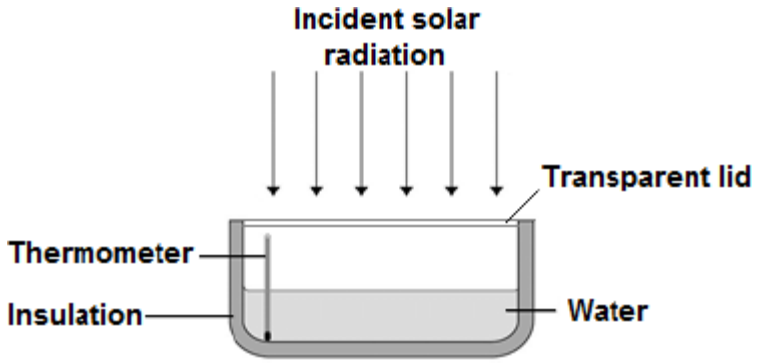
**Name of the Student**:_____
**Max. Marks : 22 Marks** **Time : 22 Minutes**

## Q1.

A student investigated how much energy from the Sun was incident on the Earth's surface at her location.

She put an insulated pan of water in direct sunlight and measured the time it took for the temperature of the water to increase by 0.6 °C.

The apparatus she used is shown in the figure below.




(a) Choose the most appropriate resolution for the thermometer used by the student.

Tick **one** box.

0.1 °C ☐

0.5 °C ☐

1.0 °C ☐

**(1)**

(b) The energy transferred to the water was 1050 J.

The time taken for the water temperature to increase by 0.6 °C was 5 minutes.

The specific heat capacity of water is 4200 J / kg °C.

Write down the equation which links energy transferred, power and time.

_____

**(1)**

(c) Calculate the mean power supplied by the Sun to the water in the pan.

_____

_____

_____

Average power = _____ W

**(2)**

(d) Calculate the mass of water the student used in her investigation.

Use the correct equation from the Physics Equation Sheet.

_____

_____

_____

Mass = _____ kg

**(3)**

(e) The student's results can only be used as an estimate of the mean power at her location.

Give **one** reason why.

_____

_____

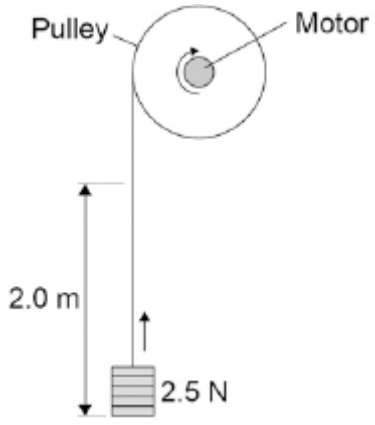
**(1)**

**(Total 8 marks)**

## Q2.

A student investigated the efficiency of a motor using the equipment in **Figure 1**.

**Figure 1**




He used the motor to lift a weight of 2.5 N a height of 2.0 m.

He measured the speed at which the weight was lifted and calculated the efficiency of the energy transfer.

He repeated the experiment to gain two sets of data.

(a) Give **one** variable that the student controlled in his investigation.

_____

**(1)**

(b) Give **two** reasons for taking repeat readings in an investigation.

1. _____

_____

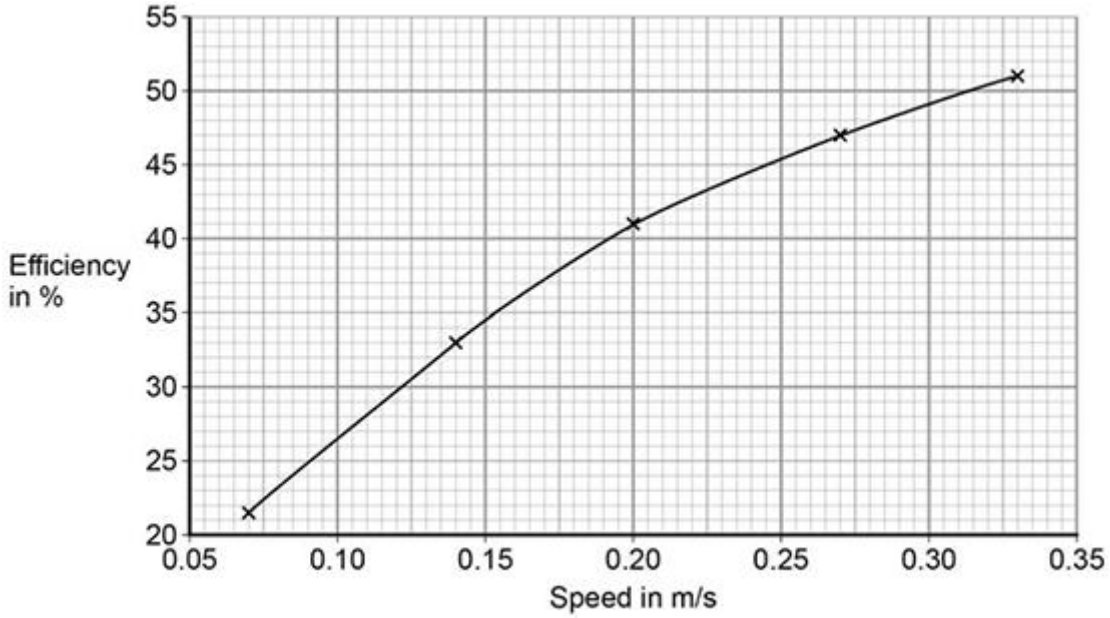
2. _____

_____

**(2)**

(c) **Figure 2** shows a graph of the student's results.

**Figure 2**




Give **two** conclusions that could be made from the data in **Figure 2**.

_____

_____

_____

_____

**(2)**

(d) Give the main way that the motor is likely to waste energy.

_____

_____

**(1)**

(e) When the total power input to the motor was 5 W the motor could not lift the 2.5 N weight.

State the efficiency of the motor.

Efficiency = _____ %

**(1)**

**(Total 7 marks)**

## Q3.

A small community of people live in an area in the mountains.
The houses are not connected to the National Grid.

The people plan to buy an electricity generating system that uses either the wind or the flowing water in a nearby river.

**Figure 1** shows where these people live.

**Figure 1**

© Brian Lawrence/Getty Images

(a) It would not be economical to connect the houses to the National Grid.
Give **one** reason why.

_____

_____

_____

_____

**(1)**

(b) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Information about the two electricity generation systems is given in **Figure 2**.

**Figure 2**

| |
|---|
| The wind turbine costs £50 000 to buy and install. |
| The hydroelectric generator costs £20 000 to buy and install. |
| The average power output from the wind turbine is 10 kW. |
| The hydroelectric generator will produce a constant power output of 8 kW. |

Compare the advantages and disadvantages of the two methods of generating electricity.

Use your knowledge of energy sources as well as information from **Figure 2**.

**(6)**

**(Total 7 marks)**