

- (c) infra red ticked 1
- (d) dark surfaces
accept matt / dull / black surfaces 1
- [6]

- M4.** absorber 1
- reflector 1
- emitter 1
- [3]

- M5.** (a) convection
 air is heated by the burner / particles gain energy
 air expands / particles move about more / particles move faster
 air becomes less dense / particles are more spread out
 air rises / particles rise - *not* heat rises
 air from C moves into the heater / particles from C move into the heater to
 replace it / them
any four for 1 mark each 4
- (b) (i) radiation
for one mark 1
- (ii) black surface radiates / emits well
 (*allow* absorbs and emits well) (*allow* comparison with shiny / white surfaces)
 large surface area needed
 high temperature (of the lumps)
any one for 1 mark 1
- [6]

- M6.** (a) (i) Carries heat up (as convection current) 1
- (ii) (1) By conduction or from molecule to molecule
(2) By radiation or as IR 2
- (iii) Use shiny surface (inside or outside) or small area 1
- (b) (i) Rise more quickly 1
- (ii) Dull surface good absorber
(accept "attract" = "absorb" if context correct,
then penalise spg mark.
Shiny surface poor absorber 2
- (c) (i) Fall more quickly 1
- (ii) Dull surface good emitter
Shiny surface poor emitter 2

[10]

- M7.** (i) radiation **or** infra red
do not accept rays
do not accept waves
accept electromagnetic waves 1
- (ii) good absorber (of heat) to absorb heat (**or** infrared)
do not accept 'attract' or 'capture' or soak 1
- (iii) reduce heat loss (from the panel)
accept (good) (heat) insulator
accept stop or reduce conduction
accept stop or reduce convection
accept traps heat
accept keeps water hot 1
- (iv) to reflect (back into the panel) heat **or** infrared **or** Sun's energy
do not accept 'bouncing'
do not accept reflect Sun
do not accept reflect sunlight or sun's rays 1

Q11. a) the colour of the cans

(b) (i) 18 (°C) **or** 88 to 70
ignore negative sign 1

(ii) 8 (°C) **or** 70 to 62
ignore negative sign 1

(c) greater temperature difference between water and surroundings (at start)
must mention temperature difference
ignore just water hotter
accept energy used to heat cans initially 1

(d) black 1

temperature falls the fastest (in L)
accept (can L) loses more heat / cools quicker
accept heat for temperature 1

black is a good / the best / better emitter (of heat / radiation)
accept converse
ignore black is best absorber 1

[7]

M12. (a) (i) 25 (%)
*do **not** accept ¼* 1

(ii) increases 1

(b) tick (✓) in top and bottom box
both required 1

- (c) SHINY surfaces are good reflectors of infra-red radiation
accept white for shiny
- or** black surfaces are POOR reflectors of infra-red radiation
accept bad for poor
accept insertion of 'not' before 'good' in statement
- or** black surfaces are good EMITTERS of infra-red radiation
- or** black surfaces are good ABSORBERS of infra red radiation

1

[4]

M13. (a) conduction

*do **not** accept conductor*

1

(b) the freezer

both parts needed

greater temperature difference (between freezer and room)

*do **not** accept because it is the coldest*

1

(c) any **two** from:

- poor absorber of heat / radiation
accept does not absorb heat poor emitter of heat / radiation is neutral
- reflects heat / radiation (from room away from fridge-freezer)
- reduces heat transfer into the fridge-freezer
- reduces power consumption of fridge-freezer
*do **not** accept it is a bad conductor / good insulator*

2

[4]

M14. (a) the bigger the surface area, the faster the water cools down / temperature falls

answers must imply rate

accept heat for temperature provided rate is implied

*do **not** accept cools down more unless qualified*

1

(b) any **two** from:

the ears:

- have large surface / area
not just has large ears
- radiate heat
accept loses heat, but does not score if the reason given for heat loss is wrong
- keep blood cooler

2

(c) (i) radiation

1

(ii) conduction

1

[5]

M15.

(a) (i) silvered surfaces

more than the correct number of ticks in a row negates the mark

radiation

2

plastic cap

conduction, convection (both required)

	conduction	convection	radiation	
vacuum	✓	✓		
silvered surfaces			✓	(1)
plastic cap	✓	✓		(1)

(ii)

any mention of air or any other substance in a vacuum scores zero

because there are no particles in a vacuum

accept atoms / molecules for particles

accept vacuum is empty space

accept there is nothing in a vacuum

accept there is no air / gas in the vacuum

conduction **and** convection need particles / medium

*need reference to both conduction **and** convection*

accept correct descriptions

2

- (b) (i) less heat lost (to air above the heater)

*do **not** accept **no** heat lost*

light shiny surfaces are poor emitters (of radiation)

accept radiators for emitters

references to reflection are neutral

or dull, matt surfaces are good emitters (of radiation)

*do **not** credit answers which infer reflection from the underside of the hood*

ignore correct reference to absorption

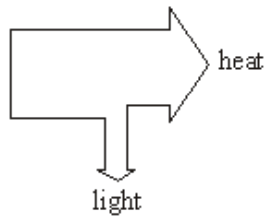
2

- (ii) correct diagram drawn with one output arrow narrower than the other

ignore input

arrows correctly labelled with energy form

eg



flow charts score zero

2

- (iii) energy cannot be destroyed

accept (principle of) conservation of energy

*do **not** accept because energy cannot be lost without clarification*

1

[9]