

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Mark Schemes

Q1.

- (a) air near freezer compartment is cooled or loses energy
accept air at the top is cold 1
- cool air is (more) dense or particles close(r) together (than warmer air)
*do **not** allow the particles get smaller / condense* 1
- so (cooler) air falls 1
- air (at bottom) is displaced / moves upwards / rises
*do **not** allow heat rises*
accept warm air (at the bottom) rises 1
- (b) if volume is doubled, energy use is not doubled
or
volume ÷ energy not a constant ratio 1
- correct reference to data, eg 500 is 2×250 but 630 not 2×300 1
- (c) accept suitable examples, eg
advantage:
- reduces emissions into atmosphere
 - lower input power or uses less energy or wastes less energy
 - costs less to run
- cost of buying or installing new fridge is insufficient*
ignore reference to size of fridge 1
- disadvantage:
- land fill
 - energy waste in production
 - cost or difficulty of disposal
 - transport costs
- 1

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Q2.

- (a) (i) 5.88 (watts)
an answer of 5.9 scores 2 marks
allow 1 mark for correct substitution ie
$$0.42 = \frac{\text{power out}}{14}$$

allow 1 mark for an answer of 0.0588 or 0.059
2
- (ii) 8.12
allow 14 – their (a)(i) correctly calculated
1
- (b) (i) input power / energy would be (much) less (reducing cost of running)
accept the converse
electricity is insufficient
1
- (also) produce less waste energy / power
accept 'heat' for waste energy
1
- (as the waste energy / power) increases temperature of the cabinet
1
- so cooler on for less time
1
- (ii) line graph
need to get both parts correct
accept scattergram or scatter graph

both variables are continuous
allow the data is continuous
1
- (c) number of bulbs used-halogen=24 (LED=1)
1
- total cost of LED = £30 + £67.20 = £97.20
accept a comparison of buying costs of halogen £36 and LED £30
1
- total cost of halogen= 24 x £1.50 + 24 x £16.00 = £420
or
buying cost of halogen is £36 **and** operating cost is £384
accept a comparison of operating costs of halogen £384 and LED £67.20
allow for 3 marks the difference in total cost is £322.80 if the number 24 has not been credited
1
- statement based on correct calculations that overall LED is cheaper
*must be **both** buying **and** operating costs*
- an alternative way of answering is in terms of cost per hour:

buying cost per hour for LED $\left(\frac{£30.00}{2000}\right) = 0.0625\text{p}/£0.000625$

buying cost per hour for halogen = $\left(\frac{£1.50}{2000}\right) = 0.075\text{p}/£0.00075$
a calculation of both buying costs scores 1 mark

operating cost per hour for LED = $\left(\frac{£67.20}{48000}\right) = 0.14\text{p}/£0.0014$

operating cost per hour for halogen = $\left(\frac{£16.00}{2000}\right) = 0.8\text{p}/£0.008$
a calculation of both operating costs scores 1 mark

all calculations show a correct unit

***all** units correct scores 1 mark*

statement based on correct calculations of **both** buying **and** operating costs, that overall LED is cheaper

correct statement scores 1 mark

1

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