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Exam Preparation and Free Resources

Name of the Student:_____

Max. **Marks : 21 Marks**　　　　　　　　　　　　　　　　　　**Time : 21 Minutes**

Mark Schemes

Q1.

(a)　(i)　5.88 (watts)

　　　　　　*an answer of 5.9 scores **2** marks*
　　　　　　*allow **1** mark for correct substitution ie*

　　　　　　$0.42 = \dfrac{\text{power out}}{14}$

　　　　　　*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 $\left(\dfrac{£30.00}{48000}\right)$ = 0.0625p/£0.000625

buying cost per hour for halogen = $\left(\dfrac{£1.50}{2000}\right)$ = 0.075p/£0.00075

> *a calculation of both buying costs scores 1 mark*

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

operating cost per hour for halogen= $\left(\dfrac{£16.00}{2000}\right)$ = 0.8p/£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*

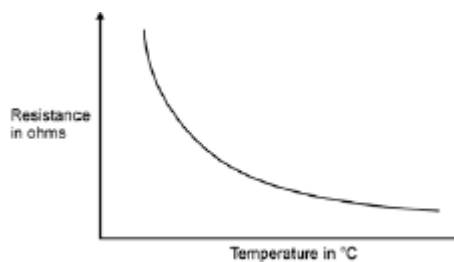**1**

[12]

Q2.

   (a)   (i)

1

   (ii)   360

> *allow 1 mark for correct substitution, ie 9 = 0.025 × R*

2

   (iii)   sketch graph of correct shape, ie

(iv)   An automatic circuit to switch a heating system on and off.

(b)   so ammeter reduces / affects current as little as possible

accept so does not reduce / change the current (it is measuring)
accurate reading is insufficient
not change the resistance is insufficient

(c)   gives a common understanding

accept is easier to share results
accept can compare results
do not need to be converted is insufficient
prevent errors is insufficient

(d)   replace Bunsen (and water) with a lamp

accept any way of changing light level

replace thermometer with light sensor

accept any way of measuring a change in light level
datalogger alone is insufficient

[9]