

Q1. (2018)

05.4		an answer of 25 000 scores 4 marks		AO2 6.1.1.4
	$E = 15\,000\,000 \text{ (J)}$		1	
	$t = 600 \text{ (s)}$		1	
	$p = \frac{15\,000\,000}{600}$	allow a correct substitution of incorrectly / not converted values of E and / or t	1	
	$P = 25\,000 \text{ (W)}$	allow a correct calculation using incorrectly / not converted values of E and / or t	1	

Q2. (2019)

a)

03.2		an answer of 30 (A) scores 4 marks		AO2.1 6.2.4.1	E
	$6.9 \text{ k(W)} = 6900 \text{ (W)}$		1		
	$6900 = 230 \times I$	allow correct substitution of an incorrectly/not converted value for power	1		
	$I = \frac{6900}{230}$	allow a correct transformation using an incorrectly/not converted value for power	1		
	$I = 30 \text{ (A)}$	allow a correct calculation using an incorrectly/not converted value for power	1		

b)

03.3	direct potential difference is always in the same direction	allow direct current is always in the same direction	1	AO1.1 6.2.3.1	E
	alternating potential difference changes direction	allow alternating current changes direction	1		

c)

03.4	lower potential difference across the cable	allow lower power/energy dissipation	1	AO1.1 6.1.2.2 6.2.4.1	E
	it is more efficient	allow it won't get as hot	1		
	OR				
	(lower resistance gives) a greater current (for the same potential difference) (1)				
	so the car battery can charge faster (1)				

Q3. (2019)

a)

05.1	electrons collide with particles in the heating element	allow there is a current in the heating element	1	AO1.1 6.2.4.2 6.3.2.1 WS 1.2	E
	which increases the (kinetic) energy of the particles (in the heating element)	allow internal store of energy increases	1		
		allow the particles (in the heating element) vibrate more rapidly			

b)

05.5		an answer of 4800 (J/kg °C) scores 6 marks a correct answer given to more than 2 s.f. scores 5 marks		AO2.1	E
	$E = 2600 \times 120$	allow a correct substitution of an incorrectly/not converted value of P and/or t.	1	6.3.2.2 6.1.1.3 6.1.1.4 WS 3.3	
	$E = 312\,000 \text{ (J)}$	this answer only	1		
		the equation $E=Pt$ must have been used to score subsequent marks.			
	$312\,000 = 0.80 \times c \times (100-18)$ or $312\,000 = 0.80 \times c \times (82)$	allow use of their value of E calculated using $E=Pt$ for this and subsequent steps	1		
	$c = \frac{312\,000}{0.80 \times 82}$		1		
	$c = 4\,756$		1		
	$c = 4\,800 \text{ (J/kg °C) (2 s.f.)}$	this mark can only be scored for a correct rounding of a value of c calculated using correct equations	1		

Q4. (2020)

a)

01.1	swap the blue wire and the green and yellow wire	allow connect the blue wire to the neutral pin and the yellow and green wire to the earth pin. allow swap the earth and neutral wires ignore the earth wire and neutral wire are wrongly connected	1	AO2 6.2.3.2
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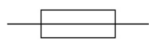
b)

01.2	230 (V)		1	AO1 6.2.3.1
	50 (Hz)		1	6.2.3.2

c)

01.3	0 (V)		1	AO1 6.2.3.2
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d)

01.4			1	AO1 6.2.1.1
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e)

01.5	the person could get an electric shock	allow so the person could be electrocuted	1	AO3 6.2.3.2
	because there is a current in the person	allow because the person provides a connection (from the washing machine) to earth allow because there is a potential difference across the person	1	

f)

01.6	the charge flows through the earth wire (instead of the person)		1	AO3 6.2.3.2
	because the resistance of the earth wire is much less than that of a person	allow so the case does not become live allow so the fuse will break / melt / blow	1	

Q5. (2021)

01.3	energy = power × time		1	AO1 6.2.4.2
	or			
	$E = P t$			

Q6. (2021)

01.4	time = 150 000s		1	AO2 6.2.4.2
	energy = $0.46 \times 150\,000$	allow a substitution using an incorrectly/not converted value of time	1	
	energy = 69 000 (J)	allow a correct calculation using an incorrectly/not converted value of time	1	

Q7. (2021)

a)

05.1	240 mW = 0.24 W		1	AO2 6.2.4.1
	$0.24 = 2.5 \times I$	allow a correct substitution using an incorrectly/not converted value of power	1	
	$I = \frac{0.24}{2.5}$	allow a correct re-arrangement using an incorrectly/not converted value of power	1	
	$I = 0.096 \text{ (A)}$	allow a correct calculation using an incorrectly/not converted value of power	1	

b)

05.2	because the potential difference is always positive	allow because potential difference does not change direction	1	AO1 6.2.3.1
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Q8. (2022)

a)

02.3	power = $\frac{\text{energy transferred}}{\text{time}}$		1	AO1 6.1.1.4 6.2.4.2 RPA14
	or			
	$P = \frac{E}{t}$			

b)

02.4	$50 = \frac{4750}{t}$		1	AO2 6.1.1.4 6.2.4.2
	or			
	$4750 = 50 \times t$			
	$t = \frac{4750}{50}$		1	
	$t = 95 \text{ (s)}$		1	

Q9. (2022)

05.2	290 mA = 0.29 A		1	AO2 6.2.4.1
	$0.98 = V \times 0.29$	allow a correct substitution of an incorrectly / not converted current	1	
	or			
	$R = \frac{0.98}{0.29^2}$	allow $R = 11.652\dots$ ignore $0.98 = (0.29)^2 \times R$		
		allow a correct substitution of an incorrectly / not converted current		
	$V = \frac{0.98}{0.29}$	allow $V = 11.65 \times 0.29$	1	
	$V = 3.379\dots$	allow a correct rearrangement using an incorrectly / not converted current	1	
	$V = 3.4 \text{ (V)}$	allow a correct calculation using an incorrectly / not converted current	1	
		allow a correctly rounded answer to 2 sig figs consistent with their calculated value of V using numbers from the question		

Q10. (2023)

a)

03.3	the street lamps are connected in parallel		1	AO3 6.2.2
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b)

03.5	$20 \text{ mA} = 0.020 \text{ A}$		1	AO2 6.2.4.1
	$6.0 = 0.020^2 \times R$	allow a correct substitution using an incorrectly / not converted value of current.	1	
	$R = \frac{6.0}{0.020^2}$	allow a correct re-arrangement using their incorrectly / not converted value of current.	1	
	$R = 15000 \text{ } (\Omega)$	allow an answer consistent with their incorrectly / not converted value of current	1	
	OR			
	$20 \text{ mA} = 0.020 \text{ A (1)}$			
	$V = \frac{6.0}{0.020} = 300 \text{ (1)}$			
	$R = \frac{300}{0.020} \text{ (1)}$			
	$R = 15000 \text{ } (\Omega) \text{ (1)}$			

Q11. (2024)

a)

01.4	$P = I^2 R$		1	AO1 6.2.4.1
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b)

01.5	$I = 0.500 \text{ A}$		1	AO2 6.2.4.1
	$P = 0.500^2 \times 640$	allow a correct substitution of an incorrectly / not converted current	1	
	$P = 160 \text{ (W)}$	allow a correct calculation using an incorrectly / not converted current	1	

c)

01.6	230 (V)		1	AO1 6.2.3.2
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