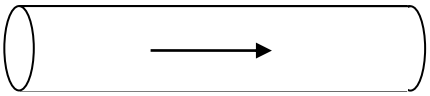
**Quiz B11**

**Current and circuits**

**1.** Electric current is established in a cylindrical metallic wire.



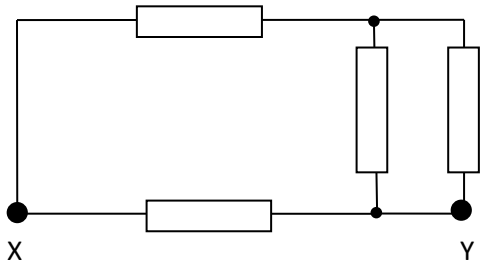
The current is

**A** the number of electrons moving past the cross sectional area of the wire per unit time.
**B** the number of electrons moving past a point in the wire per unit time.
**C** the charge that flows through the cross sectional area of the wire per unit time.
**D** the charge in 1 $cm^3$ of the wire per unit time.

**2.** Two cylindrical wires, X and Y, have the same length. X has resistivity $\rho$ and radius $r$. Y has resistivity $2\rho$ and radius $2r$. What is the ratio $\frac{R_X}{R_Y}$ of the resistance of X to that of Y?

**A** 8 **B** 2 **C** $\frac{1}{2}$ **D** $\frac{1}{8}$

**3.** Four resistors, each of resistance 10 Ω, are connected as shown. What is the resistance between X and Y?

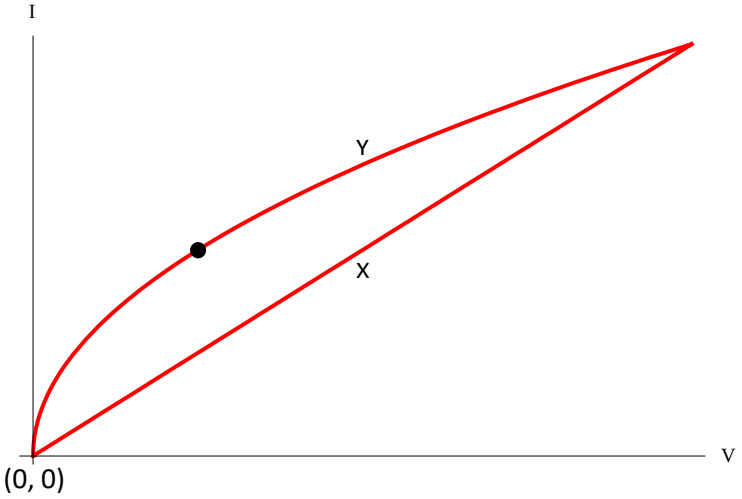



**A** 2.5 Ω **B** 6.0 Ω **C** 10 Ω **D** 30 Ω

**4.** A cylindrical wire of resistance *R* is connected to a source of negligible internal resistance. The power dissipated in the wire is *P*. The wire is cut into two pieces of equal length. The pieces are connected in parallel to the same source. What is the total power dissipated in the circuit?

**A** $\frac{P}{4}$ **B** $\frac{P}{2}$ **C** $2P$ **D** $4P$

**5.** The graph shows the I-V characteristics of two resistors X and Y. At the marked point, the tangent to the curve for Y is parallel to the graph for X.



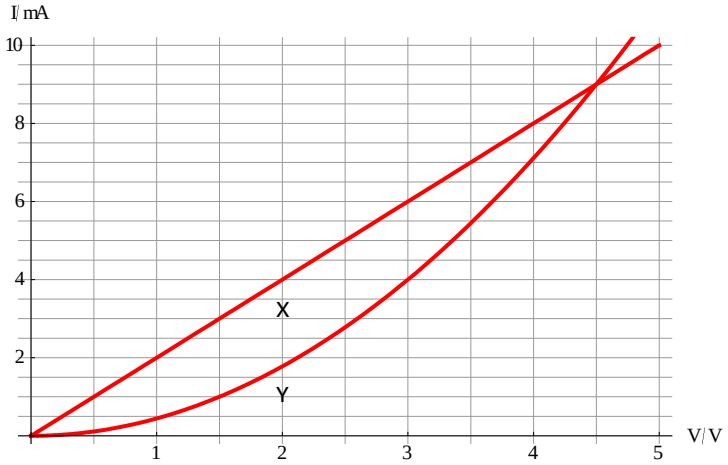

Three statements are made about X and Y:

I The resistance of X is constant
II The resistance of Y increases with increasing voltage
III Excluding the origin, X and Y have the same resistance at two different voltages

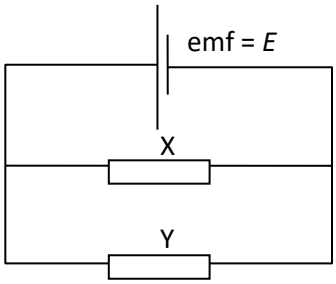
Which statements are correct?

**A** I and II
**B** I and III
**C** II and III
**D** I, II and III

**6.** The graph shows the I-V characteristics of two resistors X and Y.




X and Y are connected to a cell of negligible internal resistance. The current leaving the cell is 10 mA.



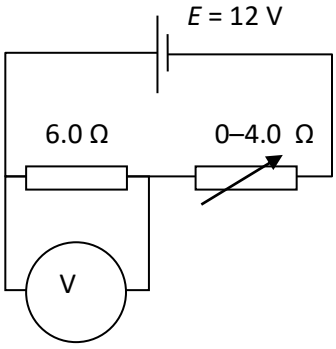

What is the emf *E* of the cell?

**A** 2.5 V **B** 3.0 V **C** 3.5 V **D** 4.5 V

**7.** A light bulb is rated 60 W at 220 V. What would be the power dissipated in the lamp if it is connected to a source of 110 V?

**A** 15 W **B** 30 W **C** 120 W **D** 240 W

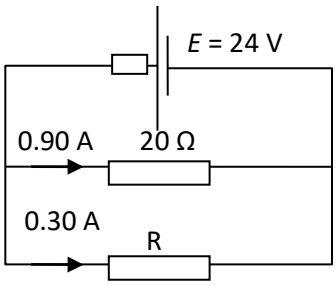
**8.** In the circuit shown the cell has negligible internal resistance. The variable resistance can be varied from 0 to 4.0 Ω.




What is the range of readings of the voltmeter as the variable resistor is varied from 4.0 Ω to 0?

**A** 0 V – 4.8 V **B** 0 V – 7.2 V **C** 4.8 V – 12 V **D** 7.2 V – 12 V

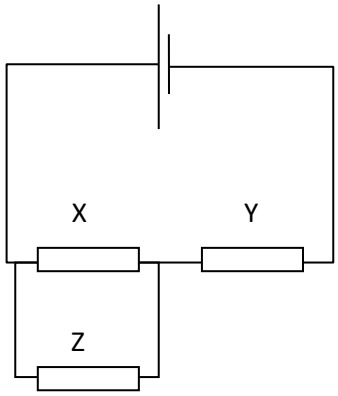
**9.** A cell of emf 24 V is connected to two external resistors in parallel. The 20 Ω resistor takes current 0.90 A and R takes current 0.30 A.




What is the internal resistance of the cell and what is the resistance of R?

| | Internal resistance | External resistance R |
|---|---|---|
| **A** | 5 Ω | 40 Ω |
| **B** | 5 Ω | 60 Ω |
| **C** | 10 Ω | 40 Ω |
| **D** | 10 Ω | 60 Ω |

**10.** Three identical resistors are connected as shown. The cell has no internal resistance.




Resistor Z burns out. What happens to the power dissipated in X and the power dissipated in Y?

| | **Power in X** | **Power in Y** |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | stays the same |
| **C** | increases | decreases |
| **D** | increases | stays the same |

| Quiz B11 Answers | |
|---|---|
| 1 | C |
| 2 | B |
| 3 | B |
| 4 | D |
| 5 | A |
| 6 | B |
| 7 | A |
| 8 | D |
| 9 | B |
| 10 | C |