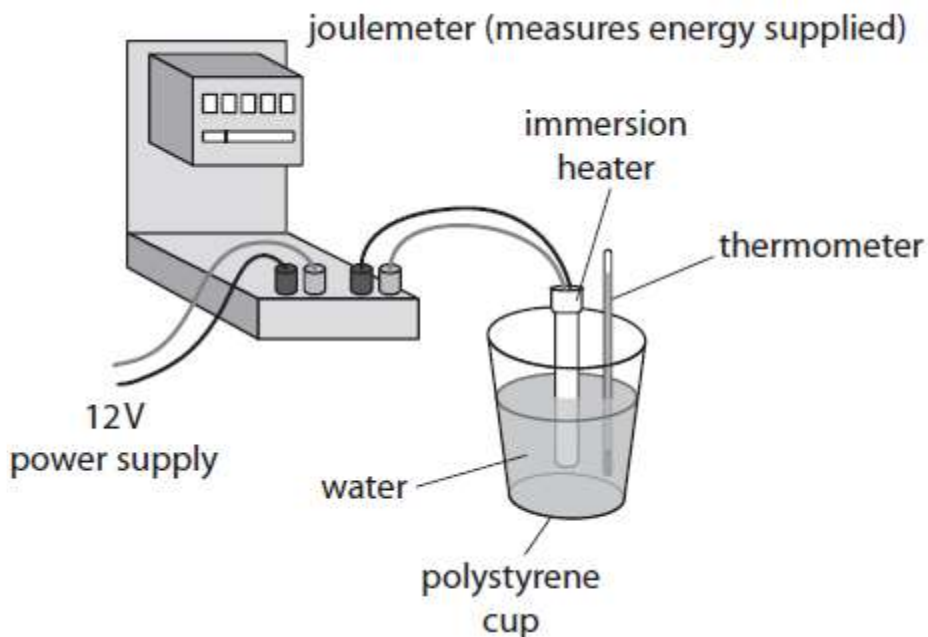
**SECTION B**

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

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

**1.** A student uses the apparatus in **Figure 3** to determine the specific heat capacity of water.

**Figure 3**



**1.1** State the measurements needed to calculate the specific heat capacity of water.

**[4 Marks]**

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**1.2** State two ways that the apparatus could be adapted to improve the procedure.

**[2 Marks]**

**Adaptation 1**

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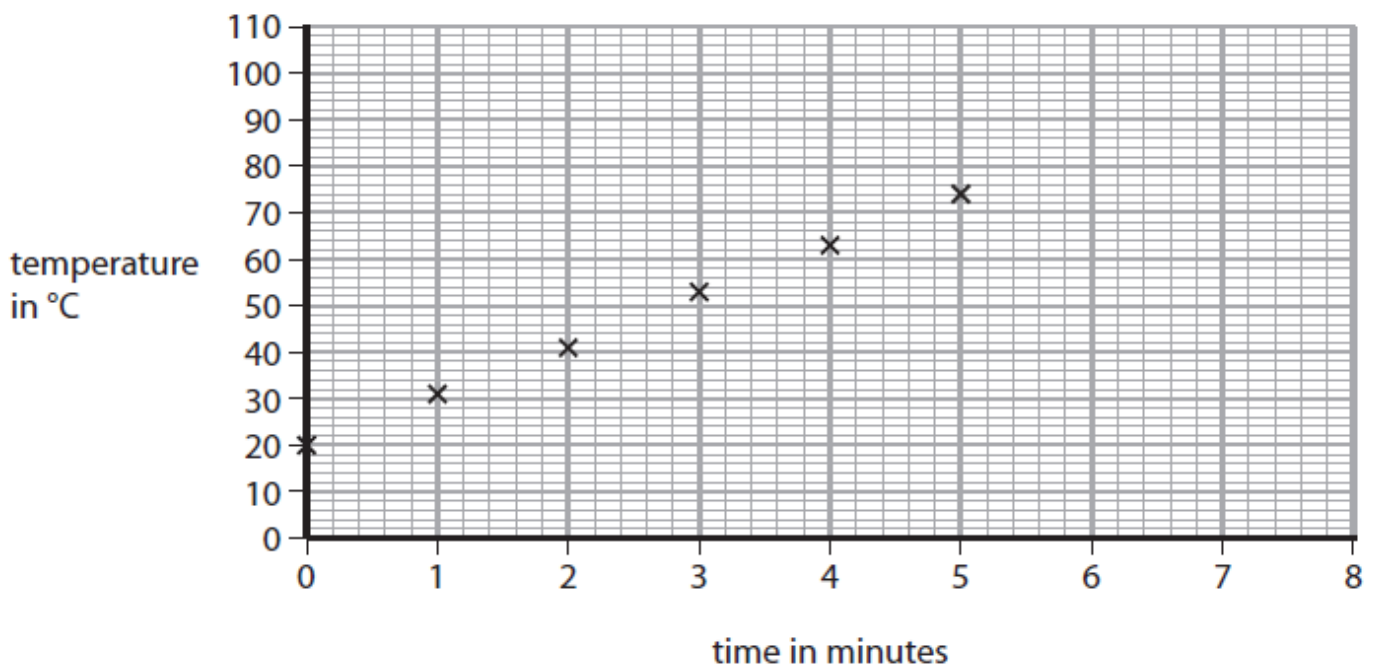
Adaptation 2

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The student decides to measure the temperature of the water every minute while it is being heated.

**Figure 4** shows a graph of the student's results.

**Figure 4**



**1.3** Predict the temperature of the water if the heating continues up to 8 minutes.

**[1 Mark]**

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 .....

Temperature of the Water = ..... °C



**SECTION C**

**This is a challenge question to extend your understanding.**

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

**1.** A student heats up a 5000-g block of iron from 18 °C to 46 °C, transferring 62.8 kJ of energy.

**1.1** Calculate the specific heat capacity of iron.

**[2 Marks]**

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**1.2** Suggest why the experimental value could be different from the value stated in physics tables for iron.

**[3 Marks]**

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**1.3** How could this experimental method be improved to make the result more accurate?

**[3 Marks]**

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**FEEDBACK SHEET**

<b>Overall Mark:</b>	<b>/23</b>	<b>GRADE ACHIEVED:</b>	
<b>Section A :</b>	<b>/8</b>	<b>9</b> <input type="checkbox"/>	<b>5</b> <input type="checkbox"/>
<b>Section B :</b>	<b>/7</b>	<b>8</b> <input type="checkbox"/>	<b>4</b> <input type="checkbox"/>
<b>Section C :</b>	<b>/8</b>	<b>7</b> <input type="checkbox"/>	<b>3</b> <input type="checkbox"/>
		<b>6</b> <input type="checkbox"/>	<b>U</b> <input type="checkbox"/>

<b>Knowledge and understanding shown</b>	Unsatisfactory	Satisfactory	Good	Outstanding
<b>Strengths:</b>	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills <b>Others</b> (Topic Specific)		<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving	
<b>Areas to Improve:</b>	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills <b>Others</b> (Topic Specific)		<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving	
<b>Progress:</b>	Unsatisfactory	Satisfactory	Good	Outstanding
<b>Working:</b>	Below	In line with	Above	<b>(your target)</b>
<b>Effort:</b>	Poor	Inconsistent	Good	Excellent

**To improve further you need to:**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Carry out <b>independent</b> revision.</li> <li><input type="checkbox"/> Complete outstanding work.</li> <li><input type="checkbox"/> Make corrections as indicated by the teacher.</li> <li><input type="checkbox"/> Attend intervention for this topic</li> <li><input type="checkbox"/> Include more information in responses.</li> <li><input type="checkbox"/> Include more key words in responses.</li> <li><input type="checkbox"/> Attend departmental revision sessions.</li> <li><input type="checkbox"/> Read the questions carefully.</li> <li><input type="checkbox"/> Explain your answers in more detail.</li> <li><input type="checkbox"/> Carry out revision on Seneca Learning.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Revise the equations.</li> <li><input type="checkbox"/> Check the units on answers.</li> <li><input type="checkbox"/> Check the correct amount of sig figs on answers.</li> <li><input type="checkbox"/> Check to convert values correctly.</li> <li><input type="checkbox"/> Show your full working out.</li> <li><input type="checkbox"/> Check your calculations.</li> <li><input type="checkbox"/> Revise the science investigative skills.</li> <li><input type="checkbox"/> Revise the key concepts of the topics.</li> <li><input type="checkbox"/> Thoroughly check your work for mistakes.</li> </ul> <p>Other:</p> |
|--|--|

**Student response**

**TASK 3: INSULATION****SPEC CHECK**

<b>Content</b>	<b>Achieved?</b>
Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed.	
Students should be able to describe with examples where there are energy transfers in a closed system, that there is no net change to the total energy.	
Students should be able to describe, with examples, how in all system changes energy is dissipated, so that it is stored in less useful ways. This energy is often described as being 'wasted'.	
Students should be able to explain ways of reducing unwanted energy transfers, for example through lubrication and the use of thermal insulation.	

**Target Setting**

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

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

**What Topics Do I Know Well?**

**What Topics Do I Need to Revise?**



**SECTION A**

**This is a revision question on a previous topic.**

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

**1.1** Which of these is a non-renewable source of energy?

**[1 Mark]**

- A** geothermal
- B** natural gas
- C** tidal
- D** solar

**1.2** Explain why renewable sources provide an increasing fraction of the electricity supply for many countries.

**[2 Marks]**

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Electricity can be generated using a water turbine.

**1.3** Water gains kinetic energy by falling from the top of a dam.

Calculate the minimum height that 7.0 kg of water must fall to gain 1300 J of kinetic energy.

**[3 Marks]**

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Minimum Height = ..... m



**1.4** As water enters the turbine at the bottom of the dam, the kinetic energy of 8.0 kg of moving water is 1100 J.

Calculate the speed of the moving water as it enters the turbine.

**[3 Marks]**

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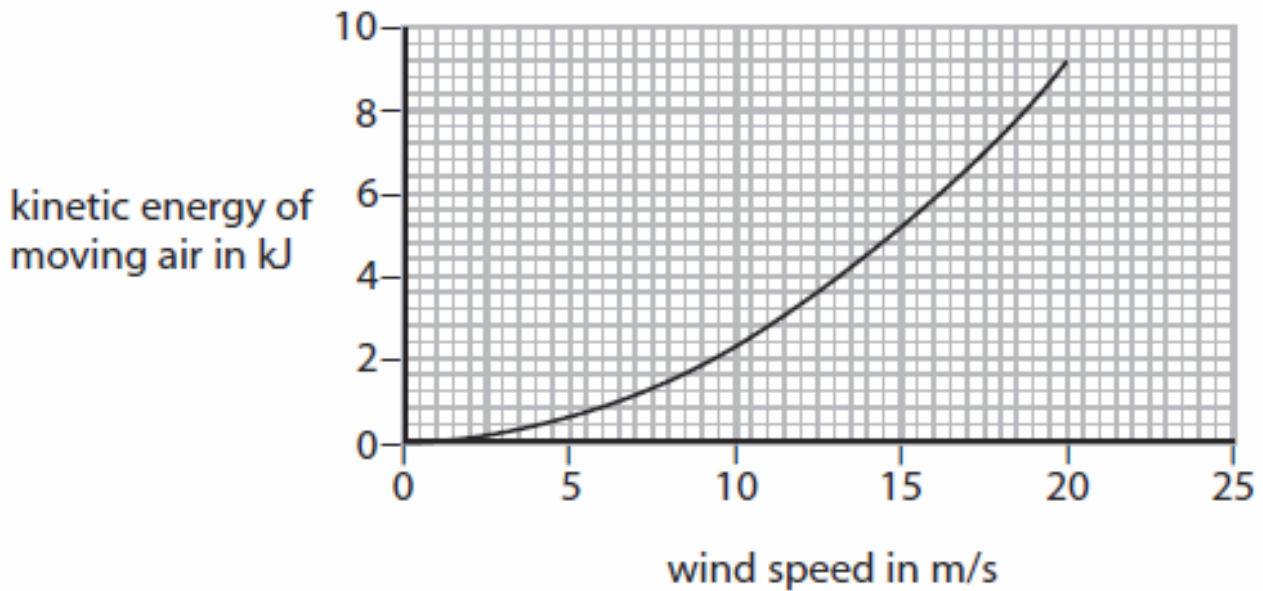
Speed = ..... m/s



1.5 Moving air can be used to generate electricity using a wind turbine.

Figure 8 is a graph of kinetic energy against wind speed for a mass of moving air.

Figure 8



Just before the air reaches a wind turbine it has a wind speed of 15 m/s.

When the air has gone through the turbine it has a wind speed of 13 m/s.

As the air moves through the turbine some of its kinetic energy is transferred to the turbine.

Use the graph to determine the percentage of the kinetic energy transferred to the turbine from the air.

[3 Marks]

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Percentage of Kinetic Energy Transferred from the Air = ..... %

**SECTION B**

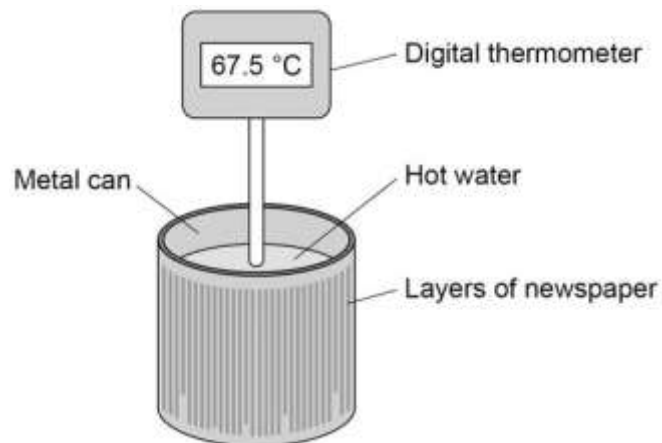
This is a question to revise understanding carried out in lesson.

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

1. A student investigated the insulating properties of newspaper.

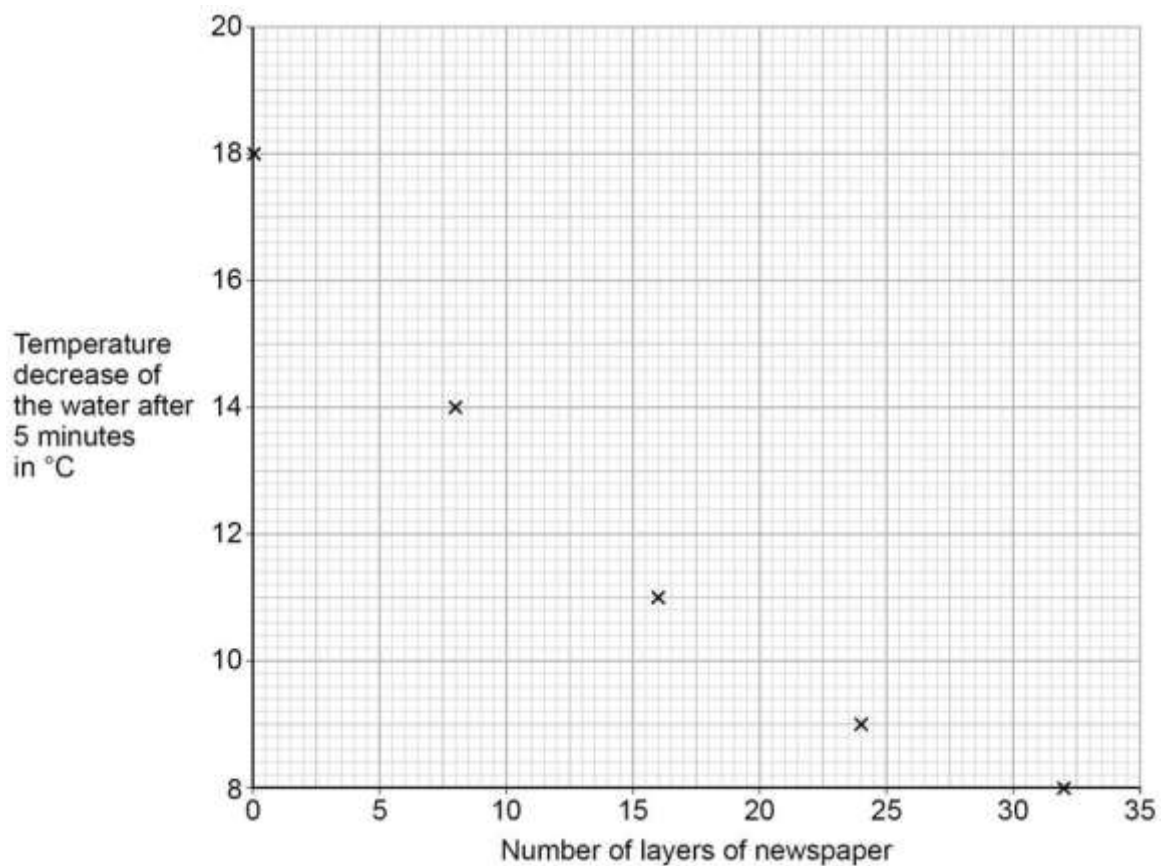
**Figure 1** shows the apparatus the student used.

**Figure 1**



The student's results are shown in **Figure 2**.

**Figure 2**





**1.1** Describe a method the student could have used to obtain the results shown in **Figure 2**.

**[6 marks]**

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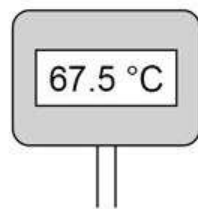
.....

**1.2** The student could have used a datalogger with a temperature probe instead of the digital thermometer.

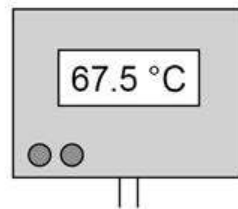
**Figure 3** shows the readings on the digital thermometer and the datalogger.

**Figure 3**

**Digital thermometer**



**Datalogger**



The datalogger records 10 readings every second.

The student considered using a temperature probe and datalogger.

Explain why it was not necessary to use a temperature probe and datalogger for this investigation.

**[2 marks]**

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**SECTION C**

**This is a challenge question to extend your understanding.**

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

**1.** A student investigated the effect of the starting temperature of hot water on the rate at which it cooled.

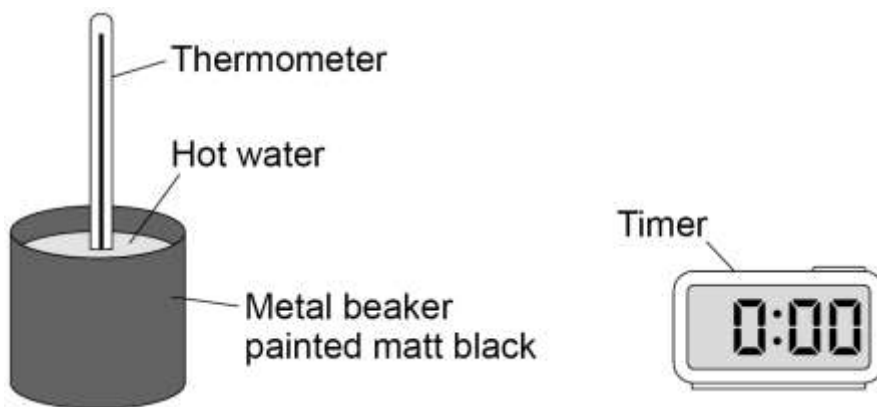
**Table 1** shows the student's results.

**Table 1**

Starting temperature in °C	Temperature after 5 minutes in °C
80	66
70	59
60	52
50	45
40	37

**Figure 1** shows the equipment used.

**Figure 1**



**1.1** Describe a method the student could use to carry out the investigation safely and obtain the results in **Table 1**.

**[6 marks]**

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**1.2** What was the resolution of the thermometer used in the investigation?

**[1 mark]**

Resolution = ..... °C

**1.3** Explain **one** conclusion the student should make from the results in **Table 1**.

**[2 marks]**

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**1.4** The student repeated the investigation using a metal beaker of the same shape and size but painted shiny silver.

Explain why the temperature after 5 minutes was higher than with the matt black beaker for each starting temperature.

**[2 marks]**

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**FEEDBACK SHEET**

<b>Overall Mark:</b>	<b>/31</b>	<b>GRADE ACHIEVED:</b>	
<b>Section A :</b>	<b>/12</b>	<b>9</b> <input type="checkbox"/>	<b>5</b> <input type="checkbox"/>
<b>Section B :</b>	<b>/8</b>	<b>8</b> <input type="checkbox"/>	<b>4</b> <input type="checkbox"/>
<b>Section C :</b>	<b>/11</b>	<b>7</b> <input type="checkbox"/>	<b>3</b> <input type="checkbox"/>
		<b>6</b> <input type="checkbox"/>	<b>U</b> <input type="checkbox"/>

<b>Knowledge and understanding shown</b>	Unsatisfactory	Satisfactory	Good	Outstanding
<b>Strengths:</b>	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Previous Topics <input type="checkbox"/> Analytical Skills <input type="checkbox"/> Problem Solving <b>Others (Topic Specific)</b>			
<b>Areas to Improve:</b>	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Previous Topics <input type="checkbox"/> Analytical Skills <input type="checkbox"/> Problem Solving <b>Others (Topic Specific)</b>			
<b>Progress:</b>	Unsatisfactory	Satisfactory	Good	Outstanding
<b>Working:</b>	Below	In line with	Above	<b>(your target)</b>
<b>Effort:</b>	Poor	Inconsistent	Good	Excellent

**To improve further you need to:**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Carry out <b>independent</b> revision.</li> <li><input type="checkbox"/> Complete outstanding work.</li> <li><input type="checkbox"/> Make corrections as indicated by the teacher.</li> <li><input type="checkbox"/> Attend intervention for this topic</li> <li><input type="checkbox"/> Include more information in responses.</li> <li><input type="checkbox"/> Include more key words in responses.</li> <li><input type="checkbox"/> Attend departmental revision sessions.</li> <li><input type="checkbox"/> Read the questions carefully.</li> <li><input type="checkbox"/> Explain your answers in more detail.</li> <li><input type="checkbox"/> Carry out revision on Seneca Learning.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Revise the equations.</li> <li><input type="checkbox"/> Check the units on answers.</li> <li><input type="checkbox"/> Check the correct amount of sig figs on answers.</li> <li><input type="checkbox"/> Check to convert values correctly.</li> <li><input type="checkbox"/> Show your full working out.</li> <li><input type="checkbox"/> Check your calculations.</li> <li><input type="checkbox"/> Revise the science investigative skills.</li> <li><input type="checkbox"/> Revise the key concepts of the topics.</li> <li><input type="checkbox"/> Thoroughly check your work for mistakes.</li> </ul> <p>Other:</p> |
|--|--|

**Student response**

**TASK 4: ELASTIC ENERGY****SPEC CHECK**

<b>Content</b>	<b>Achieved?</b>
<p>The amount of elastic potential energy stored in a stretched spring can be calculated using the equation:</p> <p>elastic potential energy = <math>0.5 \times \text{spring constant} \times \text{extension}^2</math> <math>E_e = \frac{1}{2} k e^2</math></p> <p>(assuming the limit of proportionality has not been exceeded) elastic potential energy, <math>E_e</math>, in joules, J spring constant, <math>k</math>, in newtons per metre, N/m extension, <math>e</math>, in metres, m</p>	

**Target Setting**

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

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

**What Topics Do I Know Well?**

**What Topics Do I Need to Revise?**



**SECTION A**

**This is a revision question on a previous topic.**

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

**1.** A homeowner had a new gas boiler installed.

The following information is an extract from the information booklet supplied with the boiler.

<b>Fuel</b>	Natural Gas
<b>Water temperature</b>	60 °C
<b>Energy supplied to gas boiler</b>	8.0 kJ/s (8.0 kW)
<b>Efficiency</b>	0.95

**1.1** Calculate the energy transferred each second by the gas boiler to the water inside the boiler.

Show clearly how you work out your answer.

**[2 Marks]**

.....

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.....

Energy Transferred by the Gas Boiler Each Second = ..... kJ

**1.2** The energy value of the gas used in a home is measured in kilowatt-hours (kWh).

The homeowner has a pre-payment meter and pays £30 into his account. With a pre-payment meter, gas costs 15p per kilowatt-hour.

Calculate the total number of hours that the gas boiler would operate for £30.

Show clearly how you work out your answer.

**[2 Marks]**

.....

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Number of Hours = .....



**1.3** Although the gas boiler is very efficient, some energy is wasted.

Explain what happens to the waste energy.

**[2 Marks]**

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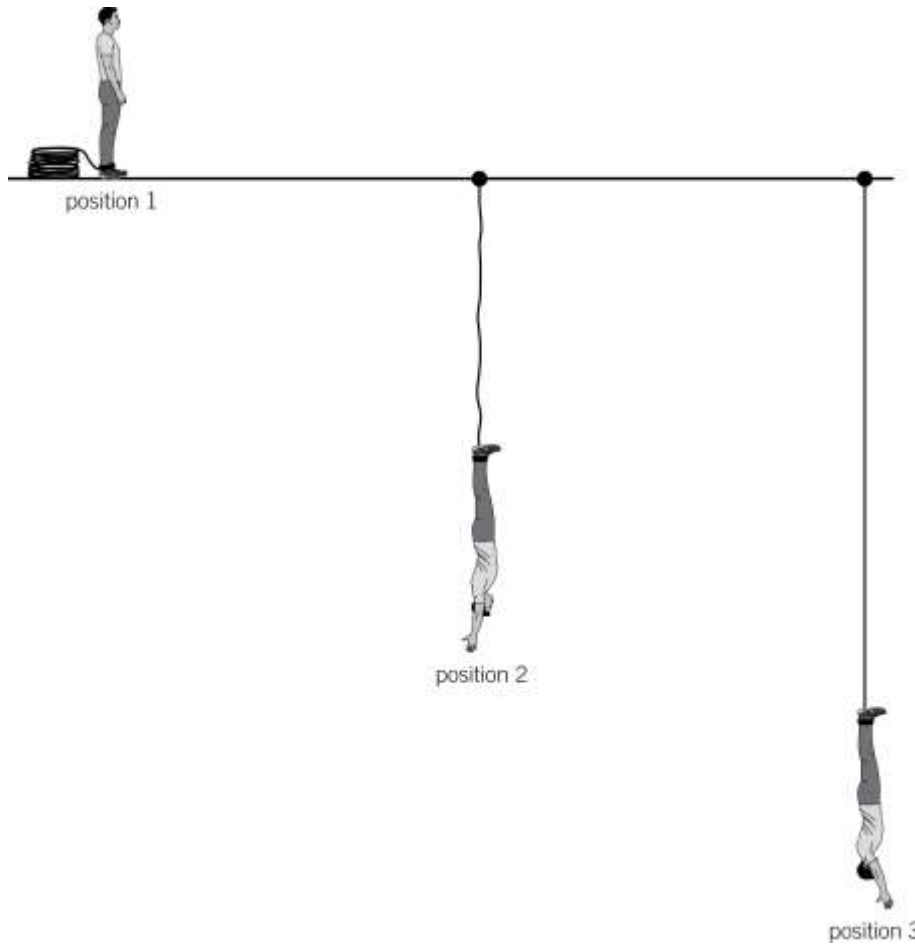


**SECTION B**

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

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

**1.** The diagram shows a bungee jumper at three different positions: waiting to jump (position **1**), at the point where the bungee rope is fully unwound and about to start stretching (position **2**), and at the lowest point before he rebounds (position **3**).



**1.1** In which of the three positions is the bungee jumper's gravitational potential energy store largest? Explain your answer.

**[2 Marks]**

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**1.2** In which of the three positions is the bungee jumper's gravitational energy store smallest?

Explain your answer.

**[2 Marks]**

.....

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**1.3** In which of the three positions is the rope's elastic energy store largest? Explain your answer.

**[2 Marks]**

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**1.4** Describe and explain the changes in the rope's elastic energy store as the jumper moves from position **1** to position **3**.

**[5 Marks]**

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**1.5** Explain, in terms of energy transfer, why a bungee jumper eventually stops moving.

**[3 Marks]**

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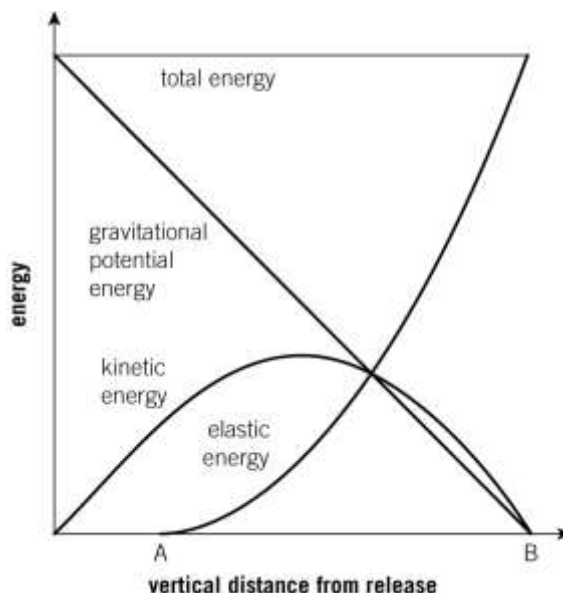


**SECTION C**

**This is a challenge question to extend your understanding.**

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

**1.** The diagram shows the sizes of a bungee jumper's energy stores for different positions of the bungee jumper.



**1.1** The graphs are not entirely realistic. Suggest what assumption has been made in drawing them.

**[1 Mark]**

.....

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**1.2** Which of the three positions in the bungee jumper diagram corresponds to position **A** on the graphs? Explain your answer.

**[3 Marks]**

.....

.....

.....



**1.3** Which of the three positions in the bungee jumper diagram corresponds to position **B** on the graphs? Explain your answer.

**[2 Marks]**

.....

.....

.....

**1.4** Explain why the jumper's kinetic energy store reaches a maximum and then decreases. Use the graphs to help you.

**[3 Marks]**

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.....



## FEEDBACK SHEET

<b>Overall Mark:</b>	<b>/29</b>	<b>GRADE ACHIEVED:</b>	
<b>Section A :</b>	<b>/6</b>	<b>9</b> <input type="checkbox"/>	<b>5</b> <input type="checkbox"/>
<b>Section B :</b>	<b>/14</b>	<b>8</b> <input type="checkbox"/>	<b>4</b> <input type="checkbox"/>
<b>Section C :</b>	<b>/9</b>	<b>7</b> <input type="checkbox"/>	<b>3</b> <input type="checkbox"/>
		<b>6</b> <input type="checkbox"/>	<b>U</b> <input type="checkbox"/>

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding
<b>Strengths:</b>	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills <b>Others</b> (Topic Specific)		<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving	
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|--|--|

### Student response



## GCSE Physics Equation Sheet

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



### 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 Science Specification.

