Practice Question Set For GCSE
**Subject : Physics**
**Paper-1 Topic: Particle Model Of Matter (Low Demand)**

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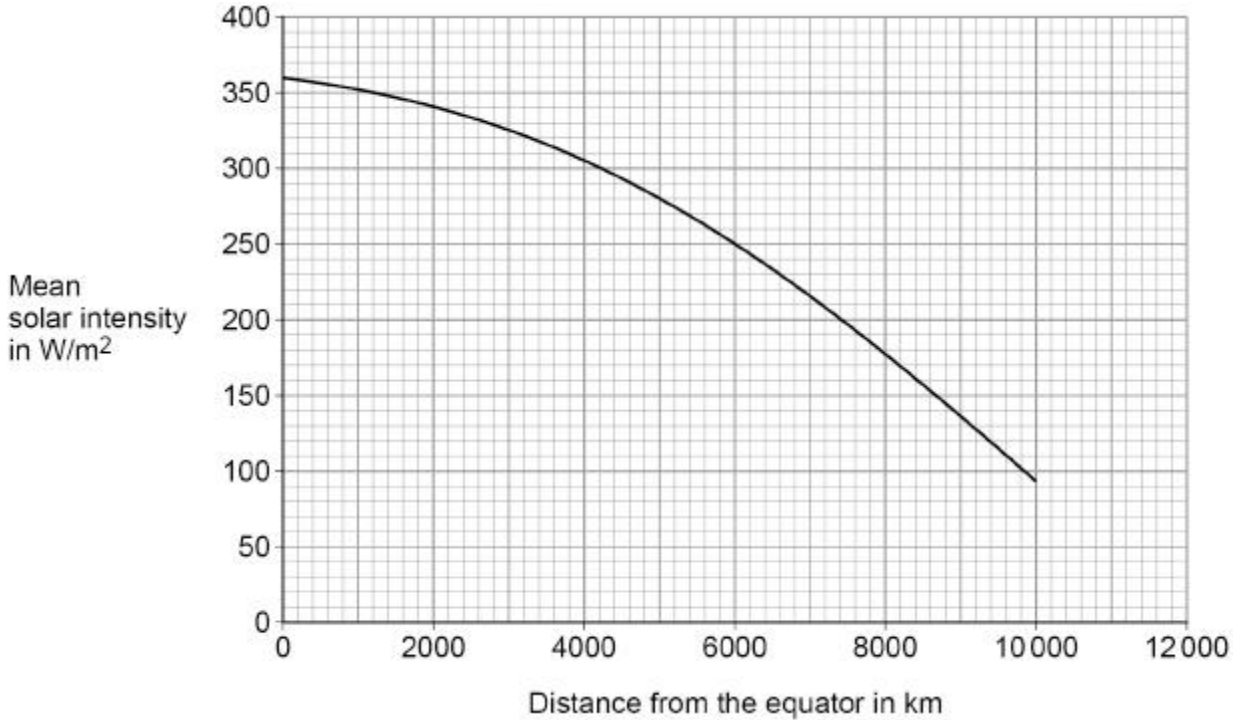
**Name of the Student**:_____
**Max. Marks : 25 Marks** **Time : 25 Minutes**

## Q1.

Solar intensity is a measure of the radiation received from the Sun at the surface of the Earth.

**Figure 1** shows how the mean solar intensity changes with the distance from the equator.

**Figure 1**




(a) The city of Athens is 4200 km from the equator.

What is the mean solar intensity in Athens?

Mean solar intensity = _____ $W/m^2$

**(1)**

Solar water heaters use radiation from the Sun to heat water.

The heated water is stored in a water tank.

**Figure 2** shows a solar water heater on the roof of a building.

**Figure 2**

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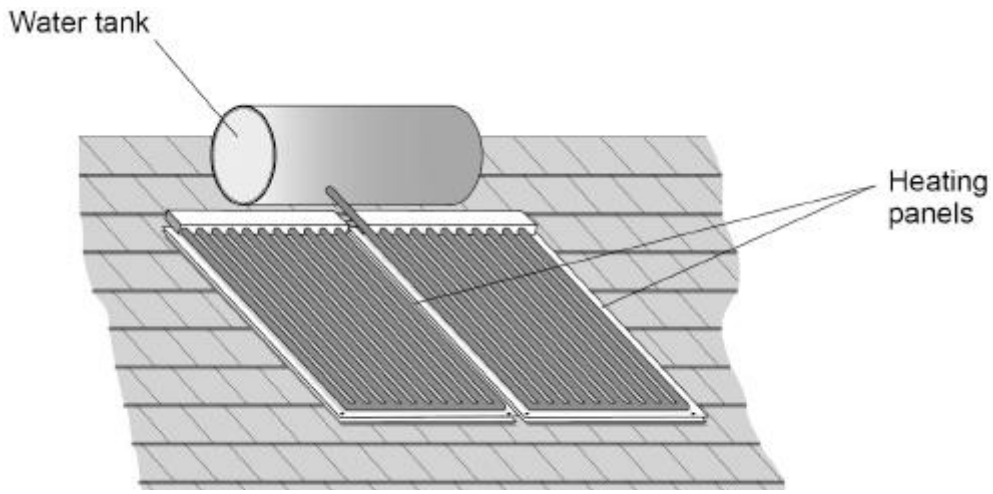


(b) Cities closer to the equator have many more buildings with solar water heaters than cities further away from the equator.

Suggest why.

_____

_____

**(1)**

(c) The use of solar water heaters may reduce the need to burn fossil fuels.

Complete the sentence.

Choose the answer from the box.

| | | |
|---|---|---|
| **carbon dioxide** | **nitrogen** | **oxygen** |

Burning fossil fuels contributes to global warming because there is an increase in the amount of _____ in the atmosphere.

**(1)**

(d) The efficiency of the solar water heater is 0.61

Calculate the useful power output when the total power input to the solar water heater is 1100 W.

Use the equation:

useful power output = efficiency × total power input

_____

_____

_____

Useful power output = _____ W

**(2)**

(e) Different solar water heaters have different sized heating panels.

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Suggest how the size of the heating panels affects the input power to a solar water heater.

_____

_____

**(1)**

(f) Water has a high specific heat capacity.

What is meant by the specific heat capacity of water?

Tick (✓) **one** box.

| | |
|---|---|
| The energy required to change the state of 1 kg of water from liquid to gas. | ☐ |
| The energy required to increase the temperature of 1 kg of water by 1 °C. | ☐ |
| The power required to change the state of 1 kg of water from liquid to gas. | ☐ |
| The power required to increase the temperature of 1 kg of water by 1 °C. | ☐ |

**(1)**

(g) The water tank contained 80 kg of water.

The change in thermal energy of the water was 8 400 000 J.

specific heat capacity of water = 4200 J/kg °C

Calculate the temperature change of the water.

Use the Physics Equations Sheet.

_____

_____

_____

_____

_____

Temperature change = _____ °C

**(3)**

(h) The water tank is thermally insulated.

How does thermal insulation affect the rate of energy transfer from the water in the tank?

Tick (✓) **one** box.

| | |
|---|---|
| Thermal insulation decreases the rate of energy transfer. | ☐ |

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Thermal insulation does not change the rate of energy transfer. ☐

Thermal insulation increases the rate of energy transfer. ☐

**(1)**

(i) The table below shows information about different materials.

| **Material** | **Thermal conductivity in arbitrary units** |
|---|---|
| A | 3 |
| B | 2 |
| C | 8 |
| D | 4 |

Which material in the table above is the best thermal insulator?

Tick (✓) **one** box.

**A** ☐ **B** ☐ **C** ☐ **D** ☐

**(1)**

**(Total 12 marks)**

## Q2.

A scientist had a balloon which was filled with air.

(a) Which statement describes how air particles move?

Tick (✓) **one** box.

At random speeds in random directions ☐

At random speeds in the same direction ☐

At the same speed in random directions ☐

At the same speed in the same direction ☐

**(1)**

The temperature of the air was 19 °C

The scientist dipped the balloon into liquid nitrogen.

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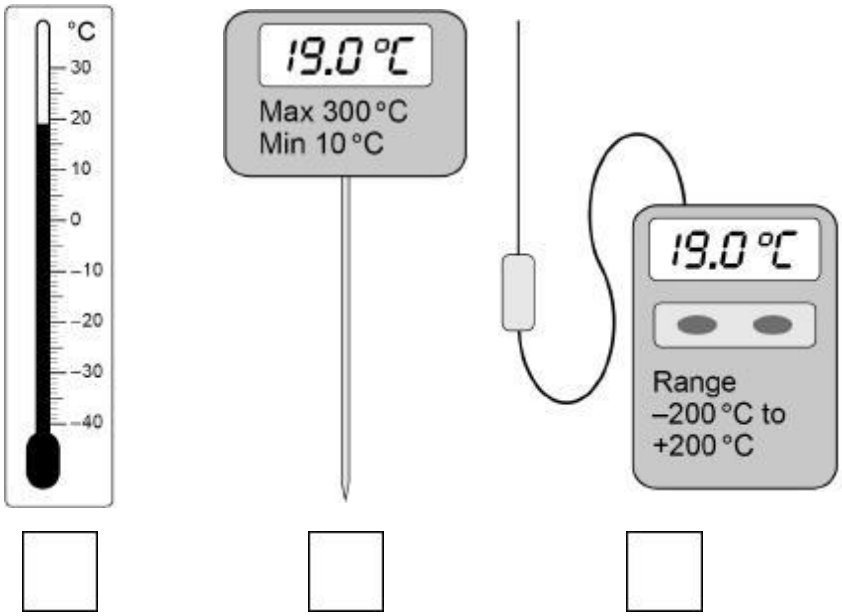
The temperature of the liquid nitrogen was −196 °C

(b) Which thermometer could be used to measure the temperature of the liquid nitrogen?

Tick (✓) **one** box.




☐ ☐ ☐

**(1)**

(c) The scientist wore special insulating gloves when putting the balloon into the liquid nitrogen.

Suggest why.

_____

_____

**(1)**

(d) When the balloon was put into liquid nitrogen the temperature of the air in the balloon decreased.

Complete the sentences.

Choose answers from the box.

Each answer may be used once, more than once or not at all.

| **decreased** | **stayed the same** | **increased** |
|---|---|---|

As the air in the balloon cooled down, the speed of the particles

_____. This is because the kinetic energy of the

particles _____.

**(2)**

(e) The air in the balloon had a mass of 0.00320 kg

The temperature of the air in the balloon decreased by 215 °C

The change in thermal energy of the air in the balloon was 860 J

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Calculate the specific heat capacity of the air in the balloon.

Use the Physics Equations Sheet.

_____

_____

_____

_____

_____

_____

Specific heat capacity = _____ J/kg°C

**(3)**

(f) The liquid nitrogen boiled.

What happens to the temperature of nitrogen as it boils?

Tick (✓) **one** box.

| | |
|---|---|
| Temperature decreases | ☐ |
| Temperature increases | ☐ |
| Temperature stays the same | ☐ |

**(1)**

The scientist recorded measurements to calculate the specific latent heat of vaporisation of nitrogen.

(g) What is meant by vaporisation?

Tick (✓) **one** box.

| | |
|---|---|
| A change of state from liquid to gas | ☐ |
| A change of state from solid to gas | ☐ |
| A change of state from solid to liquid | ☐ |

**(1)**

(h) The mass of nitrogen that vaporised was 0.0072 kg

1440 J of energy was transferred to the nitrogen as it vaporised.

Calculate the specific latent heat of vaporisation of nitrogen.

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Use the Physics Equations Sheet.

_____

_____

_____

_____

_____

_____

Specific latent heat of vaporisation = _____ J/kg

**(3)**

**(Total 13 marks)**

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