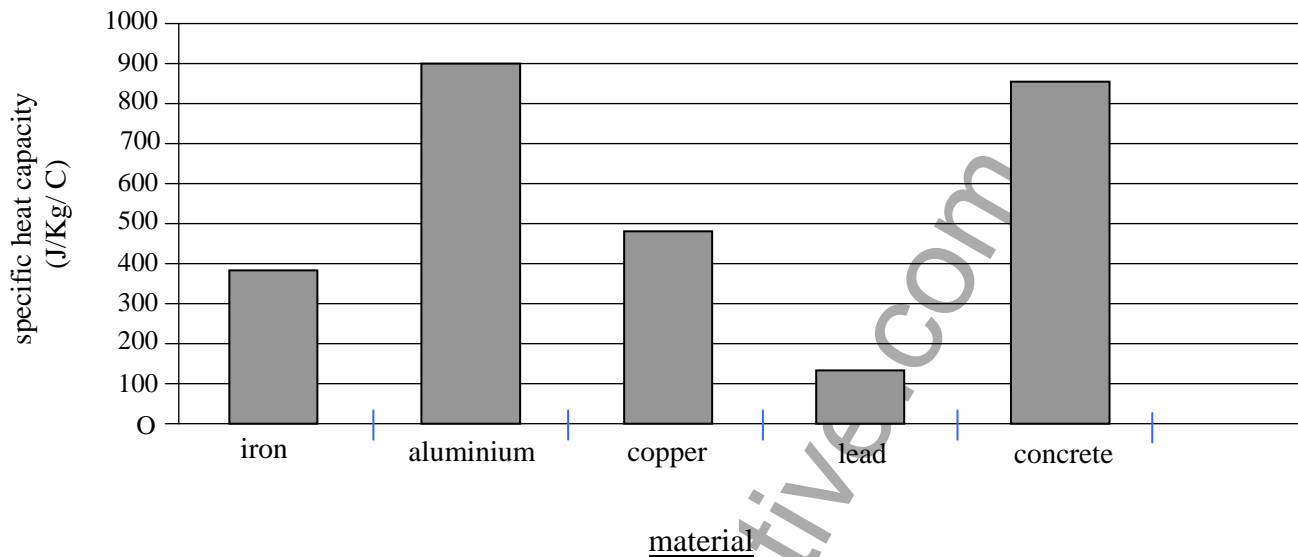


QUESTIONSHEET 1

- (a) (i) sensible scale
-
- correct plotting

1
1

- (ii) lead/Pb

1

- (iii) Lead dissolves in the water and is poisonous/
-
- can cause health problems/can cause illness.

1

- (b) (i)
- $0.5 \times 80 \times 490 \text{ J/kg/}^\circ\text{C}$
-
- $19\,600\text{J} / 19.6 \text{ kJ}$

1
1

- (ii)
- $0.5 \times 80 \times 900 \text{ J/kg/}^\circ\text{C}$
-
- $36,000\text{J}/36 \text{ kJ}$
-
- energy saved:
- $16,400\text{J}/16.4 \text{ kJ}$

1
1
1**TOTAL / 9**

QUESTIONSHEET 2

- (a) amount of stored/chemical energy. 1
- (b) (i) $0.02 \times 4200 \times 50 \text{ J/kg/}^\circ\text{C}$ 1
4200 J/4.2 kJ
- (ii) Two from
heating the container/heating the air/
heating the surroundings/lost by convection in air/
lost by radiation into air/peanut not all burned. 2
- (c) (i) carbon 1
- (ii) the peanut/combustion of peanut 1

TOTAL / 7

QUESTIONSHEET 3

- (a) (i) Percentage calculation 1
 ie. $100/35 \times \text{COST} (\pounds 1000)$
 Correct answer ($\pounds 2857.14$) 1
- (ii) (missing % = 15%) $\times \pounds 1000 = \pounds 150$ 1
- (iii) fitting a curtain, or porch 1
- (b) (i)

Place of installation	Method of insulation	Purchase cost (£)	Cost of energy wasted per year before fitting (£)	Cost of energy saved per year after fitting (£)
Roof	Rock-wool or Fibre-glass in loft	250	200	160
Walls	Cavity wall filling	1000	350	280
Windows	Double glazing	3500	150	120
Doors	Draught-proofing	5	150	120

- One correct 1
 Two correct 2
 All correct 3
- (ii) (Cost/ saving per year = $\pounds 3500/120 = 29.17$ years) 1
- (iii) Draught proofing 1
- Very quick pay back/ recoup cost of purchase quickly 1
 Compared to other methods of insulation 1
 i.e. loft-insulation saves more but cost a lot more to start with 1

TOTAL / 12

QUESTIONSHEET 4

(a) $W / m^2 \text{ } ^\circ C$	1
(b) Area of roof = $8 \times 10 = 80 \text{ m}^2$	1
$80 \times 18 \times 0.4$	1
= $576 \text{ W} / m^2 \text{ } ^\circ C$	1
(units not necessary as given in part a)	
TOTAL / 4	

QUESTIONSHEET 5

(a) black is good heat absorber	1
maximises heat absorbed	1
(b) helps to trap heat / like greenhouse	1
(c) (i) have greater surface area	1
to absorb as much heat as possible	1
(ii) to reduce heat loss	1
(d) (i) hot water rises	
by convection currents	1
(ii) hot water rises into it	1
(e) high enough temperatures to heat water cannot be relied upon	1
TOTAL / 9	

QUESTIONSHEET 6

(a) feathers trap more air 1
 air is a good insulator 1

(b) newspaper also traps air 1

(c) points to include: (one mark each to maximum of 8)

two similar containers
 cover one in feathers
 the other in newspaper
 fill with hot water
 same volume in each
 approximately the same temperature
 record temperature at regular intervals
 for set period of time
 plot graphs of temperature against time
 compare rates of heat loss

TOTAL / 11

QUESTIONSHEET 7

(a) (i) energy = mass of substance x SHC x change in temp 1
 = $0.50 \times 4200 \times 5$ 1
 = 10300 J or 10.5 kJ 1

(ii) temperature change = $30 - 10 = 20$ °C 1
 energy = $0.10 \times 880 \times 20$ 1
 = 1760 J or 1.76 kJ 1

(b) SHC = energy / (mass of substance x temp change) 1
 = $20\,000 / (4 \times 10)$ 1
 = 500 J / kg °C 1

(c) water has a higher specific heat capacity than sand 1
 water warms up more slowly 1

TOTAL / 11

QUESTIONSHEET 8

(a) (i) energy = mass of water \times SHC \times rise in temp	1
= $1.5 \times 4200 \times 95$	1
= 598 500 J or 598.5 Kj	1
(ii) 3 kW = 3000 J / s	1
3000 \times time = 598 500	1
time = 199.5 s or 3 min 19.5 s	1
(b) energy to melt ice = $2 \times 334\ 000 = 668\ 000$ J	1
energy to boil kettle = $2 \times 4200 \times 100$	1
= 840 000 J	
Time to boil = $(668\ 000 + 840\ 000) / 3000$	
= 503 s or 8 min 23 s	1
	TOTAL / 10

QUESTIONSHEET 9

(a) (i) diagram of bent strip	1
with copper on outside of bend	1
(ii) diagram of bent strip	1
with aluminium on outside	1
(b) (i) heat in appliance heats up strip	1
strip bends & breaks contact	1
strip cools	1
strip straightens and makes contact	1
	TOTAL / 8

QUESTIONSHEET 10

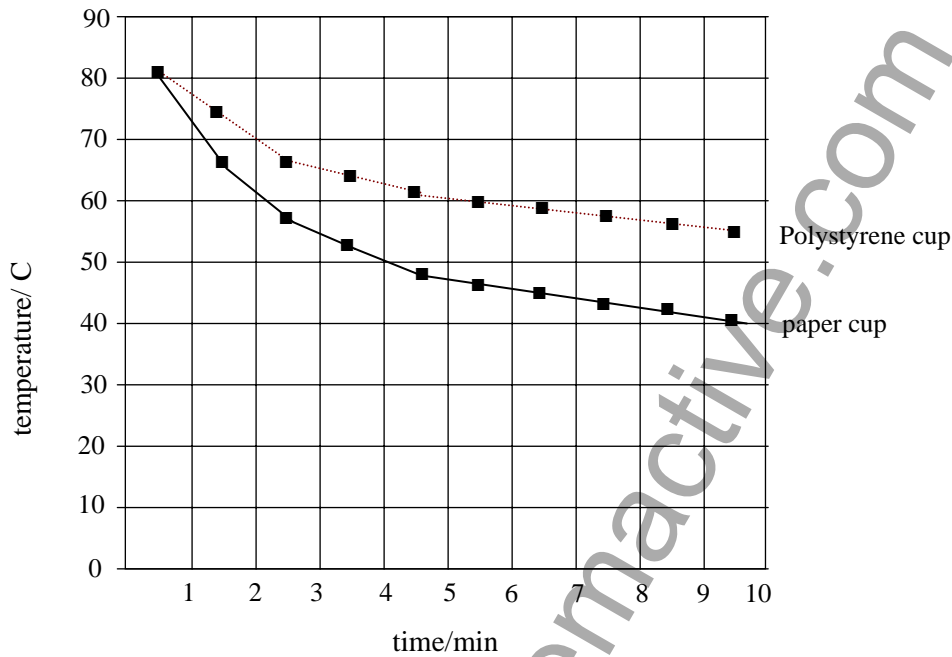
(a) (i) air trapped between panes of glass	1
air is good insulator	1
(ii) fibre glass traps air	1
which acts as an insulator	1
(iii) carpets are insulators	1
reduce heat loss due to conduction	1
(b) air in cavity is free to move and carry away heat	1
foam traps the air	1
(c) worn under a shirt	1
traps layer of air next to body	1
TOTAL / 10	

QUESTIONSHEET 11

(a) (i) if the bridge expands too much	1
it will buckle	1
(ii) increased length = $500 \times 50 \times 0.000\ 012$	1
= 0.3 m	1
new length = 500.3 m	1
(b) copper $50 \times 40 \times 0.000\ 02$	1
= 0.04 m	1
aluminium $50 \times 30 \times 0.000\ 03$	1
= 0.045 m	1
aluminium expands most (no mark for this)	
(c) tyres were heated and put over wheels	1
then cooled to contract onto wheel	1
TOTAL / 11	

QUESTIONSHEET 12

- | | | |
|---------|-----------------|---|
| (a) (i) | sensible scales | 1 |
| | labelled axes | 1 |
| | plotting | 2 |
| | best fit lines | 1 |



- | | | |
|---------|--|---|
| (ii) | paper cup: 0.6 mins (allow +/- 0.1 min) | 1 |
| | polystyrene cup: 1.6 min (allow +/- 0.1 min) | 1 |
| (iii) | polystyrene | 1 |
| (iv) | liquids cooled more slowly in it/
it did not allow heat through so quickly/
heat loss was slower | 1 |
| (b) (i) | Both containers would cool more slowly. | 1 |
| | (ii) Heat loss by convection (in the air) was prevented. | 1 |

TOTAL / 11

QUESTIONSHEET 13

(a) (i) A: 2.5 min (allow +/- 0.1 min)	1
B: 8.5 min (allow +/- 0.2 min)	1
C: 1.5 min (allow +/- 0.1 min)	1
(ii) A: 68°C (allow +/- 0.5 °C)	1
B: 79.5°C (allow +/- 0.5 °C)	1
C: 49.5°C (allow +/- 0.5 °C)	1
(b) (i) C	1
(ii) by radiation (of heat)	1
(iii) conduction, convection.	2
	TOTAL / 10

QUESTIONSHEET 14

(a) (i) Conduction	1
(ii) Convection	1
(b) Hot water expands	1
Could build up pressure/ dangerous if no valve	1
(c) Conduction movement of heat from particle to particle.	1
Because particles are fixed in solid- cannot move.	1
Convection heat is carried with moving particles.	1
Particles can move in liquids and gasses.	1
	TOTAL / 8

QUESTIONSHEET 15

- | | |
|--|---|
| (a) hot air rises up chimney | 1 |
| cool air comes into room to replace it | 1 |
| (b) hot air rises (thermals) | 1 |
| supports glider | 1 |
| (c) smoke is hot and rises | 1 |
| leaving cool air at bottom of room | 1 |
| (d) light colours reflect radiation | 1 |
| keeping person cool | 1 |
| (e) clouds insulate atmosphere | 1 |
| keep ground warmer | 1 |

TOTAL / 10

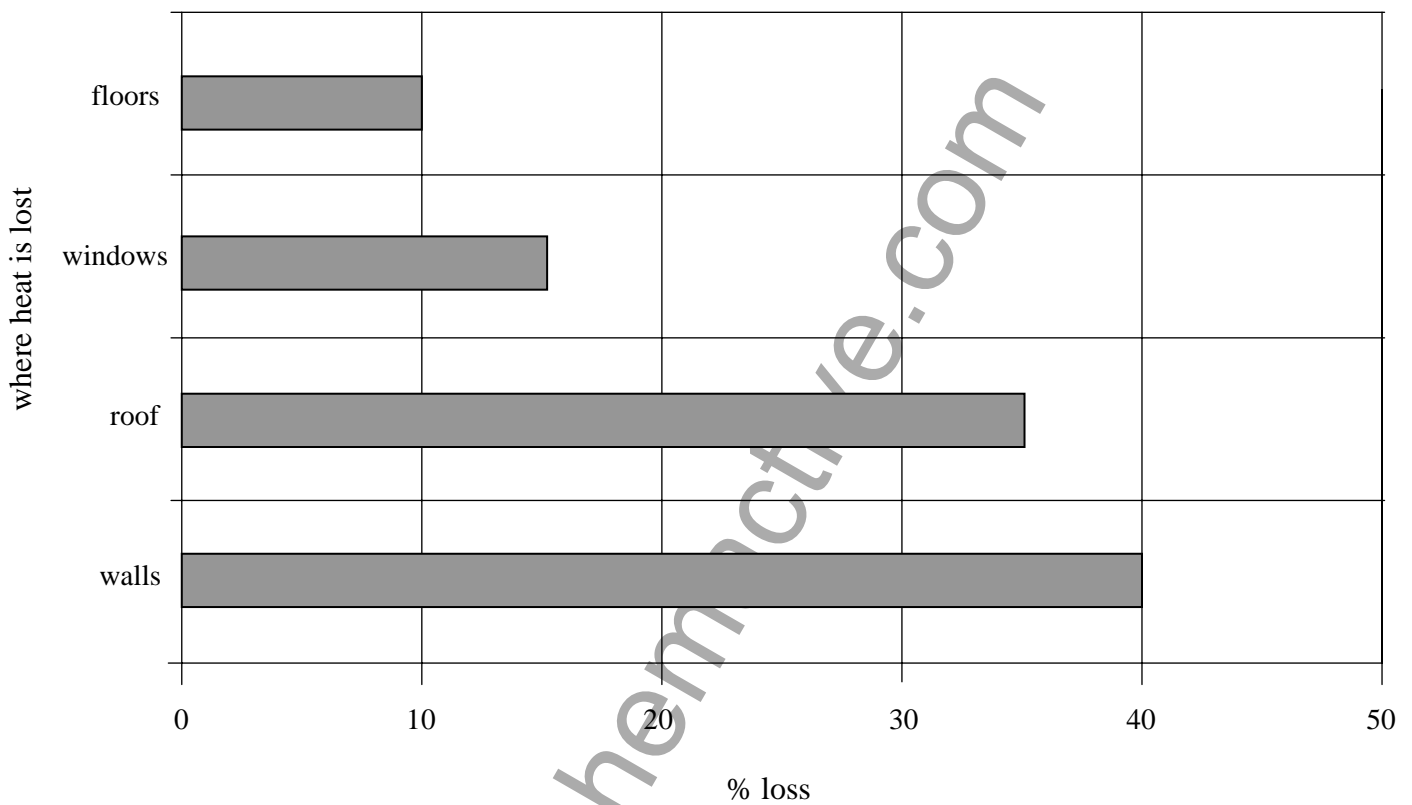
QUESTIONSHEET 16

- | | |
|--|---|
| (a) perspiration evaporates | 1 |
| takes in (latent) heat from skin | 1 |
| cool skin | 1 |
| (b) water evaporating from damp clothing | 1 |
| needs heat from body | 1 |
| causing person to get very cold | 1 |
| (c) (i) air not saturated with water | 1 |
| is able to absorb more from washing | 1 |
| (ii) wind removes water vapour from near clothes | 1 |
| allowing more to escape | 1 |
| (iii) greater surface area | 1 |
| for water to escape from | 1 |

TOTAL / 12

QUESTIONSHEET 17

- (a) reduce heat being lost from the house 1
- (b) (i) sensible scales 1
correct plotting 1

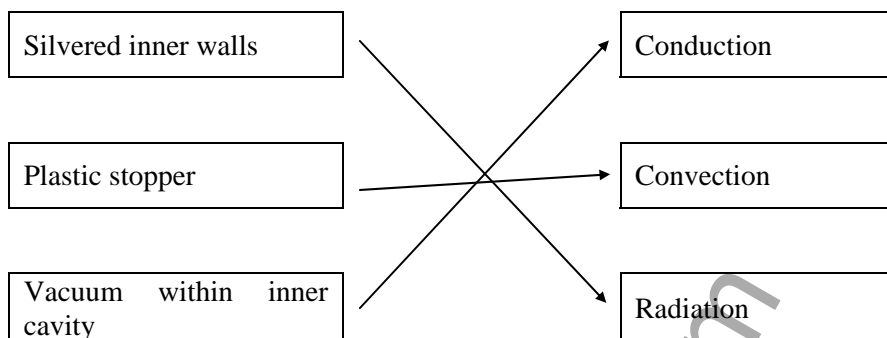


- (ii) walls 1
- (iii) walls: cavity foam/insulation 1
roof: loft insulation/fibre layer 1
windows: double glazing/secondary glazing 1
floor: carpet/floor covering 1

TOTAL / 8

QUESTIONSHEET 18

(a)



One correct

1

Two or more correct

1

(b) Inserted words in order:-

CONDUCTION

1

CONVECTION

1

CONVECTION

1

RADIATION

1

(c) Air replaces vacuum.

1

Air will allow heat to move through (by convection)

and vacuum does not

1

TOTAL / 8**QUESTIONSHEET 19**

(a) (i) 100 °C

1

(ii) 37 °C

1

(iii) 1530 °C

1

(iv) 20 °C

1

(v) 0 °C

1

(b) shorter range of temperature

1

clinical has constriction to allow reading after removal

1

(c) mercury

1

alcohol

1

TOTAL / 9

QUESTIONSHEET 20

one for each of the following in correct order:

convection
rises
falls
radiation
mirrors (silvered surface, shiny surface)
reflectors
absorbers
Joule
Conduction
Conductors
Insulators

TOTAL / 11
