

**Q1.**

The photograph shows an electric heater used to warm garages.



When the heater is switched on, it quickly warms up and then stays at a constant temperature. Explain why the heater stays at a constant temperature.

(2)

(Total for Question = 2 marks)

**Q2.**

The International Space Station (ISS) has several solar panels called wings.



A wing is in direct sunlight.  
The ISS is not receiving energy from the wing.  
The temperature of the wing remains constant.

Explain why the temperature of the wing remains constant in these conditions.

(2)

(Total for Question = 2 marks)

**Q3.**

- (a) A wind generator is used as the source of energy for a remote farmhouse.



When the lamp is first switched on, it heats up.  
It then reaches a constant temperature.  
Explain why the temperature of the lamp remains constant.

(2)

(Total for Question = 2 marks)

**Q4.**

The Asteroid Belt is part of our Solar System.

Vesta is an asteroid in the Asteroid Belt.

Energy is transferred from the Sun to Vesta by radiation.

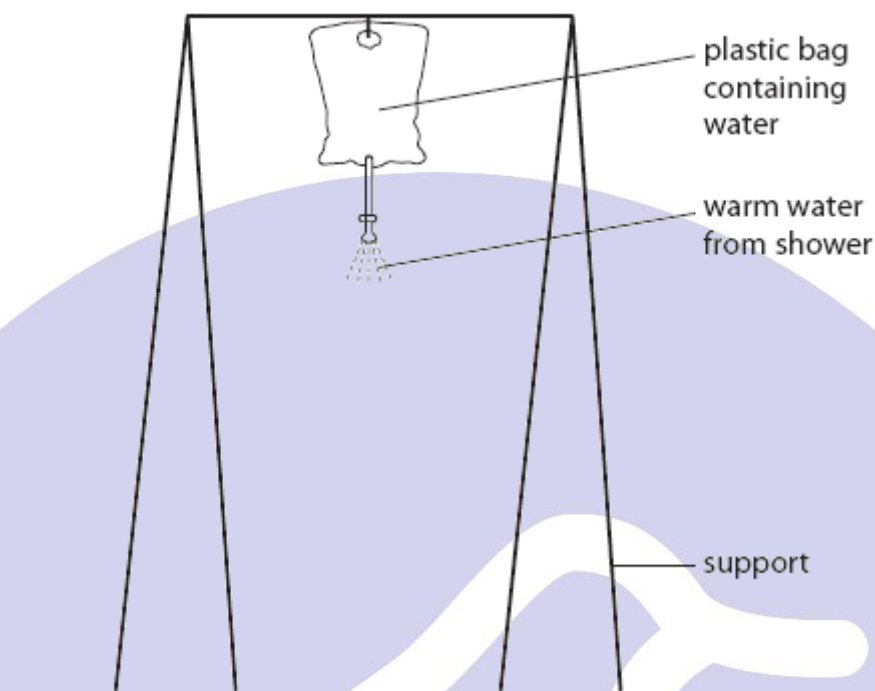
Explain why the temperature on Vesta does not continue to rise, even though it is absorbing energy from the Sun.

(3)

(Total for question = 3 marks)

**Q5.**

The following arrangement is used as a solar powered shower.



The bag is left out in the sunlight during the day.

(i) Explain what colour the bag should be to heat the water to the highest temperature.

(2)

(ii) On a sunny day the bag is filled with cold water.

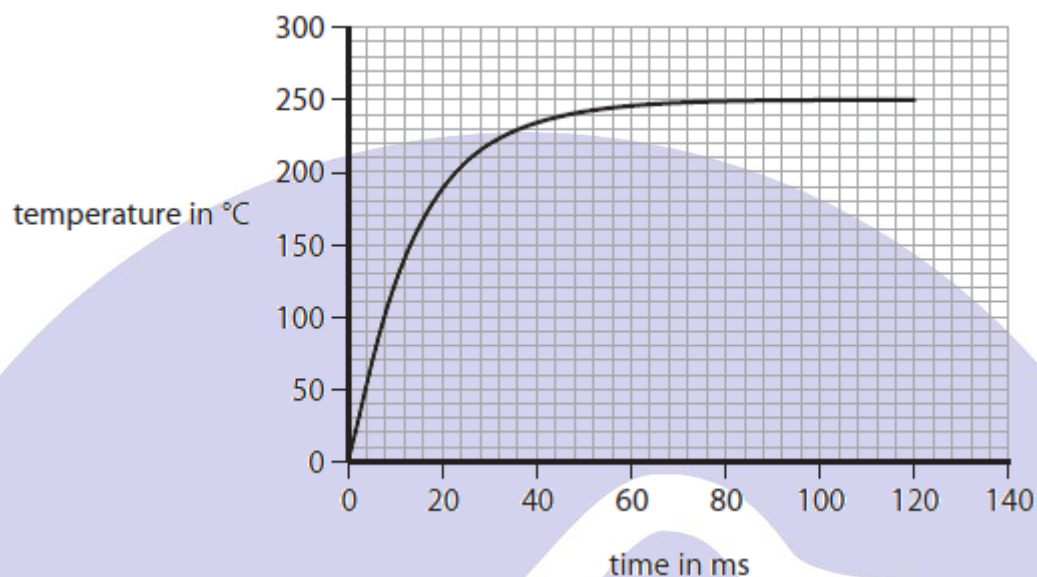
Explain why the temperature of the water increases and then stays constant.

(3)

(Total for Question = 5 marks)

**Q6.**

Figure 11 is a graph of temperature against time for a halogen lamp for the first 120 ms after it has been switched on.



**Figure 11**

(Part (i) is a type of question that could come up in any topic in Physics. It's testing skills instead of content knowledge.)

- (i) Calculate the gradient of the graph at a time of 30 ms.  
State the unit.

(4)

gradient = ..... unit .....

- (ii) Explain why the temperature of the lamp rises and then remains at a constant value.

(3)

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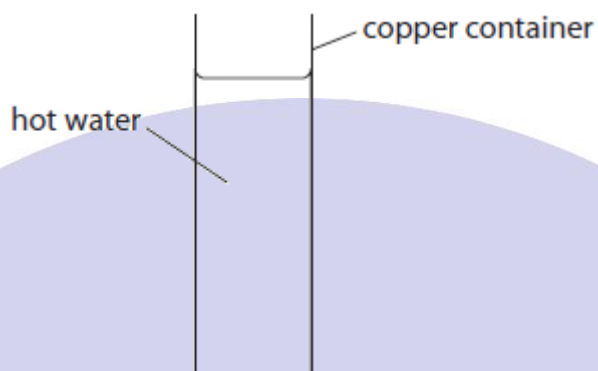
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**(Total for question = 7 marks)**

**Q7.**

A student investigates how different surfaces radiate energy as they cool.

Figure 9 shows some of the apparatus used in a part of the investigation.



**Figure 9**

Describe how the student could collect data to show how the rate of cooling of the container and water change with time.

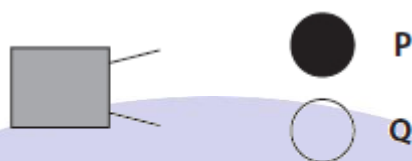
(2)

(Total for question = 2 marks)

**Q8.**

Figure 16 shows two iron spheres, **P** and **Q**, near to a radiant heater.

**P** is painted black and **Q** is painted white.



**Figure 16**

Each sphere is the same distance away from the heater.

The spheres have the same radius.

The heater is switched on and the spheres heat up.

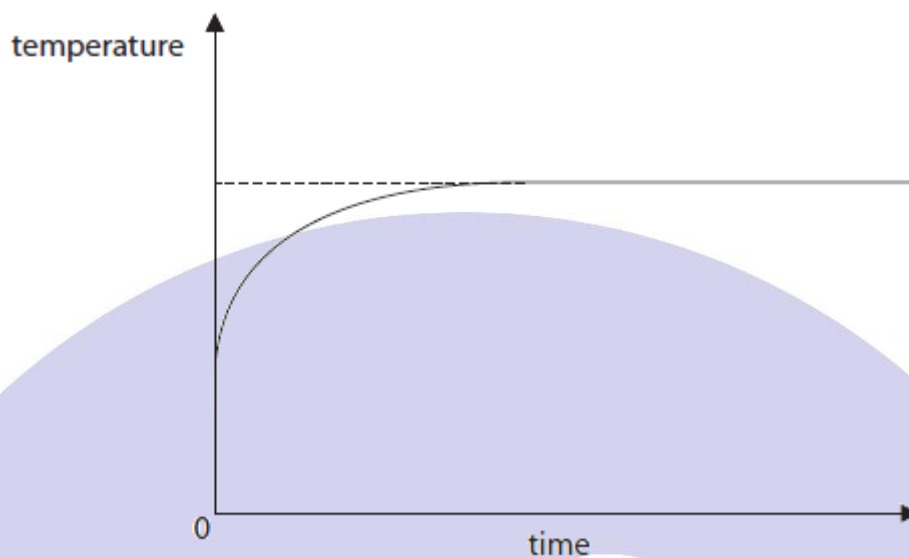
The temperature of each sphere is monitored.

(i) Explain why the temperature of sphere **P** increases at a faster rate than the temperature of sphere **Q**.

(2)

(ii) The heater remains switched on.

Figure 17 shows how the temperature of sphere **P** changes with time.



**Figure 17**

Explain why the temperature of **P** reaches a constant value, even though the heater remains switched on.

(4)

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**(Total for question = 6 marks)**



**Q9.**

\* Sulfates and black soot are particles formed by industrial processes.

Some of these particles are found in the atmosphere over the Arctic Ocean.

The sulfates stay in the atmosphere and reflect (scatter) sunlight.

The black soot falls onto the Arctic ice.

Discuss how a reduction in these industrial processes is likely to affect the temperature of the atmosphere.

(6)

(Total for question = 6 marks)