Circuits 2

① $V = IR$

$= (3.5)(220)$

$V = \boxed{770\ V}$

② $I = \frac{V}{R} = \frac{25}{470} = \boxed{0.053\ A}$

③ $R = \frac{V}{I} = \frac{120}{0.33} = \boxed{364\ \Omega}$

④ 3 cells × 1 V ea = 3 V total

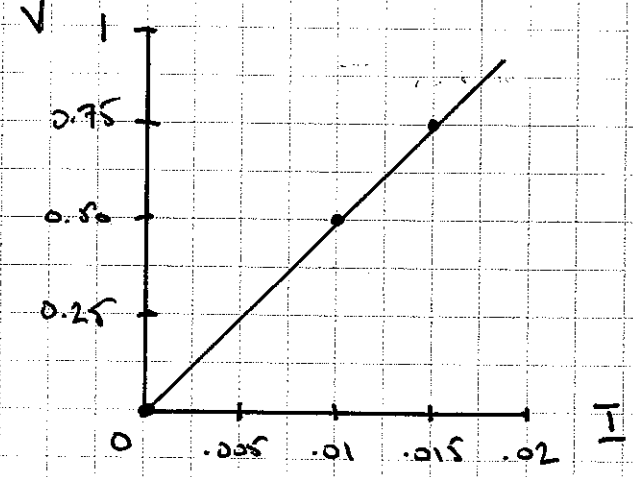
$R = \frac{V}{I} = \frac{3}{0.6} = \boxed{5\ \Omega}$

⑤ $R = \frac{V}{I} = \frac{1.64}{0.853} = \boxed{1.92\ \Omega}$

⑥ $I = \frac{Q}{t} = \frac{8.0 \times 10^4\ C}{3600\ s} = 22.2\ A$

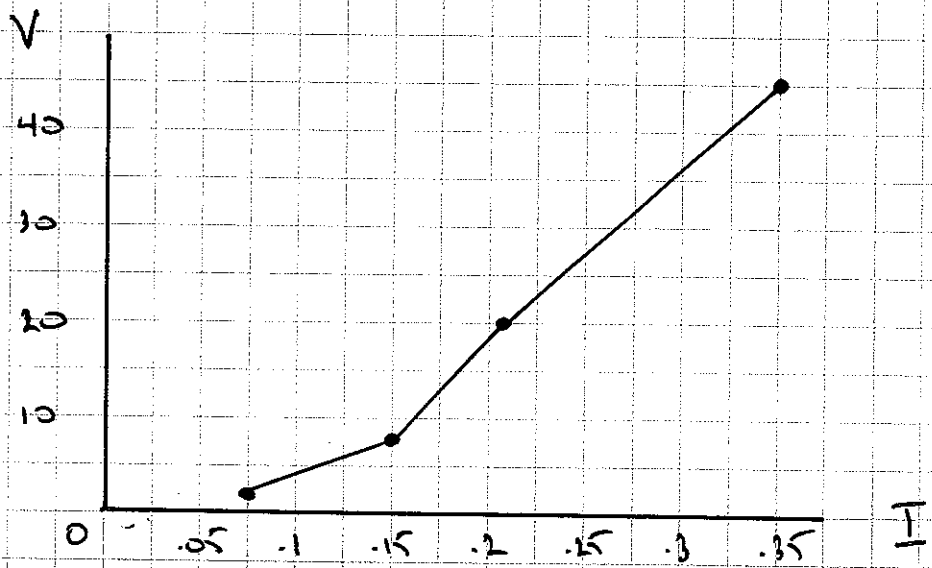
$R = \frac{V}{I} = \frac{12}{22.2} = \boxed{0.54\ \Omega}$

⑦



Since the graph is a straight line, this resistor obeys Ohm's law.

⑧



Since the graph is not a straight line, this resistor does not obey Ohm's law.

(9) Resistance is the ratio of voltage applied to current that flows.

Resistivity represents the nature of a material in terms of its resistance to the flow of electricity.

(10) $A = 0.5176\ mm^2 \times \frac{1\ m}{1000\ mm} \times \frac{1\ m}{1000\ mm} = 5.176 \times 10^{-7}\ m^2$

$R = \rho \frac{L}{A} = \frac{(1.72 \times 10^{-8})(2)}{(5.176 \times 10^{-7})} = \boxed{0.066\ \Omega}$

(11) $A = 5.176 \times 10^{-7}\ m^2$

$R = \rho \frac{L}{A}$

$\rho = \frac{RA}{L} = \frac{(0.19)(5.176 \times 10^{-7})}{1} = \boxed{9.8 \times 10^{-8}\ \Omega \cdot m}$

The material is probably **iron**.

(12) $A = 0.90\ mm^2 \times \frac{1}{1000} \times \frac{1}{1000} = 9.0 \times 10^{-7}\ m^2$

$R = \rho \frac{L}{A} = \frac{(9.71 \times 10^{-8})(2)}{(9 \times 10^{-7})} = \boxed{0.216\ \Omega}$

(13) $A = \pi (3.25 \times 10^{-3})^2 = 1.96 \times 10^{-7}\ m^2$

$R = \rho \frac{L}{A} = \frac{100 \times 10^{-8} (1.25)}{1.96 \times 10^{-7}} = \boxed{6.4\ \Omega}$

(14) 18 ga.

$A = 0.8231\ mm^2 \times \frac{1}{1000} \times \frac{1}{1000} = 8.231 \times 10^{-7}\ m^2$

$R = \rho \frac{L}{A} = \frac{1.72 \times 10^{-8} (5)}{8.231 \times 10^{-7}} = \boxed{0.104\ \Omega}$

16 ga.

$A = 1.309\ mm^2 \times \frac{1}{1000} \times \frac{1}{1000} = 1.309 \times 10^{-6}\ m^2$

$R = \rho \frac{L}{A} = \frac{1.72 \times 10^{-8} (5)}{1.309 \times 10^{-6}} = \boxed{0.066\ \Omega}$

(18) 16 ga Aluminum

$A = 1.309 \times 10^{-6}\ m^2$

$R = \rho \frac{L}{A} = \frac{(2.65 \times 10^{-8})(1)}{(1.309 \times 10^{-6})} = 0.0202\ \Omega$

18 ga Copper

$A = 8.231 \times 10^{-7}\ m^2$

$R = \rho \frac{L}{A} = \frac{(1.72 \times 10^{-8})(1)}{(8.231 \times 10^{-7})} = 0.0209\ \Omega$

Ratio: $\frac{16\text{ ga Al}}{18\text{ ga Cu}} = \frac{0.0202}{0.0209} = \boxed{0.969}$