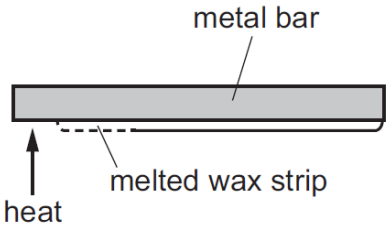
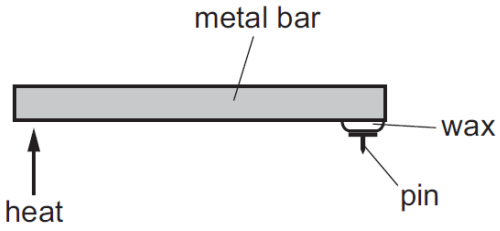
Thermal Processes – 2021 IGCSE 0625

1. June/2021/Paper_11/No.19

Two students carry out different experiments to compare the abilities of different metals to conduct thermal energy.



experiment 1



experiment 2

In experiment 1, the bar is heated for one minute and the length of wax strip that melts is measured.

In experiment 2, the bar is heated and the time taken for the pin to drop off is measured.

What happens to each of these measurements when a better conductor of thermal energy is tested?

	length of melted wax strip	time taken for the pin to drop
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

2. June/2021/Paper_11/No.20

In which substances is convection a method of thermal energy transfer?

A air and water only

B air only

C air, water and wood

D water only

3. June/2021/Paper_12/No.19

The table gives some examples of convection and an explanation of why the convection occurs.

Which row is correct?

	example	explanation
A	air conditioner unit	The unit is placed in a high position to circulate the cold air rising from the floor level and so keeping the room cold.
B	convection oven	The air in the oven becomes more dense when heated so it falls to the bottom heating the food faster.
C	hot-air balloon	Air inside the balloon becomes less dense which causes the balloon to rise.
D	land and sea breezes	A breeze forms due to the warm air above the land moving down towards the sea.

4. June/2021/Paper_12/No.20

In which situation is radiation the main method by which energy is transferred?

A heating a pan of water using a gas camping stove

B energy reaching the Earth from the Sun

C heating the air in a room with a radiator

D giving gravitational potential energy to a glider when it is lifted by thermal currents

5. June/2021/Paper_13/No.20

Solar heating panels consist of pipes carrying water that absorb radiation from the Sun.

Which texture and colour are the surface of the pipes so that the temperature of the water rises at the quickest rate?

A dull black

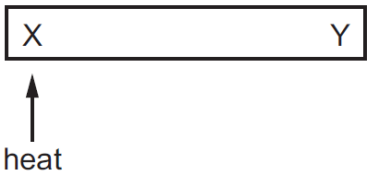
B dull white

C shiny black

D shiny white

6. June/2021/Paper_21/No.19

A metal rod is heated at end X.



Why does end Y of the metal rod become hot?

A Energy is transferred from end X of the rod to end Y by vibration of positive ions and by movement of electrons.

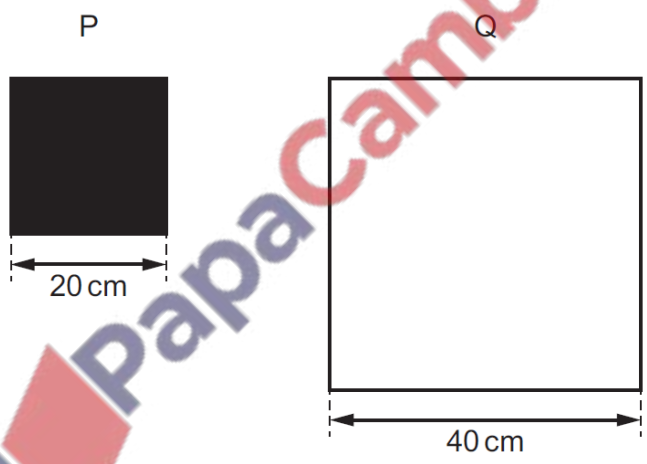
B Energy is transferred from end X of the rod to end Y by movement of positive ions only.

C Energy is transferred from end X of the rod to end Y by vibration of positive ions only.

D Energy is transferred from end X of the rod to end Y by movement of electrons only.

7. June/2021/Paper_21/No.20

Two square sheets of metal, P and Q, are heated to the same temperature. The metal sheets are shown.



Sheet Q is emitting more radiation than sheet P.

Which statement explains this?

A Dull black surfaces are better conductors of radiation.

B Dull black surfaces are better emitters of radiation.

C The surface area of Q is larger than that of P.

D White surfaces are better absorbers of radiation.

8. June/2021/Paper_22/No.19

A student sets up four cans. Each can contains the same mass of water at 90 °C.

The cans are identical except for the outside surfaces.

Which can will cool down the fastest?

A dull, black surface

B dull, white surface

C shiny, black surface

D shiny, white surface

9. June/2021/Paper_22/No.20

Thermal energy is transferred by conduction in a metal bar.

Which statement is **not** correct?

A Fast vibrating ions leave the surface.

B Free moving electrons carry thermal energy through the bar.

C Ions vibrate and strike neighbouring ions to make them vibrate.

D Ions vibrate but do not change position.

10. June/2021/Paper_23/No.19

Three students are planning an experiment to test thermal conduction in different materials.

The students each propose a hypothesis.

1 I think the copper rod will be a good thermal conductor because it is a metal.

2 I think the glass rod will be a good thermal conductor because it has free electrons which vibrate and transfer energy quickly.

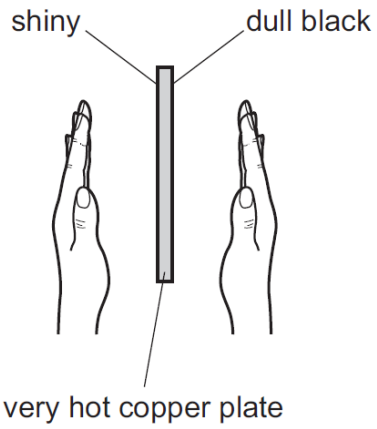
3 I think the wooden rod will be a poor thermal conductor because it can only transfer energy along the rod by vibrating the lattice particles.

Which of their hypotheses are correct?

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

11. June/2021/Paper_23/No.20

A copper plate is shiny on one side and is painted dull black on the other side. The plate is heated to a high temperature. A person places his hands at equal distances from either side of the plate, close to the plate, but not touching it.



Why does the hand near the dull black surface of the plate feel much hotter than the hand near the shiny surface?

A The dull black surface is a better emitter of radiation than the shiny surface.

B The dull black surface is a better conductor of radiation than the shiny surface.

C The dull black surface is a better reflector of radiation than the shiny surface.

D The dull black surface is at a higher temperature than the shiny surface.

12. March/2021/Paper_12/No.17

Four samples of materials with the same dimensions are tested.

Which material gives the highest rate of thermal conduction?

A rubber

B copper

C plastic

D steel

13. March/2021/Paper_12/No.20

Four metal mugs with lids each contain the same volume of hot water at the same temperature.

The mugs are made from the same metal and are the same shape and size, but each has its outside surface painted with a different combination of texture and colour.

Which mug radiates thermal energy at the fastest rate?

A the mug painted shiny white

B the mug painted dull white

C the mug painted shiny black

D the mug painted dull black

14. March/2021/Paper_22/No.19

Which change will cause a decrease in the rate of radiation emitted by an object?

A changing the surface colour from white to black

B changing the surface texture from dull to shiny

C increasing the surface temperature

D increasing the surface area

15. June/2021/Paper_33/No.6

(a) Three rods are identical in size and shape, but each rod is made from a different material. On one end of each rod is a pin held in place by wax. The wax melts when it is warm.

The rods are placed on a block of wood and heated equally by a Bunsen burner as shown in Fig. 6.1.

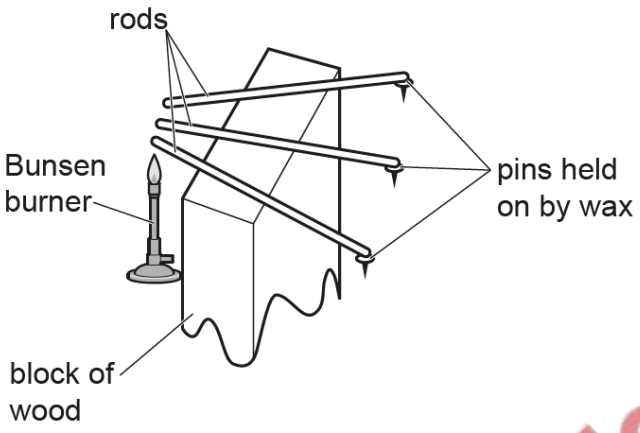


Fig. 6.1

(i) State the process of thermal energy transfer through the rods.

..... [1]

(ii) Explain how the arrangement in Fig. 6.1 can show which rod transfers thermal energy the most quickly.

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..... [2]

(b) **(i)** State the process by which infrared waves transfer thermal energy.

..... [1]

(ii) State the process of thermal energy transfer which does **not** require a medium.

..... [1]

(c) Fig. 6.2 shows a heater for warming a room. When there is hot water in the heater, the thermal energy of the water transfers to the room.

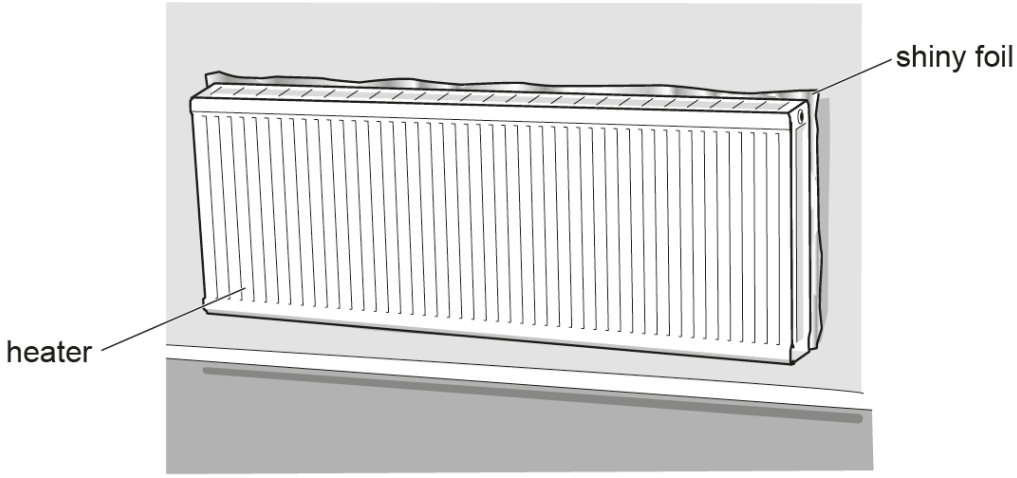

Fig. 6.2

The shiny foil on the wall increases the efficiency of the heater.

Explain how the shiny foil increases the efficiency of the heater.

.....

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..... [2]

[Total: 7]

16. June/2021/Paper_42/No.5

(a) A machine delivers a hot drink in a plastic cup, which is uncomfortably hot to hold.

Fig. 5.1 shows the cup with the hot drink.

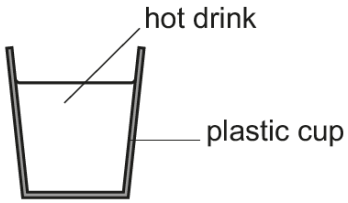

Fig. 5.1

Fig. 5.2a shows the cup with the hot drink and a holder for the sides of the cup.

Fig. 5.2b shows a cross-section through the holder. The holder is made from two strong paper cylinders separated by a wavy piece of strong paper to make air gaps.

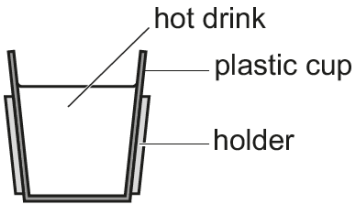

Fig. 5.2a

Fig. 5.2b

Explain how using the holder makes it more comfortable to hold the cup.

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..... [3]

(b) A student carries out experiments on the cooling of the hot drink described in **(a)**, with and without the holder in place. He finds that the holder only reduces the rate of cooling slightly.

Suggest and explain another action that reduces the rate of cooling more effectively.

suggestion .....

explanation .....

.....

..... [3]

(c) State the method of thermal energy transfer from a star through the vacuum of space.

..... [1]

[Total: 7]