

Name of the Student: _____

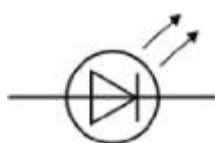
Max. Marks : 20 Marks

Time : 20 Minutes

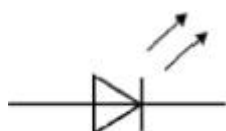
Mark Schemes

Q1.

(a)



allow:



1

(b) there is a gap in the circuit

or

S_1 needs to be closed to complete the circuit

or

S_1 needs to be closed to turn the hair straighteners on

1

(c) $E = 3600 \text{ (J)}$

1

$$3600 = 120 \times t$$

this mark may score if E is incorrectly / not converted

1

$$t = \frac{3600}{120}$$

this mark may score if E is incorrectly / not converted

1

$$t = 30 \text{ (s)}$$

allow an answer consistent with their value of E

1

(d) the total resistance of the circuit decreases

1

so the current increases

1

which increases the power output

1

Q2.

(a) $E = \frac{1.25 \times 10^{18}}{3.16 \times 10^7}$

1

$$E = 3.96 \times 10^{10} \text{ (J)}$$

an answer that rounds to 3.96×10^{10} (J) scores 1 mark

1

(b) $t = 86\,400 \text{ (s)}$

1

$$27\,000 = I \times 86\,400$$

allow a correct substitution of an incorrectly/not converted value of t

1

$$I = \frac{27\,000}{86\,400}$$

allow a correct rearrangement using an incorrectly/not converted value of t

1

$$I = 0.3125 \text{ (A)}$$

allow a correct calculation using an incorrectly/not converted value of t

allow a correctly calculated answer rounded to 2 or 3 sf

1

(c) $0.15 = \frac{\text{useful power output}}{7800}$

allow a correct substitution of an incorrectly/not converted value of total power input

1

$$\text{useful power output} = 0.15 \times 7800$$

allow a correct rearrangement using an incorrectly/not converted value of total power input

1

$$\text{useful power output} = 1170 \text{ (W)}$$

this answer only but allow 1200 (W) if correct working shown

1

(d) a really large area of land would need to be covered with solar cells

1

due to the low useful power output of the solar cells

allow due to the low efficiency of the solar cells

or

number of hours of daylight is too low (in UK)

or

low solar intensity (in UK)

or

solar radiation (in UK) is too low

or

*material for construction of solar cells and/or lithium
batteries is in limited supply*