

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Mark Schemes

Q1.

(a) conduction

1

(b) (i) any **one** from:

- starting temperature (of cold water)
temperature is insufficient
- pipe length
accept size of pipe
- pipe diameter
- pipe (wall) thickness
- volume of cold water
accept amount for volume
- temperature of hot water (in)
- time

1

(ii) (type of) material is categoric

accept one variable is categoric
accept variable(s) are categoric
accept it is categoric
accept variable(s) are not continuous
descriptions of variables ie names and numbers is insufficient

1

(iii) copper

1

greatest temperature change

only scores if copper chosen
accept heat for temperature
accept heated water the fastest
accept it was hottest (after 10 minutes)
accept it is the best / a good conductor

1

- (c) larger (surface) area
accept the pipe is longer
accept hot (dirty) water (inside pipe) is in contact with the cold water (outside pipe) for a longer time
the pipe is a spiral is insufficient

1

[6]

Q2.

- (a) (i) 2.1

correct answer only

1

- (ii) 3.15

or

their (a)(i) $\times 1.5$ correctly calculated

allow 1 mark for correct substitution

ie 2.1×1.5

or

their (a)(i) $\times 1.5$

2

kilowatt-hour

accept kWh

or

a substitution 2100×5400 scores 1 mark

2100×5400 incorrectly calculated with answer in joules scores 2 marks

an answer of 11 340 000 scores 2 marks

an answer of 11 340 000 J scores 3 marks

1

- (iii) most (input) energy is usefully transformed

accept does not waste a lot of energy

accept most of the output / energy is useful

*do **not** accept it does not waste energy*

1

- (b) the room is losing energy / heat

1

at the same rate as the heater supplies it

this mark only scores if the first is scored

*do **not** accept heater reaches same temperature as room / surroundings*

rate of heat gain = rate of heat loss scores both marks

1

[7]

Q3.

- (a) (i) makes it warmer / raises the temperature
accept produces convection (current)
accept makes it less dense

1

(ii) reduced **or** slows down

1

(b) (i) electrical energy (to run the pump) must be paid for

accept electricity for electrical energy

accept electricity is needed for the pump

accept it uses electricity

accept because of the pump

1

(ii) more useful (heat) energy is transferred into the house than the energy used to operate the pump

or reduced cost of heating the house is greater than the cost of running the (electrical) pump

or costs little to run compared to the savings made

accept for 1 mark

reduces energy bills

or reduced fuel costs / heating costs owtte

do **not** accept it's cheap

2

[5]