

Name of the Student: _____

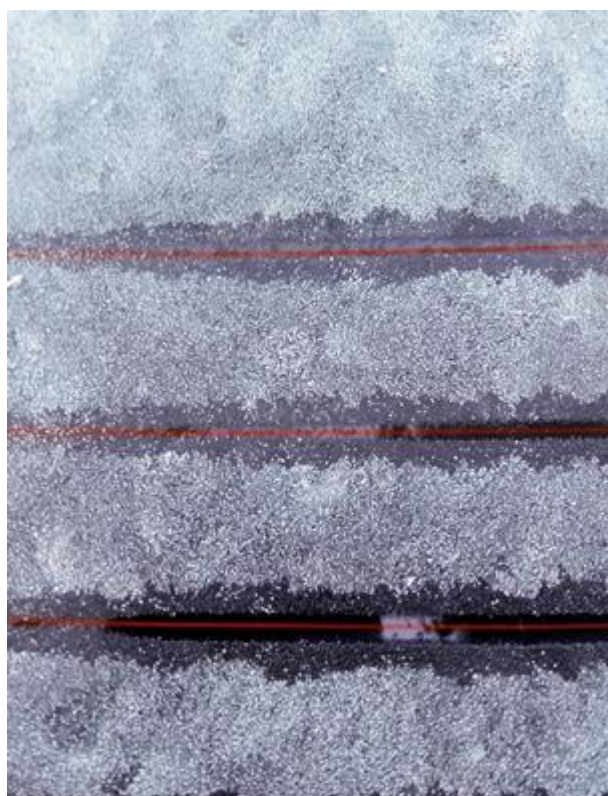
Max. Marks : 21 Marks

Time : 21 Minutes

Q1.

Figure 1 shows solid ice on a car's rear window.

Figure 1

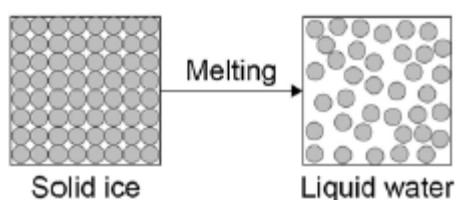


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The glass window contains an electrical heating element.

- (a) Use the particle model in **Figure 2** to describe how the heating element causes the arrangement of the ice particles to change as the ice melts.

Figure 2



You should include a description of how the particles are arranged in the solid ice and in the

water.

(6)

- (b) A car manufacturer tests different heating elements by measuring how long it takes ice to melt.

During the test some variables must be controlled.

Identify **two** control variables in the car manufacturer's test.

Tick **two** boxes.

The colour of the car

☐

The current in the heating element

☐

The mass of ice

☐

The size of the car

☐

The time taken for the ice to melt

☐

(2)

- (c) Some of the energy supplied by the heater causes the ice to melt without the temperature of the ice increasing.

What is the name given to this energy supplied by the heater?

Tick **one** box.

Latent heat of freezing

☐

Latent heat of fusion

☐

Latent heat of vaporisation



(1)

- (d) When the heater is supplied with 120 J of energy each second, the internal energy of the ice increases by 45 J each second.

Use the following equation to calculate the efficiency of the heater.

$$\text{Efficiency} = \frac{\text{Output energy transfer}}{\text{input energy transfer}}$$

Give your answer to two decimal places.

Efficiency = _____

(2)

(Total 11 marks)

Q2.

Different energy sources are used to generate electricity.

- (a) Use words from the box to match the correct energy source to each of the descriptions given in the table.

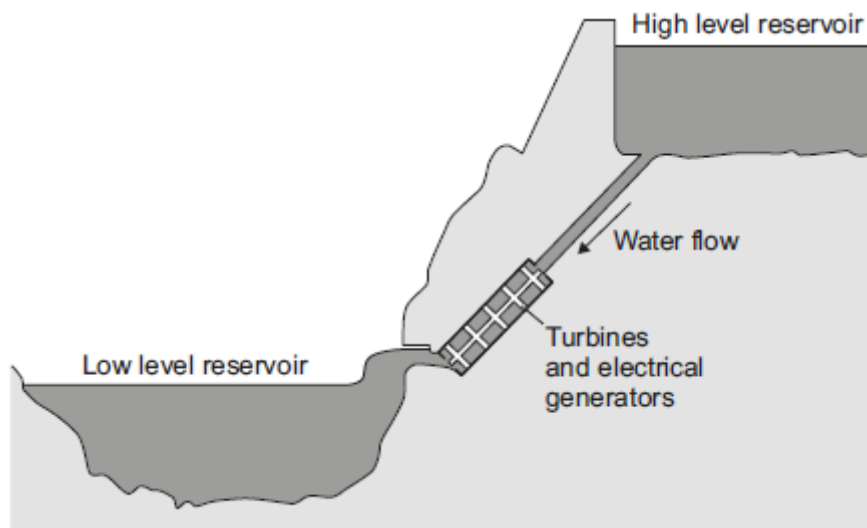
biofuel	coal	geothermal	nuclear	waves
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Description	Energy source
Energy from the Earth's core is used to heat water.	
Fission of uranium nuclei is used to heat water.	
Gases from rotting plant material are burned to heat water.	

(3)

- (b) Energy can be stored in a pumped storage power station.

The figure shows a pumped storage power station.



When electricity is needed, the water in the high level reservoir is allowed to flow to the low level reservoir. The flowing water generates electricity.

Use the correct answer from the box to complete each sentence.

electrical	gravitational potential	kinetic	nuclear	sound
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The water in the high level reservoir stores _____ energy.

The flowing water has _____ energy.

The water turns the turbine which is connected to the generator.

The generator produces some _____, this is wasted energy.

(3)

(c) The total power input to a pumped storage power station is 600 MW.

The useful power output is 540 MW.

(i) Calculate the efficiency of this pumped storage power station.

Efficiency = _____

(2)

(ii) Calculate how much power is wasted by the pumped storage power station.

Power = _____ MW

(1)

(iii) How is the temperature of the surroundings affected by the energy wasted by the pumped storage power station?
