

Eduqas Physics GCSE
Topic 6.5: Black body
radiation
Questions by topic

1.

(a) 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.

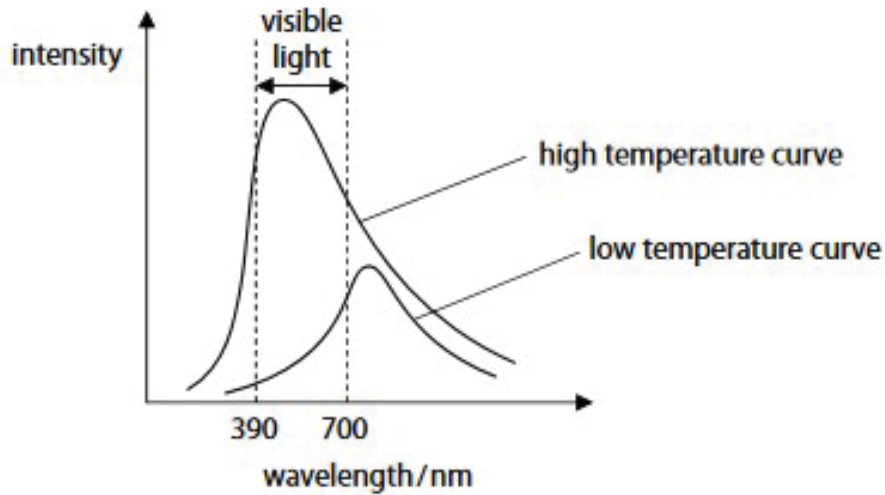


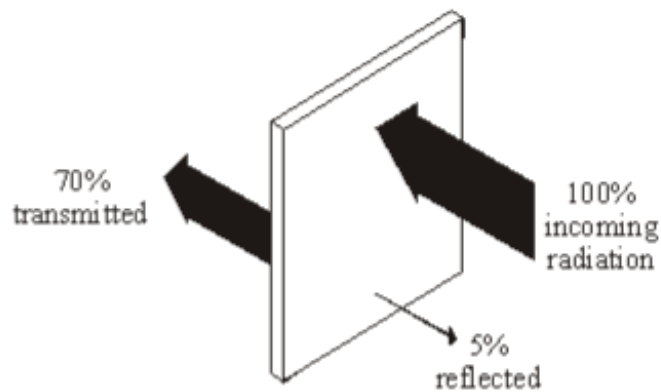
Figure 12

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

(4)

2.

(a) Infra red radiation can be reflected, absorbed and transmitted by glass.



(i) What percentage of infra red is absorbed by the glass?

.....

(1)

(ii) Complete the following sentence by drawing a ring around the correct word or phrase.

The absorbed infra red

increases
does not change
decreases

 the temperature of the glass.

(1)

(b) **Two** of the following statements are true. **One** of the statements is false.

Tick (✓) the boxes next to the **two** true statements.

All objects absorb infra red radiation.	<input type="checkbox"/>
Black surfaces are poor emitters of infra red radiation.	<input type="checkbox"/>
A hot object emits more infra red than a cooler object.	<input type="checkbox"/>

(c) The following statement is false.

Black surfaces are good reflectors of infra red radiation.

Change **one** word in this statement to make it true.

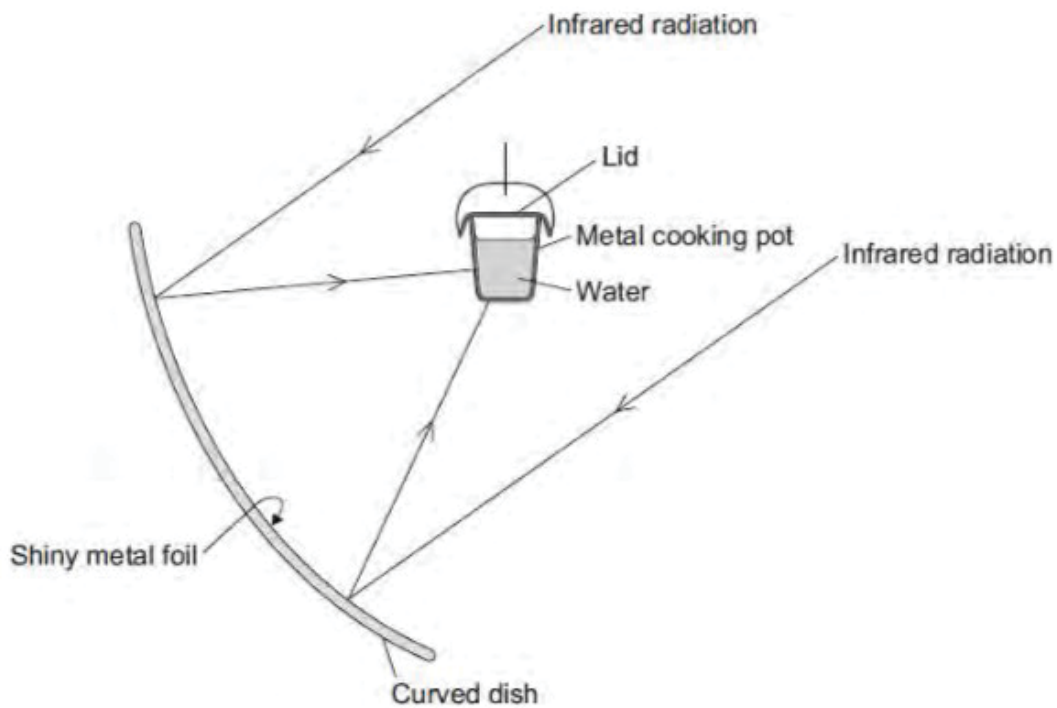
Write down your **new** statement.

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.....

(1)
(Total 4 marks)

3.

The diagram shows the design of a solar cooker. The cooker heats water using infrared radiation from the Sun.



(a) Why is the inside of the large curved dish covered with shiny metal foil?

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(1)

- (b) Which would be the best colour to paint the outside of the metal cooking pot?
 Draw a ring around the correct answer.

black

silver

white

Give a reason for your answer.

.....

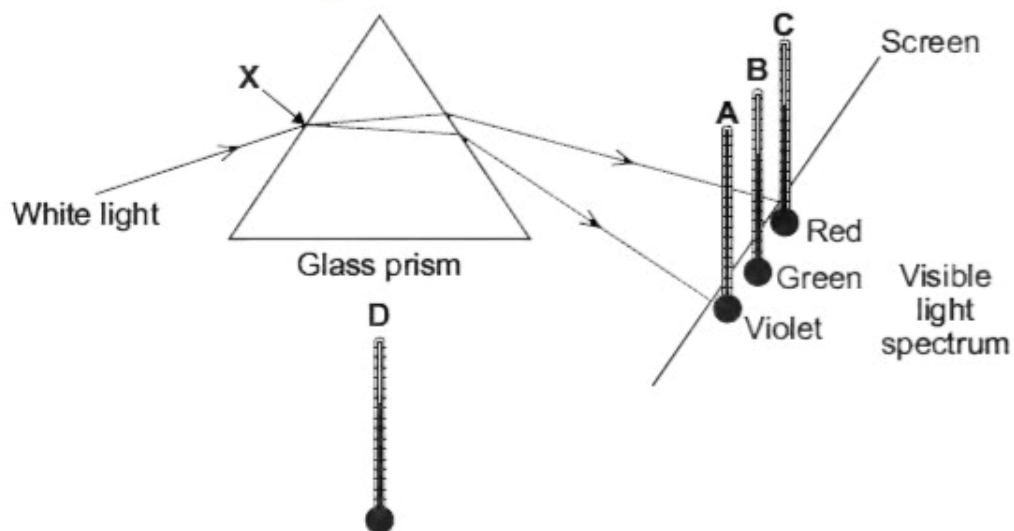
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(2)

4.

The diagram shows the apparatus that a student used to investigate the heating effect of different wavelengths of light.



- (a) (i) The student put thermometer **D** outside of the light spectrum.

Suggest why.

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(1)

- (ii) The table gives the position and reading of each thermometer 10 minutes after the investigation started.

Thermometer	Position of thermometer	Temperature in °C
A	in violet light	21
B	in green light	22
C	in red light	24
D	outside the spectrum	20

What should the student conclude from the data in the table?

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.....

(2)

- (b) A similar investigation completed in 1800 by the scientist Sir William Herschel led to the discovery of infrared radiation.

Suggest how the student could show that the spectrum produced by the glass prism has an infrared region.

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(2)

(c) A person emits infrared radiation at a frequency of 3.2×10^{13} Hz.

Calculate the wavelength of the infrared radiation that a person emits.

Take the speed of infrared radiation to be 3.0×10^8 m/s.

Show clearly how you work out your answer.

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Wavelength = m

(2)

(d) A thermal imaging camera detects infrared radiation. Electronic circuits inside the camera produce a visible image of the object emitting the infrared radiation.

At night, police officers use thermal imaging cameras to track criminals running away from crime scenes.

Thermal imaging cameras work better at night than during the day.

Explain why.

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(2)
(Total 9 marks)