01. 0625_s20_MS_61 Q: 2

2(a)(i)	$V_1 = 3.5$	1
2(a)(ii)	$I_1 = 0.38$	1
2(a)(iii)	$R_1 = 9.21$ (ecf allowed)	1
	Unit Ω	1

(b)	$R_2 = 5.7$ and $R_3 = 4.6$, with consistent 2 sf	1
(c)	Total $R = 20$	1
(d)	Statement matches readings (Expect B)	1
	Justification with suitable numbers quoted	1
(e)	Three lamps in series, correct symbol	1
	Voltmeter across lamp L_3	1
	Other symbols and circuit correct	1

02. 0625_s20_MS_63 Q: 2

(a)(i)	correct voltmeter symbol in parallel with resistor	1
	correct ammeter symbol in series	1

(a)(ii)	V_A = 2.4 (V)	1
	I_A = 0.48 (A)	1
(a)(iii)	correct calculation of R_A = 5(.0) / ecf	1
(b)	correct unit for R – Ω	1
(c)	all R values to consistent 2 or consistent 3 significant figures	1
(d)	statement matching results	1
	justification matching statement with values from results used, e.g. within limits of experimental accuracy	1
(e)(i)	correct symbol for potentiometer	1
(e)(ii)	can obtain average value / plot a graph	1

03. 0625_s19_MS_63 Q: 3

(a)	correct voltmeter symbol in parallel with **X**	**1**
(b)	I = 0.22 (A)	**1**
	V = 1.1 (V)	**1**
	A, V, Ω	**1**
(c)	statement matching results and 'currents the same within limits of experimental accuracy' / owtte	**1**
(d)(i)	R values 5.0/ecf, 14(.3478), 24/(23.8095) (Ω)	**1**
	consistent 2 or consistent 3 sig figs	**1**
(d)(ii)	R_Y = 9.0 (Ω) and R_Z = 10 (Ω)	**1**
(e)(i)	3 resistors in parallel arrangement and circuit symbols correct	**1**
	voltmeter and ammeter in correct arrangement and circuit symbols correct	**1**
(e)(ii)	$10R_P = R_S$	**1**

04. 0625_w19_MS_61 Q: 2

(a)(i)	V = 2.5	**1**
	I = 0.3(0)	**1**
	Both units correct	**1**
(a)(ii)	R_1 8.33 (ecf allowed)	**1**
(b)	R_2 11.4 with unit Ω	**1**
(c)	Statement matches results	**1**
	Justification matches statement	**1**
(d)	Lamps in parallel and correct symbol for lamp	**1**
	One voltmeter, with correct symbol, in parallel with lamps	**1**
	Variable resistor in correct position, with correct symbol	**1**

05. 0625_m18_MS_62 Q: 3

(a)	correct voltmeter symbol in parallel with lamp **X**	1
(b)	I_S = 0.34 (A)	1
(c)(i)	V_X = 1.2 (V) and V_Y = 1.9 (V)	1
(c)(ii)	V_S present and correct units (A, V) seen in **(b)** and **(c)**	1
(c)(iii)	statement matching results	1
	justification matching statement with use of comparative values (e.g. 3.1 and 3.0 are within limits of experimental accuracy)	1
(d)	correct calculation of R_1 (3.5 / ecf)	1
(e)(i)	lamps in parallel arrangement	1
	all circuit elements in correct arrangement and all circuit symbols correct	1
	resistance increases with temperature	1
(e)(ii)	$R_2 > R_1$ and brighter lamp has higher temperature	1

06. 0625_s18_MS_61 Q: 2

(a)(i)	EITHER V_1 = 2.2 **OR** I = 0.46 correct	1
	Both values correct **and** correct units V and A	1
(a)(ii)	R_1 = 4.78 (Ω) (allow ecf from 2(a)(i))	1
(b)	Statement matches readings (Expect YES)	1
	Expect justification to include the idea of within the limits of experimental accuracy (but accept beyond limits, if ecf allowed for statement matching readings)	1
(c)	R = 14.3 **OR** 14.4; 2 or 3 significant figures required	1
	Unit Ω	1
(d)	$3V_1$	1
(e)	3 resistors in parallel	1
	Correct variable resistor symbol	1
	Voltmeter symbol correct **and** circuit correct	1

07. 0625_w18_MS_62 Q: 2

(a)(i)	V_T = 2.5(0) (V)	1
	I_T = 0.18(0) (A)	1
(a)(ii)	0.45 (W)	1
(b)(i)	P_X = 0.23, P_Y = 0.22 and unit W	1
(b)(ii)	statement: Yes idea of within the limits of experimental accuracy	1
	explained: e.g. close enough, very close, not too far apart	1
(c)	statement: disagree / no	1
	low current not sufficient to make lamp glow / first lamp would not glow with no current / since there is a current (other lamp cannot be broken).	1
(d)	lamps and voltmeter in parallel	1
	correct symbols for lamps, ammeter and voltmeter	1
	variable resistor, correct symbol and position in a correct circuit	1

---

08. 0625_w17_MS_61 Q: 1

(a)(i)	1.8 (V)	1
	0.38 (A)	1
(a)(ii)	R_1 4.74 (4.737, 4.7)	1
(b)	R_2 = 9.47 OR 9.5 (*2* or 3 significant figures required)	1
(c)	Pointer at 0.13	1
(d)	Statement YES or NO (owtte) Justification to include the idea of within (or beyond, ecf) the limits of experimental accuracy, matching the statement	1
(e)	Determine each resistance in turn	1
(f)	Three resistors in parallel, ONE voltmeter in parallel with resistors and correct symbols for voltmeter and resistors	1
	Variable resistor in series with the supply, correct symbol in a correct circuit	1
(g)	Repeat with different currents OR to obtain a range of readings	1

---

09. 0625_w17_MS_63 Q: 2

(a)	correct voltmeter symbol in parallel with **X**	1
(b)	I_S = 0.18 (A)	1
(c)(i)	V_X = 1.2 (V) AND V_Y = 2.3 (V)	1
(c)(ii)	correct units (A, V) seen in **(b)** and **(c)**	1
(c)(iii)	statement matching readings	1
	justification, with use of values seen, matching readings and statement e.g: '3.5 V and 3.7 V are within limits of expt accuracy'	1
(d)	correct calculation of *R*s (20.6)	1
	2 / 3 sig figs and unit(Ω)	1
(e)(i)	resistors in parallel with correct symbol	1
	rest of circuit correct	1
(e)(ii)	valid suggestion AND explanation consistent with results	1

---

10. 0625_s16_MS_63 Q: 4

(a)	correct voltmeter symbol in parallel with lamp **P**	1
(b)	I = 0.23 unit of A	1 1
(c)	V_P = 2.7 and V_Q = 0.3	1
(d)(i)	some current in the circuit, pd across lamp **Q** is small / not equal to supply voltage / reference to lamp **P** bright and is in series	1
(d)(ii)	V_P greater than / near working voltage V_Q much less than working voltage	1 1
(e)	R = 13(.0) allow ecf 2 / 3sig figs and unit of Ω	1 1
(f)	statement matches results some correct values used and reference to 'within limits of experimental accuracy' / owtte	1 1
		Total: 11

---

11. 0625_w16_MS_61 Q: 4

	MP1 On circuit diagram: one voltmeter in parallel with any component	1
	MP2 Circuit diagram correctly shows power supply, ammeter, unless in a branch, two or more resistors in parallel	1
	MP3 Circuit diagram: Correct symbols for ammeter, voltmeter and fixed resistor	1
	MP4 Repeat with a different number of resistors (in parallel)	1
	MP5 Table that includes columns for number of resistors, voltage/V and current/A	1
	MP6 & MP7 Then any two from: Resistance calculated (may be shown in table) Use low current (to stop resistors getting too hot)/switch off between readings Use at least 5 different combinations Repeat with different current or voltage or variable resistor setting Drawing a graph of number of resistors against combined resistance	2
	Total:	7

---

12. 0625_s15_MS_61 Q: 3

(a) (i) $V = 1.8$ [1]

$I = 0.25$ AND both units correct, V and A [1]

(ii) R_S calculated correctly, e.c.f. **(i)**, expect 7.2 (Ω) [1]

(b) (i) lamps in parallel and ammeter in a correct position [1]

voltmeter in correct position, with rest of circuit and symbols correct [1]

(ii)(iii) $R_P = 3.3$ or 3.33 with unit Ω and 2 or 3 significant figures AND R_S/R_P calculated [1]

(c) (i) voltage or p.d., accept current [1]

(ii) adjust power supply OR add resistor / variable resistor [1]

[Total: 8]

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13. 0625_s15_MS_62 Q: 3

(a) (i) $V = 2.4(0)$ (V) [1]

$I = 0.84$ (A), both units correct [1]

(ii) R_P = 2.86 OR 2.9 (Ω) ecf **(a)(i)** [1]

(b) lamps in series [1]

voltmeter and ammeter in correct position, with rest of circuit and symbols correct [1]

(c) R_S = 11.4 OR 11 (Ω) NOT more than 3 sig. figs. [1]

(d) (i) correct symbol for variable resistor NOT potentiometer [1]

(ii) X correctly positioned [1]

[Total: 8]

---

14. 0625_w15_MS_62 Q: 3

(a) **(i)** V_1 = 2(.0) (V) [1]
I_1 = 0.32 (A) [1]

(ii) R_1 = 6.25 (Ω) OR e.c.f. **(i)** AND correct units V, A, Ω in **(i)** and **(ii)** [1]

(b) correct arrangement of resistors [1]
correct position for voltmeter AND correct circuit symbols AND correct labelling of resistors **A**, **B** and **C** [1]

(c) **(i)** 3.0 / 3.04 / 3.043 (Ω) [1]

(ii) 2.1 / 2.05 / 2.06 / 2.07 / 2.08 OR e.c.f. AND no unit [1]

(d) statement matches results [1]
justification including the idea of within (or beyond) the limits of experimental accuracy [1]

[Total: 9]

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15. 0625_w15_MS_63 Q: 4

(a) correct symbol for voltmeter AND shown connected in parallel [1]

(b) 3(.0)(V) AND 0.38(A) [1]

(c) arrows showing 2.8–3.0 V AND 0.76–0.78 A [1]

(d) R_1 = 7.9 (OR e.c.f.), R_2 = 3.8, R_3 = 2.7 [1]
correct unit (symbol or word) [1]
consistently 2 sig. figs. OR consistently 3 sig. figs. [1]

(e) **(i)** statement matches results with any relevant values quoted [1]
justification matching statement [1]

(ii) R_3 should be $^1/_3 \times R_1$ owtte [1]

[Total: 9]

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16. 0625_w14_MS_63 Q: 5

(a) voltmeter in parallel with lamp **L** and with correct symbol [1]

(b)(c) table:
V = 1.7 (V) [1]
I = 0.18 (A) [1]
R = 9.4(4) ecf **(b)**, 7.6 / 7.58 with 2 or 3 sig. figs. [1]
all units correct (V, A, Ω) [1]

(d) statement matches results, with matching justification which refers to values being 'too different' / 'difference beyond limits of experimental accuracy' owtte [1]

(e) lamp in circuit 1 brighter than in circuit 2
and has greater resistance [1]

(f) correct circuit symbol for variable resistor (rectangle with strike-through arrow only) [1]

connected in correct series circuit [1]

[Total: 9]

---

17. 0625_s13_MS_62 Q: 3

(a) **(i)** V_1 = 0.7 (V) [1]
I = 0.45 (A) [1]

(ii) R_1 = 1.56 or 1.6 (Ω) e.c.f. **(i)** [1]

(b) V_2 = 0.6 (V) and V_3 = 0.5 (V) c.a.o. [1]

(c) 1.8 (V) e.c.f. V_1, V_2, V_3 [1]

(d) correct symbols for ammeter, lamp, voltmeter [1]
correct parallel circuit with ammeter and voltmeter correctly connected [1]

(e) statement matches candidate's results and idea of within/beyond limits of experimental accuracy or that values are too far apart / too different [1]

(f) brighter [1]

[Total: 9]

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18. 0625_s13_MS_63 Q: 3

(a) correct symbol for voltmeter [1]

(b) **(i)** 2.59, 8.00, 3.91 [1]
consistent 2 or 3 sig. figs. [1]

(ii) units all correct (symbols or words) [1]

(c) statement matches result (expect 'No') [1]
R figures quoted appropriately and matching statement
(need to see too different o.w.t.t.e.) [1]

(d) correct parallel connection [1]

[Total: 7]

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19. 0625_w13_MS_61 Q: 3

(a) **(i)** 1.8 (V) [1]
0.3 (A) [1]

(ii) P_1 = 0.54 (W) e.c.f. allowed [1]

(iii)(iv)(v) P_T = 1.59 (or 1.6) W [1]

(b) statement matches results (expect YES) e.c.f. allowed [1]
justification in terms of within or beyond limits of experimental accuracy o.w.t.t.e. [1]

(c) **(i)** diagram:
lamps in parallel, variable resistor in series with power supply, with correct symbols for variable resistor, lamps and voltmeter [1]
one voltmeter correctly positioned [1]

(ii) vary current (or p.d.) [1]

[Total: 9]

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20. 0625_s12_MS_63 Q: 3

(a) **(i)** V_1 = 1.9 [1]
I_1 = 0.3 [1]
Units V and A both correct [1]

(ii)/(iii) R_P = 6.33 and $4R_P$ = 25.3/25.2 to 2 or 3 sig. figs. [1]
Ω [1]

(b) R_S = 23.8 (Ω) or 24 (Ω) [1]

(c) Correct statement (from candidate's work)
with matching justification (idea of within or beyond experimental accuracy) [1]

(d) Circuit: correct symbols for ammeter, voltmeter and lamp in correct series circuit [1]

(e) **(i)** Change/control current/voltage [1]

(ii) To obtain range of readings (or wtte) [1]

[Total: 10]

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91. 0625_w12_MS_61 Q: 3

(a) Correct symbols for ammeter, voltmeter and lamps [1]
Ammeter and voltmeter in correct positions [1]
Correct parallel circuit [1]

(b) **(i)** and **(ii)** V_A = 1.9(V) R_A = 2.9(2) (Ω) [1]
Units V and Ω [1]

(iii) Pointer at correct position (0.65) [1]

(c) No mark awarded

(d) Statement matches readings (expect YES) [1]
Justified with idea of experimental inaccuracy [1]
(expect 'close enough', owtte)

[Total: 8]

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22. 0625_w12_MS_62 Q: 3

(a) Voltmeter symbol and position correct [1]

(b) Pointer in correct position [1]

(c) **(i)** $I_1 = 0.84\,A$, $I_2 = 0.33\,A$, $I_3 = 0.50\,A$, all correct no significant figures penalty
Unit at least once and not contradicted [1]

(ii) No mark awarded

(iii) Sensible comment about experimental inaccuracy
e.g. difficulty in reading meter/scale or meter has a zero error [1]

(d) Circuit: correct symbol for variable resistor (not potential divider) [1]
Variable resistor in a correct position [1]

(e) Workable solution, e.g. short circuit each in turn/exchange of lamp from other circuit branch/put lamps in parallel and check/use voltmeter to check pd across bulbs plus what is observed [1]

[Total: 7]