

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Mark Schemes

Q1.

- (a) highest proportion / percentage of (input) energy wasted

NB this answer gains 2 marks

allow higher / greater

allow ratio

accept for **1** mark lots of energy wasted

or

allow for **1** mark wastes most energy

2

$$\text{efficiency} = \frac{\text{useful energy out} (\times 100\%)}{\text{total energy in}}$$

- (b)

10 % (or 0.1 if % sign crossed out)

allow **1** mark for the correct substitution into the correct equation

eg $(5/50) \times 100$

or $(1/10) \times 100$

allow **1** mark if 0.1 is given as the answer, but % sign is still present

2

- (c) heats it (the surroundings)

allow given off as heat

or

increases the temperature

ignore global warming

1

- (d) lowest energy input / needed / used

allow input only 2 J

1

- (e) (i) filament (bulb)

allow **1** mark for filament bulb being chosen provided a reason is given
(reason may be incorrect, but sensible eg cheapest)

1

lifespan is longest for the purchase cost

accept cost per hour is least / hours per £ is most

accept relevant calculation

1

- (ii) longest lifespan
allow lasts 25 000 hours
*do **not** accept most cost-effective*

1

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Q2.

- (a) (i) step-up

1

- (ii) increases voltage / decreases current
ignore changes to power
ignore resistance
allow step-up for increasing

1

decreased energy loss from power cables / wires
allow heat for energy
ignore electricity / power loss
*do **not** accept no energy loss*

1

- (b) any **two** factors from:

- cost of electricity
ignore cost of fuel
- amount of electricity / power produced
- disposal of waste (radioactive / fossil fuel)
or
 radioactive waste has long half-life
ignore pollution unqualified
accept waste could be be toxic
ignore radiation unqualified
- cost of commissioning
- cost of decommissioning
ignore demolishing
- availability of uranium / plutonium / nuclear fuel / fossil fuels
ignore non-renewable / will run out
- availability of sites to build nuclear power stations
- security hazard qualified / safety issue qualified
ignore dangerous unqualified
- carbon emissions / global warming
- start-up time
- start-up time
if no marks are given allow 1 mark for cost unqualified

2

[5]

Q3.

- (a) reflector of infrared radiation
allow reflector of infrared / IR / radiation / heat / energy
ignore bounces off

or

poor emitter of (infrared) radiation
do **not** accept **no** radiation emitted

1

(b) 3(kg)

allow **1** mark for evidence of correct calculation of temperature change
(78 °C)

allow **1** mark for correct substitution and rearrangement $982\,800 / (4200 \times 78)$

if temperature change is incorrect but used correctly in calculation
allow maximum of **2** marks

3

(c) 18000 (joules)

allow **1** mark for correct substitution (10×1800)

or ($10 \times 30 \times 60$)

allow **1** mark for an answer of 300

an answer 10×0.5 or 5 gains **1** mark

ignore incorrect units for compensation marks

if answer given is 0.005 kWh award **2** marks

2

(d) any **one** from:

- uses less electricity / energy

allow saves energy or wastes less energy

ignore power

- reduced cost
- instant availability of hot water

allow it's quicker

allow you don't have to wait

1

[7]