Chapter 2 Moving heat around

Chapter Test Answers — Total marks 45

Section A

Question 1

A Insulation is not a method of heat transfer. 1

Question 2

B Heat is transferred by contact between the surface of the iron and clothes. 1

Question 3

C Reflective coating reduces the emission of radiation from the inner wall. 1

Question 4

C Heat transfer through molecular or atomic collisions without overall transfer of the substance itself. 1

Question 5

D The flame heats the pan by radiation, heat is transferred through the pot by conduction, and heat rises through the water to the surface via convection. 1

Question 6

C Air particles move faster and are further apart 1

Question 7

C $\text{Efficiency (\%)} = \dfrac{\text{energy output}}{\text{energy input}} \times 100$

$$3 = \frac{60}{\text{energy input}} \times 100$$

$$\text{Energy input} = \frac{60}{3} \times 100$$

$$= 2000 \text{ Js}^{-1}$$

1

Question 8

C Efficiency (%) = $= \frac{\text{energy output}}{\text{energy input}} \times 100$

$= \frac{125}{100} \times 100$

$= 62.5\%$

Note: light and sound are both useful for a television's operation. 1

Question 9

B When work is done **on** a system, energy is added so there is an increase to its internal energy. When work is done **by** a system, energy is removed so its internal energy decreases. 1

Question 10

D Both light energy and thermal energy is emitted from the torch. 1

Section B

Question 1

Transfer of heat via electromagnetic radiation. 1

Electromagnetic waves do not need a medium in which to travel. 1

Question 2

No, convection can on occur in liquids and gases. 1

Convection requires atoms and molecules to move, and in solids they are fixed in place. 1

Question 3

Metals are good conductors of heat. 1

Heat moves easily from your warm hand to the metal and so the metal 'feels colder'. 1

Wood is a poor conductor of heat and little heat is transferred from your hand to the wood, so that your hand does not sense it is touching something cooler 1

Question 4

To increase the absorption of radiation.

Black matt surfaces absorb radiant energy more than white shiny surfaces. 1

Question 5

$$\text{Efficiency (\%)} = \frac{\text{energy output}}{\text{energy input}} \times 100$$ 1

$$\text{Energy output} = \frac{\text{efficiency (\%)} \times \text{energy input}}{100}$$ 1

$$= 9 \text{ MJ}$$ 1

Question 6

Slows down heat transfer by conduction as air is a poor conductor of heat, narrow air gap acts as an insulator. 2

Slows down heat transfer by convection as gap is narrow so convection currents are not easily established. 2

Question 7

a $$\text{Efficiency (\%)} = \frac{\text{energy output}}{\text{energy input}} \times 100$$ 1

$$\text{Efficiency (\%)} = \frac{360}{800} \times 100 = 45\%$$ 1

b Heat (thermal) energy and sound energy 1

Question 8

a 150 J 1

b Electrical energy into kinetic energy 1

c $$\text{Efficiency (\%)} = \frac{150}{600} \times 100 = 25\%$$ 2

Question 9

Hot water is less dense and remains at top of the test tube. 1

No heat transfer by convection. 1

Any heat transfer is by conduction and heat conduction through liquids and gases is poor. 1

Ice remains unmelted even though the water is boiling at the top of the test tube. 1

Section C

Answers will vary.

For example: Double-glazed windows
Roof insulation
Wall insulation
Floor insulation
Heavy curtains
Draught-proof doors

1 mark for each improvement 3

3 × 2 marks for identifying heat transfer responsible and how heat transfer is minimised. 6