Mark schemes

Q1.

(a) V = 0.10 × 45

1

4.5 (V)

1

(b) R = 12 / 0.10

1

total resistance = 120 (Ω)

1

R = 120 – 105 = 15 (Ω)

1

(c) (total) resistance decreases

1

(so) current increases

1

[7]

Q2.

(a) 20

1

(b) 50

1

(c) (i) 115

1

(ii) 230

1

(iii) if one goes out the other still works

or

brighter

accept power (output) is greater

can be switched on/off independently is insufficient

1

(d) the outside/casing is plastic

there is plastic around the wires is insufficient

it is plastic is insufficient

1

and plastic is an insulator

an answer the light fitting is double insulated gains both marks

1

(e) (residual current) circuit breaker

accept RCCB

accept RCBO

accept RCCD

accept RCB

accept miniature circuit breaker / MCB

trip switch is insufficient

breaker is insufficient

do not accept earth wire

1

[8]

Q3.

(a) 3rd box from the left ticked

1

(b) correct symbol drawn in series with other components

symbol must have upper case A

1

(c) (i) 9 + 3 = 12V

reason only scores if this mark scored

1

pd of battery is shared between the variable resistor and fixed resistor

accept V1 + V2 = pd of the battery

accept p.d. is shared in a series circuit

accept voltage for p.d.

1

(ii) 600

reason only scores if this mark scored

1

p.d. of supply shared equally when resistors have the same value

or

ratio of the p.d. is the same as the ratio of the resistance

1

(iii) 0.015

or

their (c)(i) ÷ (their (c)(ii) + 200) correctly calculated

allow 2 marks for correct substitution ie 12 = I × 800

or

their (c)(i) = I × (their (c)(ii) + 200)

allow 1 mark for total resistance = 800 (Ω) or their (c)(ii) + 200

or

allow 1 mark for a substitution of 12 = I × 200

or

their (c)(i) = I × 200

or

alternative method using the graph

V = 3 V (1)

3 = I × 200 (1)

3

[9]

Q4.

(a) filament bulb

1

(b) (i) 6 V

1

(ii) 3 Ω or their correctly calculated

allow 1 mark for correct substitution ie

6 = 2 × R

or their (i) = 2 × 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]

Q5.

(a)

allow 1 mark for each correct line if more than one line is drawn from any symbol then all of those lines are wrong

3

(b) (i) half

1

(ii) 3(V)

1

(iii) V1

1

(c) (i) potential difference / voltage of the power supply

accept the power supply

accept the voltage / volts

accept number of cells / batteries

accept (same) cells / batteries

do not accept same ammeter / switch / wires

1

(ii) bar drawn – height 1.(00)A

ignore width of bar

allow 1 mark for bar shorter than 3rd bar

2

(iii) as the number of resistors increases the current decreases

1

[10]

Q6.

(a) 35

an answer with more than 2 sig figs that rounds to 35 gains 2 marks

allow 2 marks for correct method, ie

allow 1 mark for I = 6.5 (A) or R =

an answer 8.8 gains 2 marks

an answer with more than 2 sig figs that rounds to 8.8 gains 1 mark

3

(b) (maximum) current exceeds maximum safe current for a 2.5 mm2 wire

accept power exceeds maximum safe power for a 2.5 mm2 wire

or

(maximum) current exceeds 20 (A)

(maximum) current = 26 (A) is insufficient

1

a 2.5 mm2 wire would overheat / melt

accept socket for wire

do not accept plug for wire

1

(c) a.c. is constantly changing direction

accept a.c. flows in two directions

accept a.c. changes direction

a.c. travels in different directions is insufficient

1

d.c. flows in one direction only

1

[7]

Q7.

(a) (i) 6

1

(ii) variable resistor

1

(iii) voltmeter

1

(b) (i) point at 3 V ringed

1

(ii) The student misread the ammeter.

1

(iii) 1 (volt)

accept every volt

1

(c) as one increases so does the other

or

directly proportional

or

positive correlation

accept a numerical description, eg when one doubles the other also doubles

1

[7]