

Mark schemes

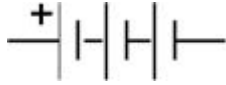
1.

(a) correct circuit symbol

1

3 cells joined in series in correct orientation

e.g.



ignore absence of + symbol

1

(b) $R = \frac{12}{1.6}$

1

$R = 7.5 (\Omega)$

1

an answer of 7.5 (Ω) scores 2 marks

(c) 4.0 (Ω)

allow their answer to part (b) – 3.5 correctly calculated

1

(d) it decreases

1

the current would be higher (for the same p.d.)

reason only scores if correct box is chosen

or

more than one path for charge to flow

allow current for charge

or

total resistance is always less than the smallest individual resistance

1

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2.

(a) 

1

(b) $E = 13 \times 230$

1

$E = 2990 (J)$

1

an answer 2990 (J) scores 2 marks

(c) charge flow = current \times time

allow $Q = It$

1

(d) $1.52 = I \times 0.40$

1

$$I = \frac{1.52}{0.40}$$

1

$$I = 3.8 \text{ (A)}$$

1

an answer of 3.8 (A) scores 3 marks

(e) $E = 0.00175 \times 205\,000$

1

$$E = 359 \text{ (J)}$$

allow an answer that rounds to 360 (J) for 2 marks

1

an answer of 359 (J) scores 2 marks

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3.

(a) to vary the current.

1

(b) the temperature of the filament increases

allow the filament heats up

1

(c) $E = 12 \times 8.5$

1

$$E = 102 \text{ (J)}$$

an answer of 102 (J) scores 2 marks

1

(d) (LED lamp)

longer lifetime (per lamp)

1

wastes less energy

or

lower input energy (for same light energy output)

1

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4.

(a) current

1

(b) $4.2 = 3.5 \times 10^{-3} \times R$

1

$R = 4.2 / 3.5 \times 10^{-3}$

1

$R = 1200 (\Omega)$

an answer of 1200 (Ω) scores 3 marks

an answer of 1.2 scores 2 marks

1

(c) conversion from minutes to seconds (300 s)

1

$Q = 0.0035 \times (5 \times 60)$

1

$Q = 1.05 \text{ C}$

an answer of 1.05 (C) scores 3 marks

an answer of 17.5 scores 1 mark

an answer of 1050 or 0.0175 scores 2 marks

1

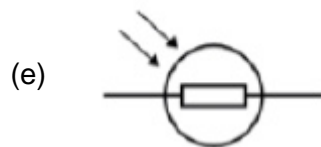
(d) (potential difference) increases

1

(because thermistor) resistance increases

2nd mark dependent on scoring 1st mark

1



1

[10]

5.

(a) current that is always in the same direction

1

(b) total resistance = 30 (Ω)

1

$V = 0.4 \times 30$

1

12 (V)

1

allow 12 (V) with no working shown for 3 marks

an answer of 8 (V) or 4 (V) gains 2 marks only

(c) $P = 0.4 \times 12 = 4.8$

1

allow 5 (W) with no working shown for 2 marks
allow 4.8 (W) with no working shown for 1 mark

[6]

6.

(a) filament bulb

1

(b) (i) 6 V

1

(ii) 3 Ω or their $\frac{(i)}{2}$ correctly calculated
allow 1 mark for correct substitution ie
 $6 = 2 \times R$
or their $(i) = 2 \times R$

2

(iii) 1 A

1

(iv) 6 Ω or their (i) / their (iii) correctly calculated

1

(v)

Decrease	Stay the same	Increase
	✓	
✓		
✓		

1
1
1

[9]