A-Level Physics: **w25 11**

Question 31 (Answer: **D**)

- Power is $P = VI$, and Ohm's law gives $I = V/R$.
- Substituting: $P = V \times V/R = V^2/R$.
- $P = I^2R$ is the other valid form; A and B mix the two together.

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Question 32 (Answer: **D**)

- With the resistance constant, $P = I^2R$, so the power goes as the *square* of the current.
- $(12.0/8.0)^2 = 1.5^2 = 2.25$.
- The new power is $2.3P$; C assumes it scales with I rather than I^2.

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Question 34 (Answer: **D**)

- Read the branches: PQ is two resistors in series ($2R$) and RS is two in parallel ($R/2$).
- So the top path P-Q-R is $3R$ and the bottom path P-S-R is $1.5R$ – the bottom path carries twice the current.
- $P = I^2R$, so SP (a full resistor at the larger current) dissipates $4V^2/9R$, beating PQ and RS at $2V^2/9R$.

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Question 30 (Answer: **B**)

- Potential difference is the energy transferred per unit charge.
- So 1 V = 1 J C^{-1}.
- A is the ampere, C is the watt, and D (J s C^{-2}) is the ohm.

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6(a)	energy transferred (to the component) per (unit) charge
6(b)(i)	$Q = It$ $= 0.030 \times 4.0 \times 60$
	$= 7.2$ C
6(b)(ii)	$I = V/R$ $I_1 = 8.0 / (430+240)$
	$= 0.012$ A
6(b)(iii)	$I_2 = 0.030 - I_1$ $= 0.030 - 0.012$ $= 0.018$ A

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6(b)(iv)	$R = V / I_2$ $= (8.0 - (0.018 \times 210)) / 0.018$
	$= 230\,\Omega$
	OR resistance of top branch = 8.0 / 0.018 $R = 8.0 / 0.018 - 210$
	$= 230\,\Omega$
	OR total circuit resistance = 8.0 / 0.030 = 267 $1 / 267 = 1 / (210 + R) + 1 / (430 + 240)$ $1 / 267 - 1 / 670 = 1 / (210 + R)$ $210 + R = 443$
	$R = 230\,\Omega$
6(c)	(When) the galvanometer reads 0 (A)
	The ratio of the resistances in the top branch will equal the ratio of the resistances in the bottom branch (so the resistance of X can be determined)
	OR The ratio of the left pair of resistances will equal the ratio of the right pair of resistances