

Q1. (2018)

a)

06.1	a curve in the first and third quadrants only, passing through origin		1	AO1 6.2.1.4
	decreasing gradient		1	

b)

06.3		an answer of 60 scores 5 calculation marks		
	$3 = I^2 \times 12$		1	AO2 6.2.4.1 6.2.4.2
	$I = \sqrt{\left(\frac{3}{12}\right)}$		1	
	$I = 0.5 \text{ (A)}$		1	
	$Q = 0.5 \times 60 = 30$	allow $Q =$ their calculated $I \times 60$	1	
	$Q_{\text{total}} = 60$	allow an answer that is consistent with their calculated value of I	1	
	or			
	$3 = I^2 \times 12 \text{ (1)}$			
	$I = \sqrt{\left(\frac{3}{12}\right)} \text{ (1)}$			
	$I = 0.5 \text{ (A) (1)}$			
	$I_{\text{total}} = 1.0 \text{ (A) (1)}$	allow $I_{\text{total}} =$ their $I \times 2$		AO1
	$Q = 1.0 \times 60 = 60 \text{ (1)}$	allow an answer that is consistent with their calculated value of I		
	coulombs or C		1	

Q2. (2019)

a)

01.1	ammeter in series with the resistor, voltmeter in parallel with the resistor		1	AO1/1 6.2.1.4 RP 16 WS 2.4	A
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b)

01.2	current decreased	ignore slows down	1	AO1/1 6.2.1.3 RP 16 WS 3.6	E
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c)

01.3	reverse the connections to the cell	allow battery for cell allow reverse the cell	1	AO1/2 6.2.1.3 RP 16 WS 2.2	E
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d)

01.4	(directly) proportional	do not allow inversely proportional do not allow indirectly proportional	1	AO1/2 6.2.1.3 RP 16 WS 3.5	G
e)					
01.5	potential difference = current × resistance or $V=IR$	allow voltage for potential difference allow any correct re-arrangement	1	AO1/1 6.2.1.3 RP 16 WS 3.3	E
f)					
01.6	 $3.0 = 0.12 \times R$ $R = \frac{3.0}{0.12}$ $R = 25 (\Omega)$	an answer of 25 (Ω) scores 3 marks	 1 1 1	AO2/1 6.2.1.3 RP 16 WS 3.3	E

Q3. (2020)

a)

03.1	(the variable resistor) changes the resistance of the circuit		1	AO1 6.2.1.3 6.2.1.4	
	to keep the current the same		1	RPA 15	
	so the temperature of the wire is kept constant	allow to control the temperature of the wire	1		

b)

03.3	resistance is directly proportional to length	allow length is directly proportional to resistance allow as length increases resistance increases for 1 mark allow positive correlation for 1 mark	2	AO1 6.2.1.3 RPA 15	
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Q4. (2020)

03.4	resistance = 7.5 (Ω)	allow a range from 7.4 to 7.6	1	AO3 6.2.1.3	
	$0.90 = I \times 7.5$	allow their value of R read from the graph correctly substituted	1		
	$I = \frac{0.90}{7.5}$	allow a correct re-arrangement using their value of R read from the graph	1		
	$I = 0.12 (\text{A})$	allow a value consistent with their value of R read from the graph	1		

Q5. (2021)

a)

01.1	$V = IR$		1	AO1 6.2.1.3
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b)

01.2	$3.9 = 0.12 \times R$		1	AO2 6.2.1.3
	$R = \frac{3.9}{0.12}$		1	
	$R = 32.5 \text{ } (\Omega)$	allow $R = 33 \text{ } (\Omega)$	1	

Q6. (2021)

a)

01.5	thermistor		1	AO1 6.2.1.1
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b)

01.6	the current will increase		1	AO1 6.2.1.4
	(because) the resistance decreases		1	

Q7. (2021)

05.3	potential difference is (directly) proportional to current		1	AO2 6.2.1.4
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Q8. (2022)

a)

02.5	thermistor		1	AO1 6.2.1.4
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b)

02.6	250 (Ω)	allow an answer in the range 240 (Ω) to 260 (Ω)	2	AO3 6.2.1.4
		allow 1 mark for temperature = 160 ($^{\circ}\text{C}$)		

Q9. (2022)

05.1	reverse the connections to the LED / battery	allow reverse the potential difference across the LED / diode	1	AO3 6.2.1.4
	because an LED / diode only allows current through in one direction	allow because an LED / diode has a large resistance in the reverse direction	1	

Q10. (2022)

05.4	$1.4 = Q \times 200$		1	AO2 6.2.4.2 6.2.1.2
	$Q = \frac{1.4}{200}$		1	
	$Q = 0.0070 \text{ (C)}$		1	
	$0.0070 = I \times 2.8 \times 10^{-4}$	allow a correct substitution of their calculated value of Q	1	
	$I = \frac{0.0070}{2.8 \times 10^{-4}}$	allow a correct re-arrangement using their value of Q	1	
	$I = 25 \text{ (A)}$	allow an answer consistent with their value of Q	1	
	OR			
	$1.4 = P \times 2.8 \times 10^{-4} \text{ (1)}$			
	$P = \frac{1.4}{2.8 \times 10^{-4}} \text{ (1)}$			
	$P = 5000 \text{ (W) (1)}$			
	$5000 = 200 \times I \text{ (1)}$	allow a correct substitution of their calculated value of P		
	$I = \frac{5000}{200} \text{ (1)}$	allow a correct re-arrangement using their value of P		
	$I = 25 \text{ (A) (1)}$	allow an answer consistent with their value of P		

Q11. (2023)

a)

02.1	voltmeter symbol correct and connected across the resistors		1	AO1 6.2.1.3 6.2.1.1 6.2.1.4 RPA15
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b)

02.3	potential difference = current × resistance		1	AO1 6.2.1.3 RPA15
	or			
	$V = IR$			

c)

02.4	$480 \text{ mA} = 0.48 \text{ A}$		1	AO2 6.2.1.3 RPA15
	$V = 0.48 \times 7.5$	allow a correct substitution of an incorrectly / not converted value for current	1	
	$V = 3.6 \text{ (V)}$	allow an answer consistent with their incorrectly / not converted value for current	1	

d)

02.5	x-axis labelled resistance of R in Ω and y-axis labelled total resistance (of resistors) in Ω		1	AO2 6.2.1.3 RPA15
	both points plotted correctly	points must be plotted within $\frac{1}{2}$ small square	1	
	curved line of best fit drawn	allow a curved line of best fit which ignores an outlier	1	
e)				
02.6	reading from graph consistent with their line of best fit	allow an answer within $\frac{1}{2}$ small square	1	AO3 6.2.1.3 RPA15

Q12. (2023)

03.4	resistance (of the LDR) increases	allow resistance (of the circuit) increases	1	AO1
	(so) the current decreases	allow so the LDR has a greater (share of the) potential difference	1	AO3
	(so) the potential difference across R decreases	dependent on MP1	1	AO3 6.2.1.4 6.2.1.3 6.2.2 6.2.2

Q13. (2024)

01.7	decreases		1	AO1 6.2.4.1
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Q14. (2024)

a)

03.3	4 points plotted correctly	allow a tolerance of $\pm \frac{1}{2}$ small square allow 1 mark for 3 points plotted correctly	2	AO2 6.2.1.4 RPA16
	line of best fit	ignore line before 1.8 V	1	

b)

03.4	the current is zero	allow the current stops	1	AO1 6.2.1.4
	because the LED / diode has a very high resistance (in the reverse direction)	allow because the LED / diode only allows current in one direction	1	RPA16

c)

3.6	resistor at constant temperature		1	AO1 6.2.1.4
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