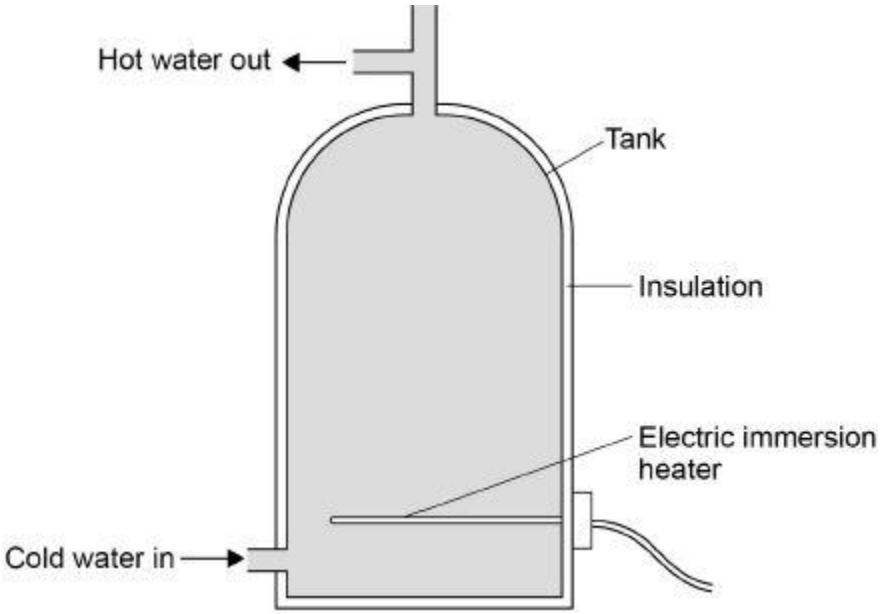
Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

Figure 1 shows a hot water tank made of copper.

Figure 1



(a) Copper has a higher thermal conductivity than most metals.

How does the rate of energy transfer through copper compare with the rate of energy transfer through most metals?

Tick **one** box.

Higher ☐

Lower ☐

The same ☐

(1)

(b) The tank is insulated. When the water is hot, the immersion heater switches off.

Complete the sentences.

Compared to a tank with no insulation, the rate of energy transfer from the

water in an insulated tank is _____ .

This means that the water in the insulated tank stays _____

for longer.

(2)

Figure 2 shows how temperature varies with time for water in a tank heated with an immersion heater.

Figure 3 shows how temperature varies with time for water in a tank heated with a solar panel.

Figure 2

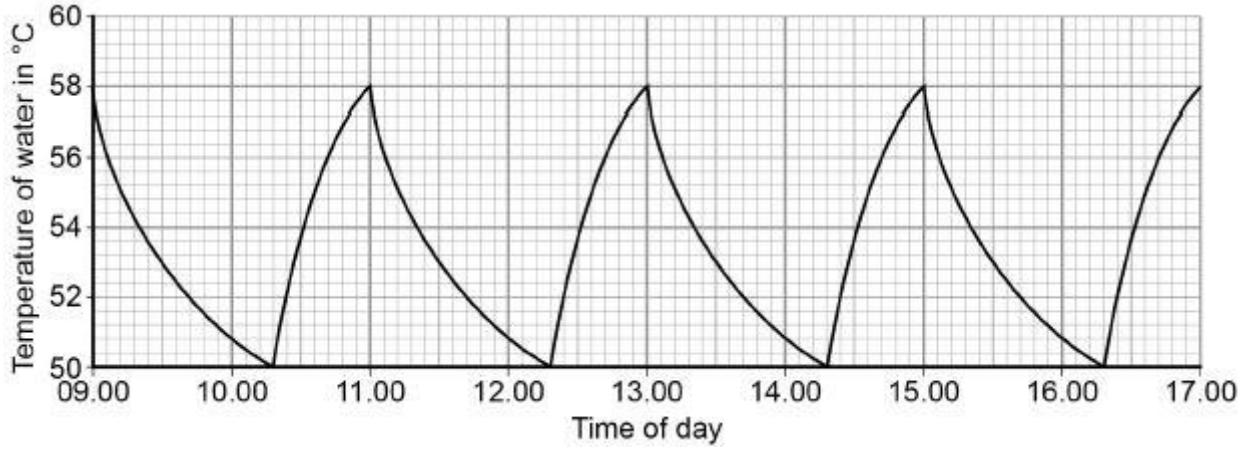
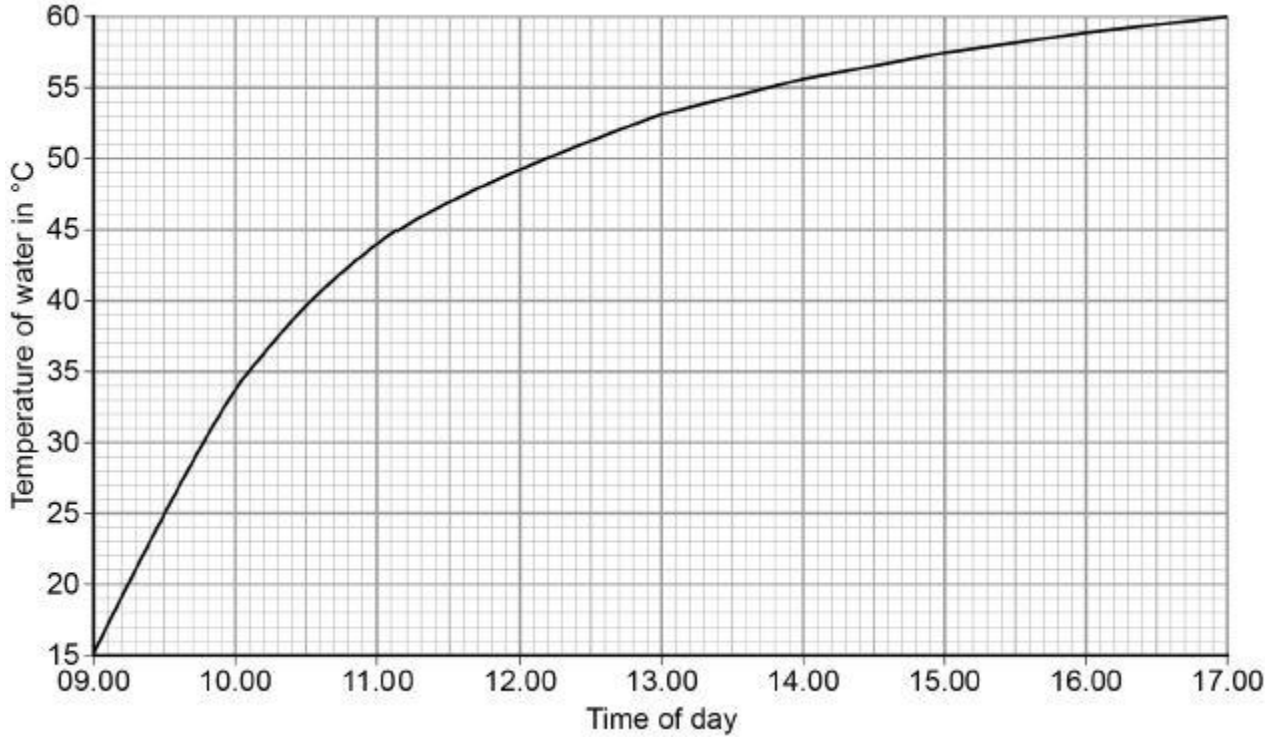


Figure 3



(c) Give **one** advantage and **one** disadvantage of heating the water using solar panels rather than an immersion heater.

Use only information from **Figure 2** and **Figure 3**.

Advantage of solar panels _____

_____

_____

Disadvantage of solar panels _____

_____

_____

(2)

(d) During one morning, a total of 4 070 000 J of energy is transferred from the electric immersion heater.

4 030 000 J of energy are transferred to the water.

Calculate the proportion of the total energy transferred to the water.

_____

_____

_____

_____

Proportion of total energy = _____

(2)

(e) Write down the equation that links energy transferred, power and time.

_____

(1)

(f) The power output of the immersion heater is 5000 W.

Calculate the time taken for the immersion heater to transfer 4 070 000 J of energy.

Give the unit.

_____

_____

_____

_____

Time = _____ Unit _____

(4)

(Total 12 marks)

Q2.

Energy resources can be renewable or non-renewable.

(a) Coal is a non-renewable energy resource.

Name **two** other non-renewable energy resources.

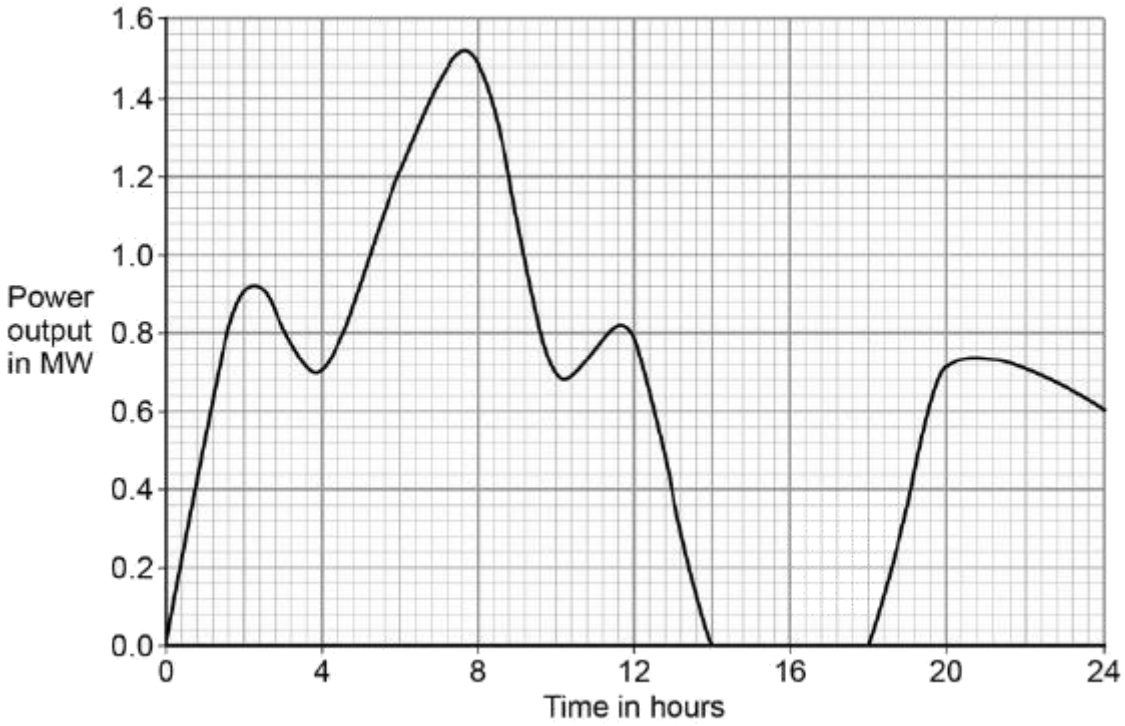
1. _____

2. _____

(2)

(b) Wind turbines are used to generate electricity.

The graph below shows how the power output of a wind turbine changes over one day.



A wind turbine does not generate electricity constantly.

For how many hours did the wind turbine generate no electricity?

_____

Time = _____ hours

(1)

(c) Electrical power is transferred from power stations to the National Grid.

What is the National Grid?

Tick **one** box.

a system of cables and pylons ☐

a system of cables and transformers ☐

a system of cables, transformers and power stations ☐

(1)

(d) An island has a large number of wind turbines and a coal-fired power station.

The island needs to use the electricity generated by the coal-fired power station at certain times.

Choose **one** reason why.

Tick **one** box.

Wind is a renewable energy resource. ☐

Wind turbine power output is constant. ☐

The power output of wind turbines is unpredictable. ☐

The fuel cost for wind turbines is very high. ☐

(1)

(e) A wind turbine has an average power output of 0.60 MW.

A coal-fired power station has a continuous power output of 1500 MW.

Calculate how many wind turbines would be needed to generate the same power output as one coal-fired power station.

_____

_____

Number of wind turbines = _____

(2)

(f) It is important that scientists develop new energy resources.

Choose **one** reason why.

Tick **one** box.

All energy resources are running out. ☐

All energy resources are used to generate electricity. ☐

Most energy resources have negative environmental effects. ☐

(1)

(Total 8 marks)