

Mark schemes

1	(a)	$V = 0.10 \times 45$	1	
		4.5 (V)	1	
	(b)	$R = 12 / 0.10$	1	
		total resistance = 120 (Ω)	1	
		$R = 120 - 105 = 15$ (Ω)	1	
1	(c)	(total) resistance decreases	1	
		(so) current increases	1	
2	(a)	20	1	
	(b)	50	1	
	(c)	(i)	115	1
		(ii)	230	1
	(iii)	if one goes out the other still works		
		or		
		brighter		
		<i>accept power (output) is greater</i>		
		<i>can be switched on/off independently is insufficient</i>		1
	(d)	the outside/casing is plastic		
<i>there is plastic around the wires is insufficient</i>				
<i>it is plastic is insufficient</i>			1	
	and plastic is an insulator			
	<i>an answer the light fitting is double insulated gains both marks</i>		1	

[7]

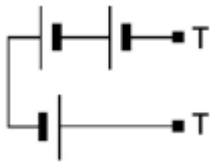
- (e) (residual current) circuit breaker
accept RCCB
accept RCBO
accept RCCD
accept RCB
accept miniature circuit breaker / MCB
trip switch is insufficient
breaker is insufficient
do not accept earth wire

1

[8]

3

- (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

p.d. of battery is shared between the variable resistor and fixed resistor

accept $V_1 + V_2 = pd$ 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) \div (their (c)(ii) + 200) correctly calculated
allow 2 marks for correct substitution ie $12 = I \times 800$
or
their (c)(i) = $I \times$ (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 $12 = I \times 200$
or
their (c)(i) = $I \times 200$
or
alternative method using the graph
 $V = 3 V (1)$
 $3 = I \times 200 (1)$

3
[9]

4

(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

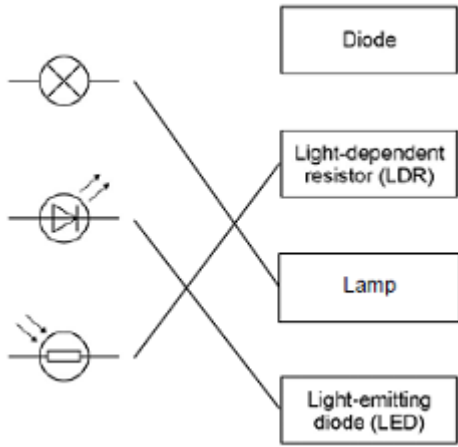
(v)

Decrease	Stay the same	Increase
	✓	
✓		
✓		

1
 1
 1

[9]

5 (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) V_1

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]

6 (a) 35

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

allow 2 marks for correct method, ie $\frac{230}{6.5}$

allow 1 mark for $I = 6.5$ (A) or $R = \frac{230}{26}$

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]

7

(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]