11.3 Radiation

1 How does thermal energy (heat energy) travel through the vacuum between the Earth and the Sun?

A by conduction

B by convection

C by radiation

D by radioactive decay

2 There is a vacuum between the double walls of a vacuum flask.

Which types of heat transfer are reduced by the vacuum?

A conduction and convection

B conduction and radiation

C convection and radiation

D conduction, convection and radiation

3 How does heat from the Sun reach the Earth?

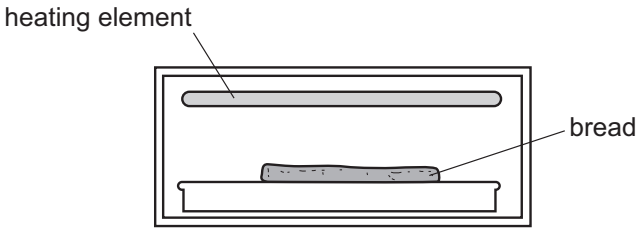
A conduction only

B convection only

C radiation only

D conduction, convection and radiation

4 Bread can be cooked by placing it below, but not touching, a heating element.



Which process transfers thermal energy from the heating element to the bread?

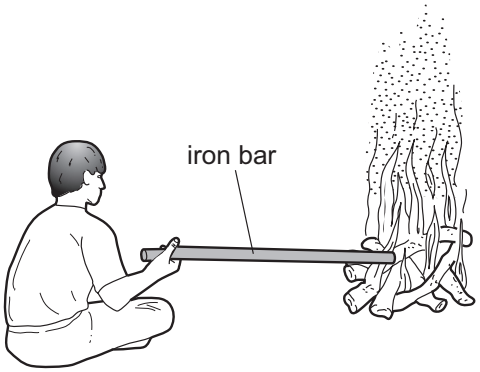
A conduction

B convection

C insulation

D radiation

5 A boy sits near a campfire. He pokes the fire with an iron bar. His hand becomes hot.



In which ways does thermal energy (heat) from the fire reach his hand?

A conduction and convection only

B conduction and radiation only

C convection and radiation only

D conduction, convection and radiation

6 One a winter day, suppose you must leave your house for a short time. In order to save energy, how should you change the settings of the house thermostat?

A Leave it unchanged.

B Turn it down, slight, and then back on again when you return.

C Turn it off and then back on again when you return.

D As far as energy consumption is concerned, it makes no difference.

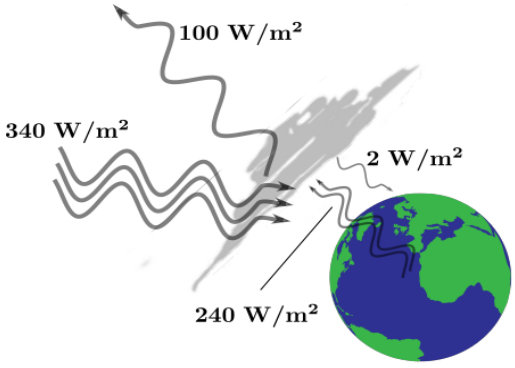
7 A simplified model of Earth's energy balance is shown below (not to scale). What is the net energy flow per unit area away from Earth?

A -2 W / m^2

B +340 W / m^2

C +338 W / m^2

D 0

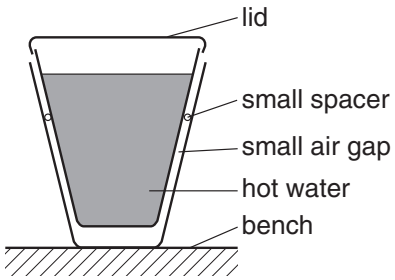


8 Water is held in three differenent containers in the same room. One contains boiling water, another contains room temperature water, and the third, ice. In terms of the emission of thermal radiation, which row below is correct?

	emits	**does not emit**
A	boiling	room temperature, ice
B	boiling, room temperature	ice
C	boiling, room temperature, ice	/
D	/	boiling, room temperature, ice

11.4 Insulator

1 Two plastic cups are placed one inside the other. Hot water is poured into the inner cup and a lid is put on top as shown.



Which statement is correct?

A Heat loss by radiation is prevented by the small air gap.

B No heat passes through the sides of either cup.

C The bench is heated by convection from the bottom of the outer cup.

D The lid is used to reduce heat loss by convection.

2 Hot liquid in a vacuum flask cools extremely slowly. This is because some methods of heat transfer cannot take place in a vacuum.

Which methods **cannot** take place in a vacuum?

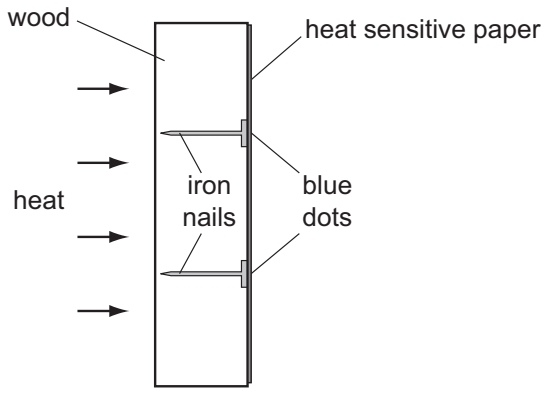
A conduction and convection only

B conduction and radiation only

C convection and radiation only

D conduction, convection and radiation

3 A piece of wood has some iron nails pushed through it. One side of the wood is covered with heat sensitive paper which turns from pink to blue when heated. The wood is heated as shown for a few minutes and blue dots appear on the heat sensitive paper where it touches the nails.



This experiment shows that, compared to wood, iron is a good

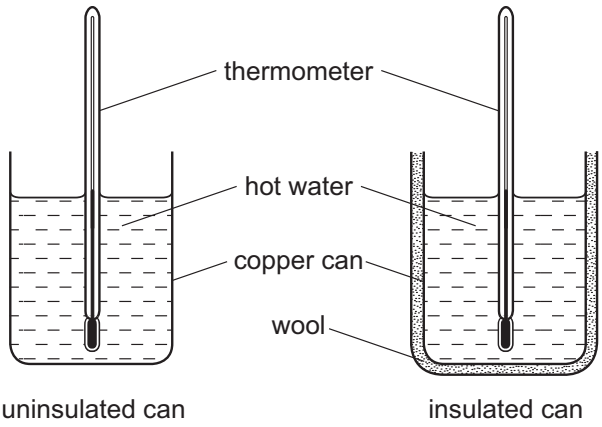
A absorber of heat.

B conductor of heat.

C convector of heat.

D emitter of heat.

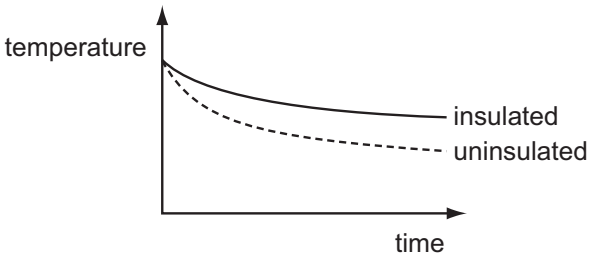
4 Two identical copper cans are filled with boiling water.



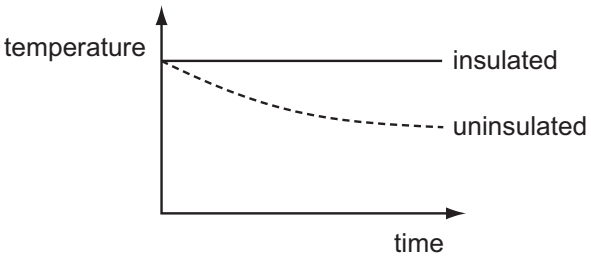
One can is insulated with wool. The temperature of the water in each can is taken every minute for several minutes. Graphs of the results are plotted.

Which graph shows the results obtained?

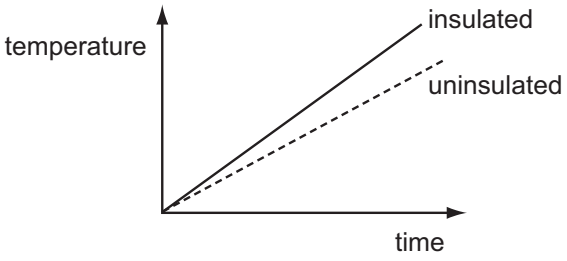
A



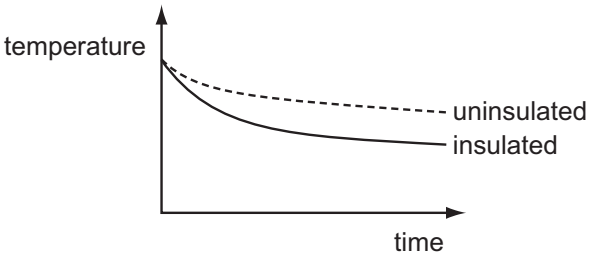
B



C



D



5 After a sheep has its wool cut off, it is harder for it to stay warm when the air temperature falls.

How does the wool help the sheep to stay warm?

A Air can circulate between the wool fibres and heat up the skin by convection.

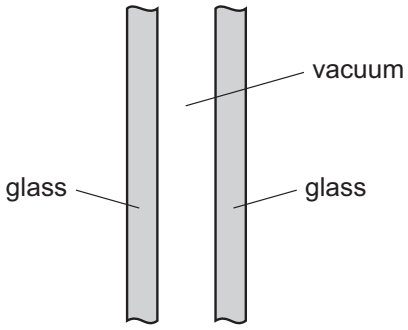
B Air trapped by the wool fibres reduces heat losses from the skin by convection.

C The wool fibres are curly so it takes longer for heat to be conducted away from the skin.

D The wool fibres conduct heat to the skin from the air outside.

6 A double-glazed window consists of two panes of glass with a vacuum between them.

The vacuum reduces the amount of thermal energy transferred through the window.



Which row shows how much thermal energy is transferred through the vacuum by conduction, by convection and by radiation?

	conduction	convection	radiation
A	none	none	some
B	none	some	some
C	some	none	none
D	some	some	none