

Transfer of Thermal Energy

Question Paper

Course	CIE IGCSE Physics
Section	2. Thermal Physics
Topic	Transfer of Thermal Energy
Difficulty	Easy

Time Allowed 50

Score /39

Percentage /100

Question 1a

A Bunsen burner heats a beaker of water, as shown in Fig. 4.1.

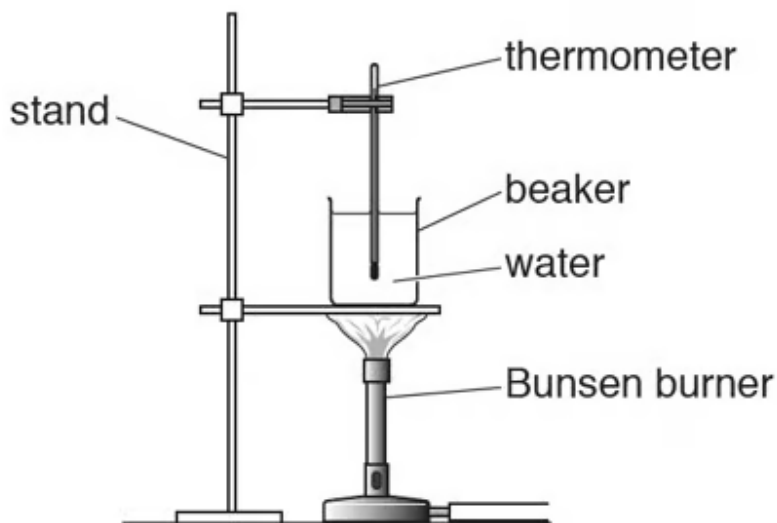


Fig. 4.1

- (i) Fig. 4.2 shows the thermometer used in Fig. 4.1.

State the temperature shown on the thermometer.

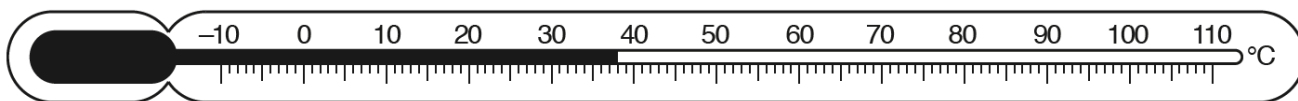


Fig. 4.2

temperature = °C [1]

- (ii) The thermometer shown in Fig. 4.2 uses a physical property that changes with temperature.

Indicate the measurable property that changes with temperature. Tick **one** box.

- ☐ expansion of glass
- ☐ expansion of liquid
- ☐ colour of liquid
- ☐ colour of glass

[1]
[2 marks]

Question 1b

Thermal energy (heat) transfers through the bottom of the beaker to the water.

State the name given to this process.

[1 mark]

Question 1c

Thermal energy transfers throughout the water in the beaker.

Describe and explain how this happens.

[4 marks]

Question 2a

Fig. 6.1 shows a hot liquid in a vacuum flask. The vacuum flask keeps the temperature of the liquid in the flask constant for a long time.

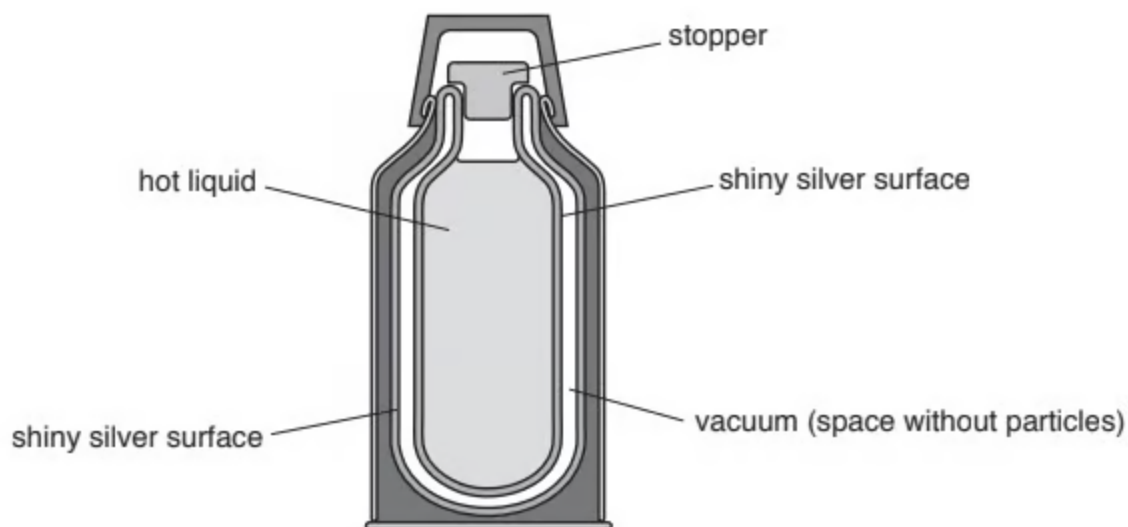


Fig. 6.1

Describe how each feature helps to keep the liquid hot for longer.

(i) shiny silver surface

[2]

(ii) the vacuum between the silvered surfaces

[3]

[5 marks]

Question 2b

- (i) Suggest a material for the stopper that will help to keep the liquid hot for longer.
- (ii) Give a reason for your answer.

[1]

[1]

[2 marks]**Question 3a**

Complete the sentences with words that describe the main process of energy transfer by heating in each case.

A man goes for a walk on a cold day. He touches a metal gate, which removes energy from his hands by He holds the sides of a cup containing a hot drink. His hands gain energy by
Some farm workers have lit a fire. The man warms his hands by the side of the fire. His hands gain energy by

[3 marks]**Question 3b****Extended**

Describe in terms of particles the transfer of energy from the thermal store of the man's hands through the metal of the gate.

[2 marks]

Question 3c

Fig. 5.1 shows a car on a sunny day in a hot country.

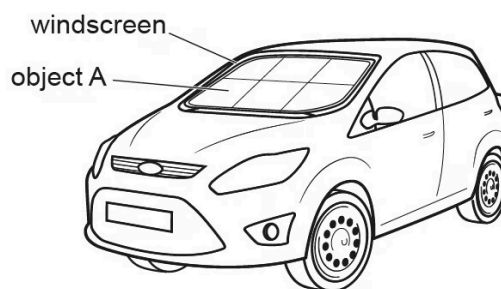


Fig. 5.1

The object labelled A is placed inside the windscreen. It is used by the owner of the car to reduce the temperature rise of the air in the car.

Select the most suitable material for the outer surface of object A. Explain your choice.

dull black

dull white

shiny black

shiny white

[2 marks]

Question 4a

Fig. 6.1 is a diagram of the inside of an electric oven. The diagram shows a side view of the oven.

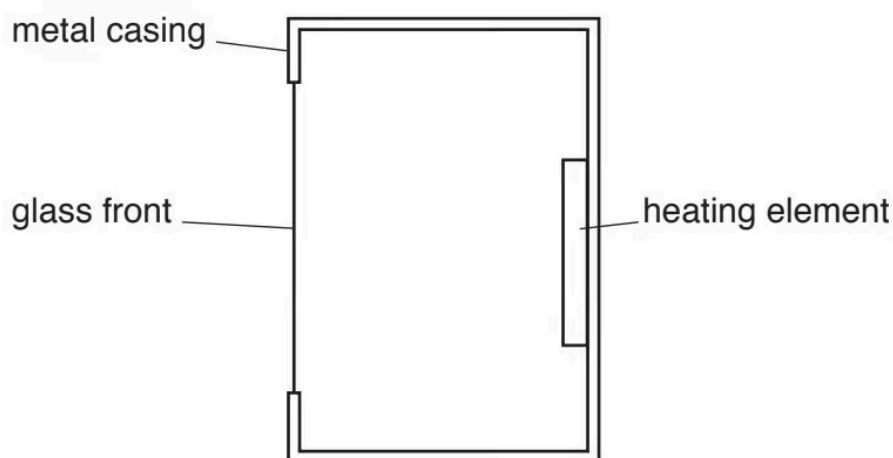


Fig. 6.1

The heater is switched on.

- (i) On Fig. 6.1, draw two arrows to show how thermal energy moves throughout the oven by convection.

[2]

- (ii) Explain how thermal energy moves throughout the oven by convection. Use your ideas about density and expansion.

[3]

- (iii) Use a word from the box to complete the sentence.

conduction expansion insulation radiation

Thermal energy travels at the speed of light by

[1]

[6 marks]

Question 4b

The oven is in a kitchen that is fitted with a smoke detector.

Warm, moving air can carry smoke particles.

Suggest the best position for the smoke detector in the kitchen.

[1 mark]

Question 5a**Extended**

A student is performing an experiment to investigate how much infrared radiation is radiated by different coloured surfaces.

Four conical flasks are painted shiny grey, dull grey, black and white, see Fig. 1.1.

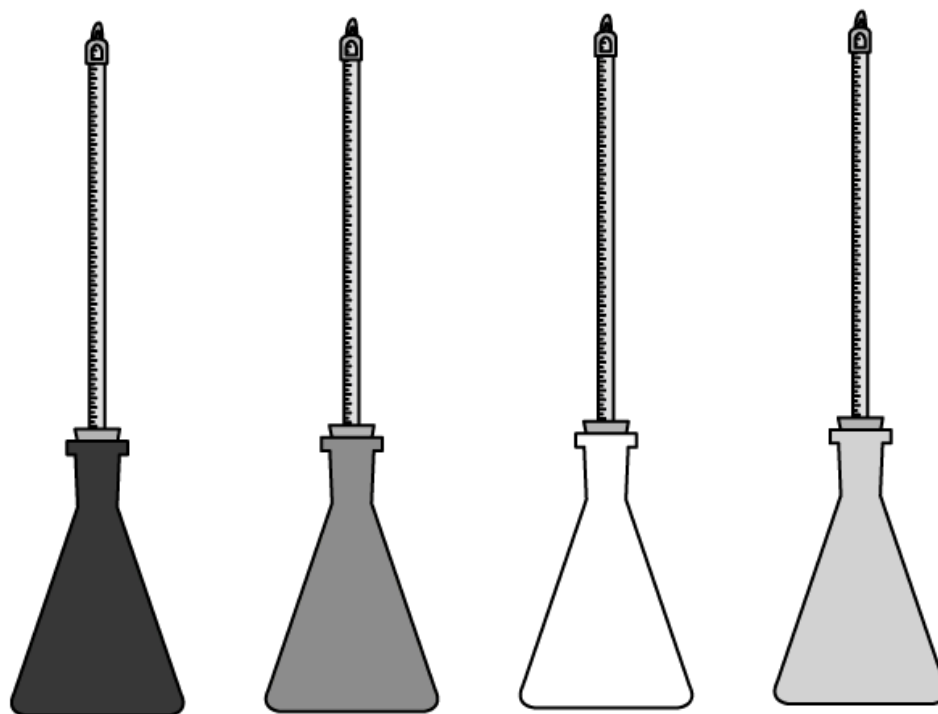


Fig. 1.1

They fill the four conical flasks with boiling water and record the subsequent temperature every 30 s.

State the dependent and independent variables in this experiment.

[2 marks]

Question 5b

Extended

State two control variables in this investigation.

[2 marks]

Question 5c

Extended

The results of the experiment are plotted in Fig. 1.2 below. Each line represents the temperature loss of a different flask.

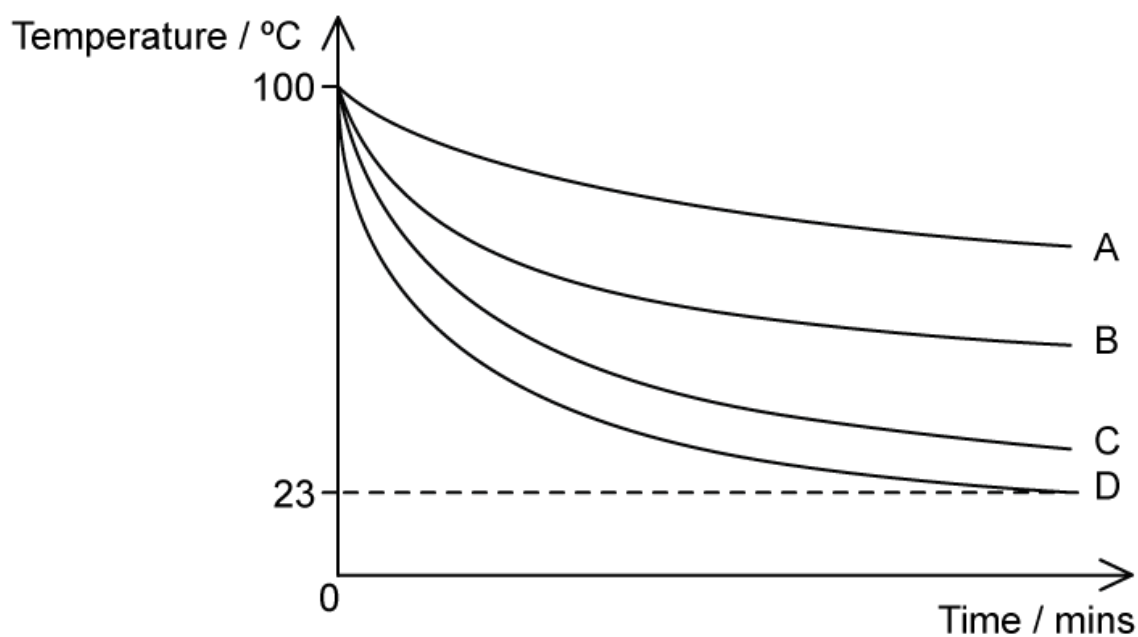


Fig. 1.2

Fig. 1.2

- (i) State the letter of the curve with the lowest temperature change per second.

[1]

- (ii) State the letter of the flask covered in the best conductor.

[1]

[2 marks]

Question 5d

Extended

- (i) Draw **four** lines between the labels from Fig. 1.2 and the different flask colours.

Dull grey	A
Shiny grey	B
White	C
Black	D

[4]

- (ii) Suggest why the temperature of flask D does not drop below 23 °C.

[1]

[5 marks]



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