

Name of the Student: _____

Max. Marks : 19 Marks

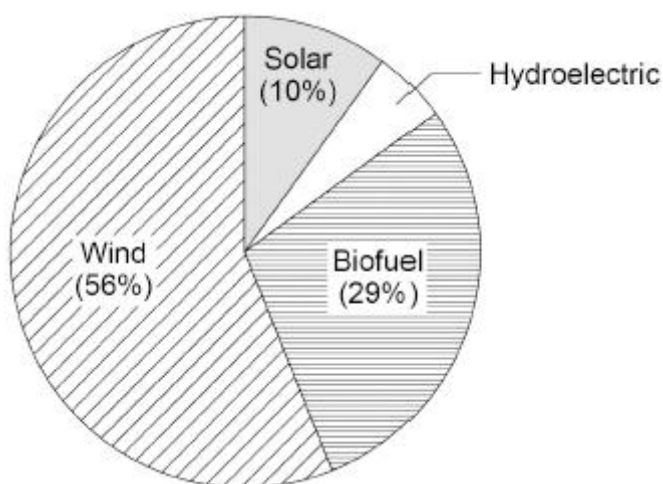
Time :19 Minutes

Q1.

The UK uses renewable energy resources to generate some of its electricity.

Figure 1 shows the proportion of electricity generated by different renewable energy resources in the UK in 2020.

Figure 1



- (a) Calculate the percentage of electricity generated using hydroelectric power.

Percentage = _____ %

(2)

A remote village in the UK uses a hydroelectric generator to provide electricity.

- (b) The mass of water that passes through the hydroelectric generator each day is 2 500 000 kg.

The change in vertical height of the water is 15.0 m.

gravitational field strength = 9.8 N/kg

Calculate the decrease in gravitational potential energy of the water.

Use the equation:

$$\text{gravitational potential energy} = \text{mass} \times \text{gravitational field strength} \times \text{height}$$

Decrease in gravitational potential energy = _____ J (2)

Use the Physics Equations Sheet to answer parts (c) and (d).

- (c) Write down the equation which links energy (E), power (P) and time (t).

(1)

- (d) The hydroelectric generator transfers electrical power of 3000 W to the village.

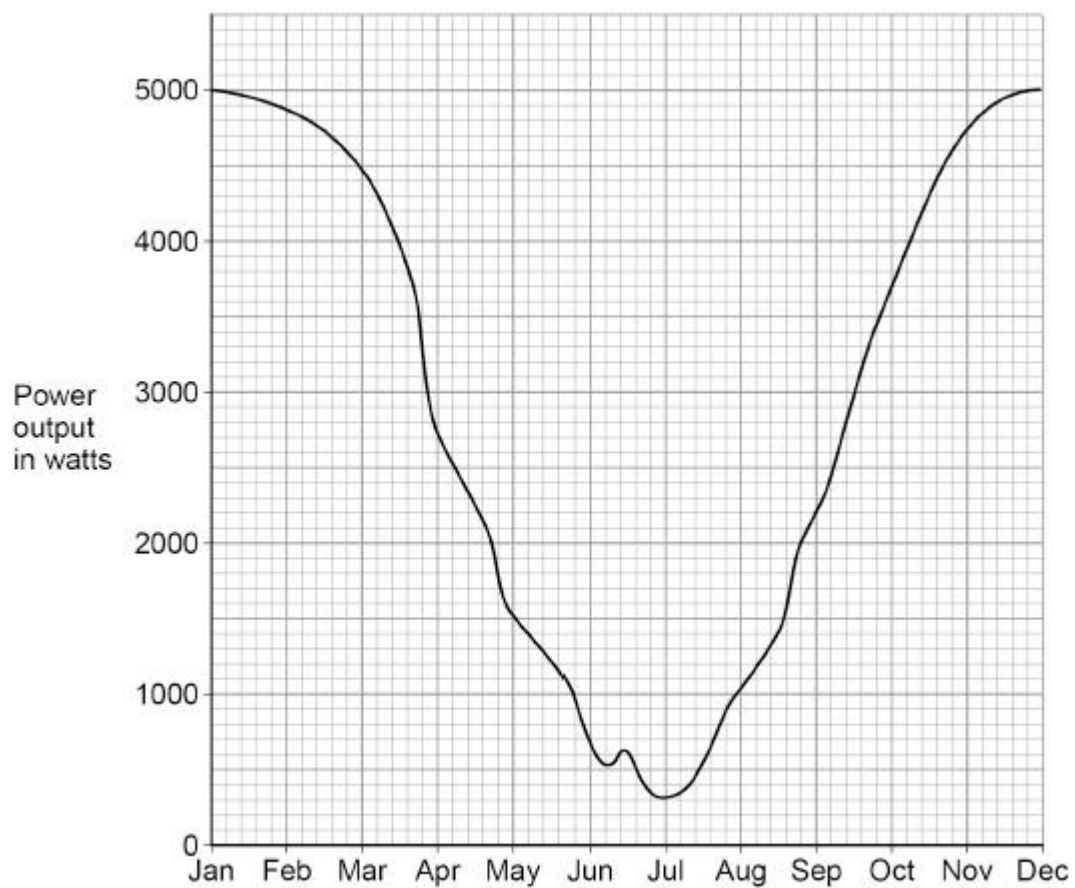
Calculate the energy transferred to the village in 60 minutes.

Energy transferred = _____ J (3)

- (e) The hydroelectric generator is turned by falling river water.

Figure 2 shows how the power output of the hydroelectric generator varied during one year.

Figure 2



Explain **one** reason why the power output varied.

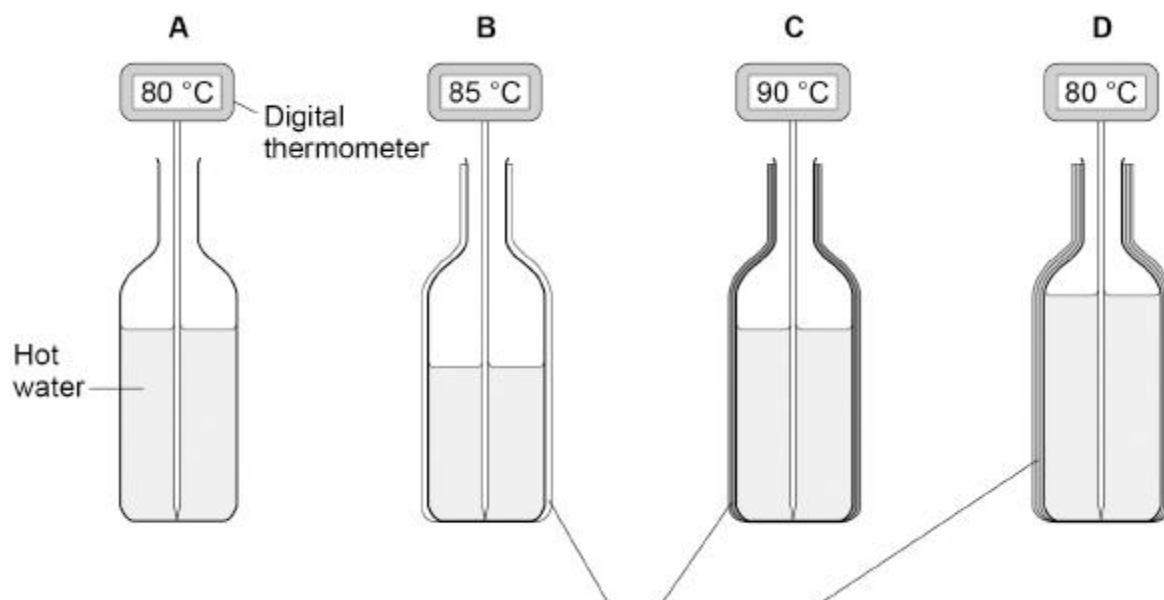
(2)
(Total 10 marks)

Q2.

A student investigated how different insulating materials affect the energy transfer from bottles of very hot water.

Figure 1 shows some of the equipment used.

Figure 1



- (a) To prevent spillages the student used a funnel to pour very hot water into each bottle.

Why did the student use the funnel?

Tick (✓) **one** box.

Preventing spillages was a control variable.

☐

To make the investigation valid.

☐

Using the funnel was a safety precaution.

☐

(1)

- (b) Why did the student **not** use insulation for bottle **A**?

Tick (✓) **one** box.

Bottle **A** was the control.

☐

Bottle **A** was the fair test.

☐

Bottle **A** was the independent variable.

☐

(1)

The student recorded how much the temperature of the water in each bottle changed in five minutes.

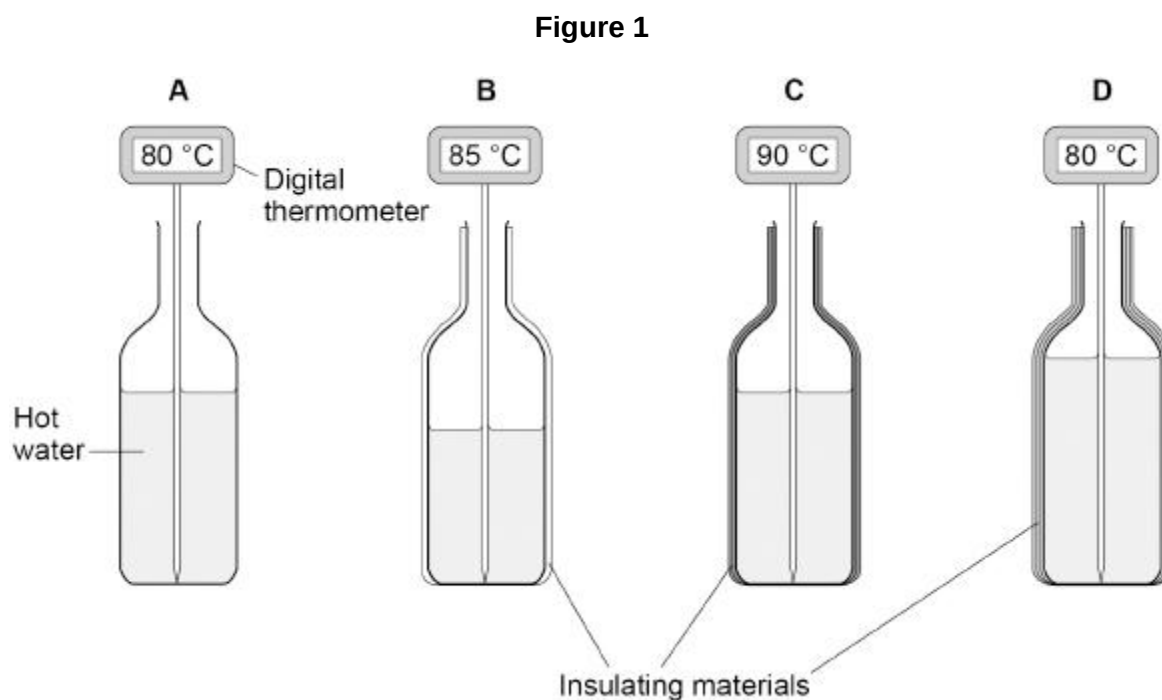
- (c) What equipment could the student use to measure time?

(1)

(d) The table below shows the results.

Bottle	Insulation	Start temperature in °C	Final temperature in °C	Temperature change in °C
A	None	80	60	20
B	1 layer of paper	85	70	15
C	2 layers of card	90	75	15
D	3 layers of bubble wrap	80	70	10

Figure 1 is repeated below.



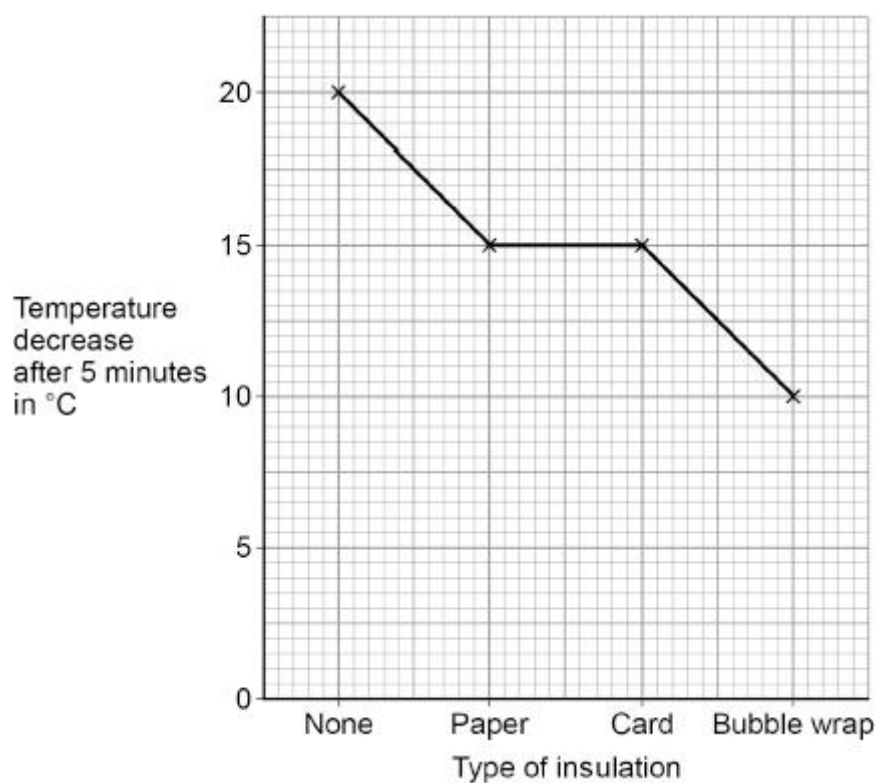
The student could **not** make a valid conclusion from the results about how different insulating materials affect the energy transfer.

Explain **two** ways that the student could improve the investigation to be able to make a valid conclusion.

Use **Figure 1** and the table above.

(e) **Figure 2** shows the graph plotted by the student.

Figure 2



The student should **not** have plotted a line graph.

What type of graph should the student have plotted?

Give a reason for your answer.

Type of graph _____

Reason _____

(2)
(Total 9 marks)