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Effects of Electric Current

Device	Conversion	Effect
Electric stove	Electrical energy to heat energy	Heating effect
Electric bulb	Electrical energy to light energy	Lighting effect
electric fan/motor	Electric Energy to mechanical energy.	Mechanical effect
Battery (charging)	Electrical Energy to chemical Energy.	Chemical effect
Induction Cooker	Electrical energy to heat energy	Heating effect
Electric Oven	Electrical energy to heat energy	Heating effect

2. a. As resistance of copper wire is less than that of nichrome wire, more current will flow through circuit – 1
- b. For the same voltage heat is inversely proportional to resistance. So more heat will be produced in copper as its resistance is small.

3. a. Electrical energy \longrightarrow Heat Energy

b. $V = 230 \text{ V}$

$R = 1500 \ \Omega$

$t = 1 \times 60 \times 60 = 3600 \text{ s}$

$H = V^2t / R$

$(230)^2 \times 3600$

$H = \frac{\quad}{\quad}$

1500

$= 126960 \text{ J}$

4.

Series connection of resistors.	Parallel connection of resistors.
Same amount of current passes through all the resistors.	When number resistors increases current also increases.
Applied voltage will be split among the resistors.	When number of resistors increases effective resistance decreases.
High resistor gets heated more.	Potential difference is same for all the resistors.
	Effective resistance is minimum.

5. a. $I = 0.1\text{A}$
 $R = 500\ \Omega$
 $t = 3\text{minute}$
 $= 3 \times 60\text{s}$
 $= 180\text{s}$

$$H = I^2 R t$$

$$= 0.1 \times 0.1 \times 500 \times 180$$

$$= 900\ \text{J}$$

b. $H = 0.1 \times 0.1 \times 1000 \times 180$
 $= 1800\ \text{J}$

c. When current is doubled, $I=0.2\text{A}$

$$H = 0.2 \times 0.2 \times 500 \times 3 \times 60$$

$$= 3600\ \text{J.}$$

When current is doubled, the heat is increased by
four times.

6. a. Series.

b. $300\ \Omega$ ($R = R_1 + R_2$)

c. $200\ \Omega$ (When resistors are connected in series more voltage is dropped across high resistor)

d. $200\ \Omega$ (When resistors are connected in series more heat is generated in resistor having high resistance)

7. a. $R = r/n$
 $= 2/10$
 $= 0.2\ \text{ohm}$

b. $R = r \times n$
 $= 2 \times 10 = 20\ \text{ohm}$

8.

a. Highest resistance,

$$R = R_1 + R_2 + R_3$$

$$R = 2 + 3 + 6 = 11 \Omega$$

b. Least resistance ,

$$1/R = 1/R_1 + 1/R_2 + 1/R_3$$

$$1/R = 1/2 + 1/3 + 1/6$$

$$= 6/6$$

$$= 1 \Omega$$

c.

