Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

All objects emit electromagnetic radiation.
The intensity and wavelength of the emitted radiation vary with the temperature of the object.
Figure 12 shows this variation for a filament lamp at two different temperatures.
The visible region of the electromagnetic spectrum is also shown.

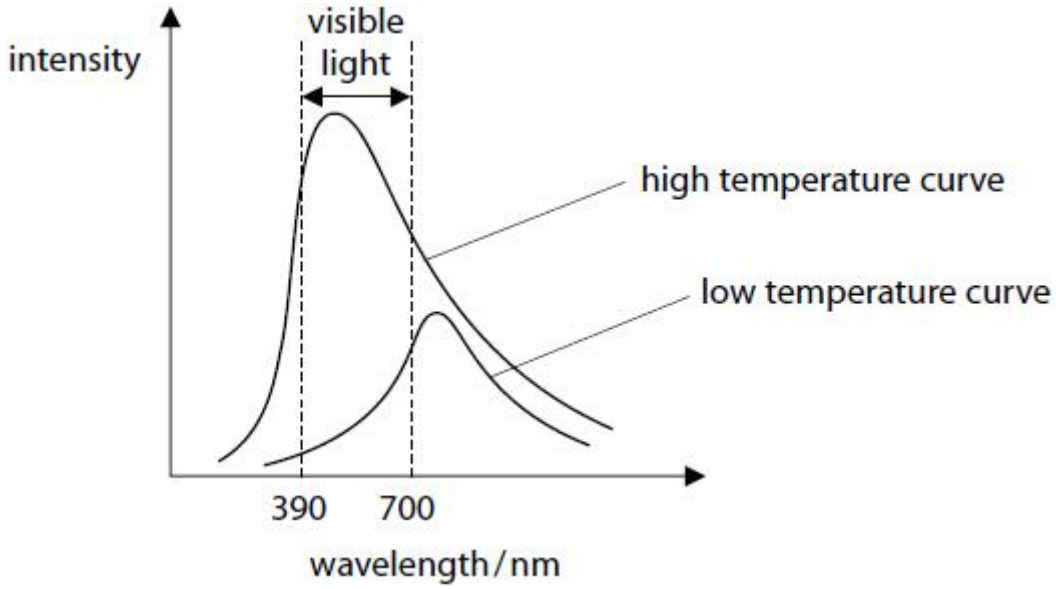


Figure 12

Explain why a filament lamp appears brighter and less red as its temperature increases.

(4)

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(Total for question = 4 marks)

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Q2.

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

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

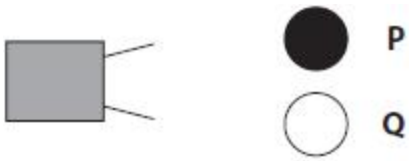


Figure 16

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)

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(ii) The heater remains switched on.

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

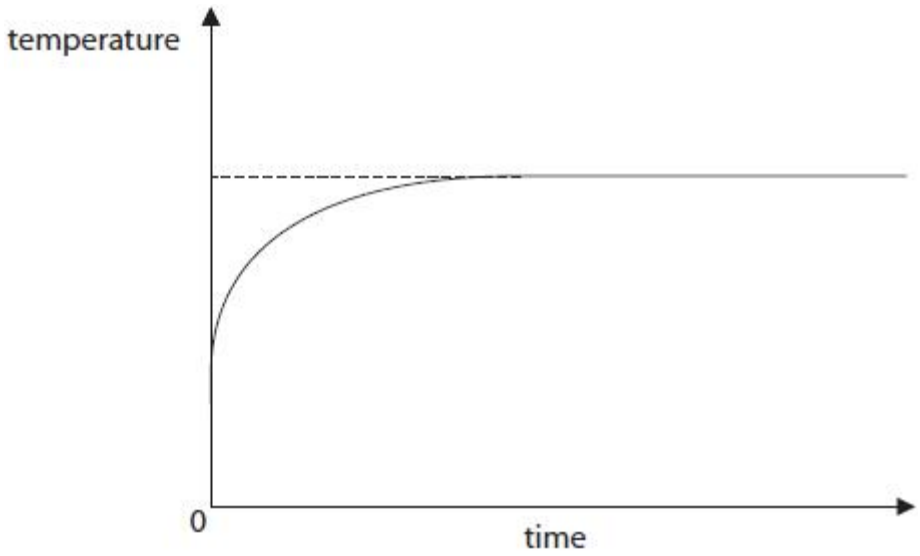


Figure 17

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)

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Q3.

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)

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(Total for question = 3 marks)

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Q4.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒

A student does an experiment to determine the critical angle for glass.

The student shines a ray of light into a semicircular glass block and measures the angles *i* and *r*, as shown in Figure 14.

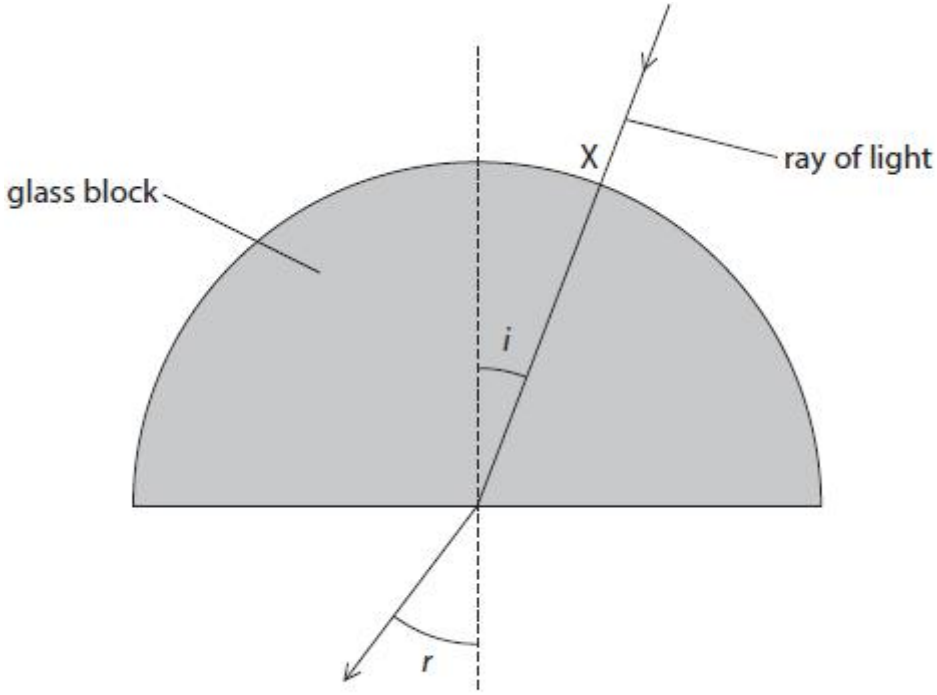


Figure 14

(i) The ray of light does not change direction when it enters the glass block at point **X.**

Which of these **explains** why the ray of light does not change direction when it enters the glass block at point **X.**

(1)

- ☒ **A** The ray enters along a normal to the edge of the block.
- ☒ **B** The ray enters at right angles to a normal to the edge of the block.
- ☒ **C** The ray speeds up as it enters the glass.
- ☒ **D** The ray slows down as it enters the glass.

(ii) The student repeats the procedure for different values of angle *i*.

Figure 15 is a graph of the student's results.

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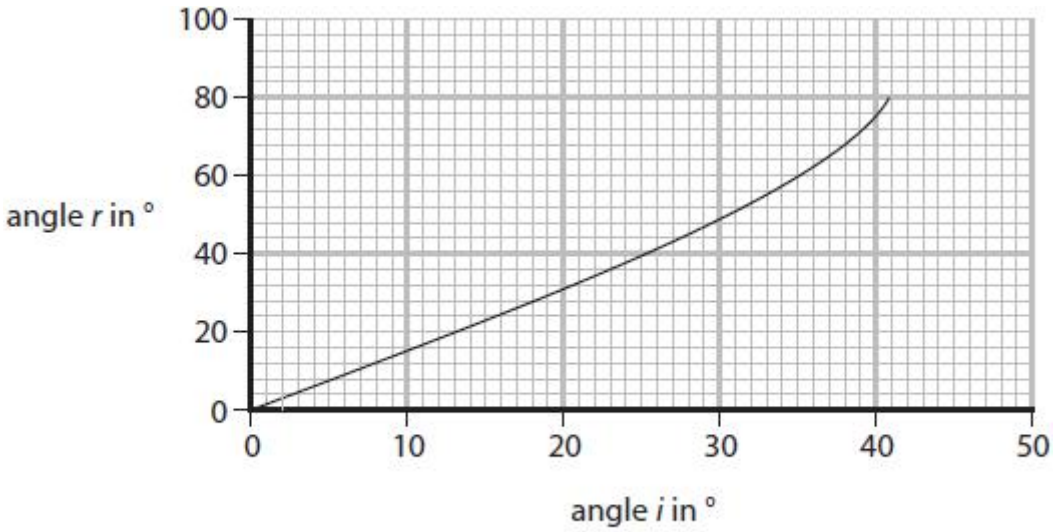


Figure 15

Describe how the student should use the graph in Figure 15 to determine the critical angle for glass.

(3)

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(Total for question = 4 marks)

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