

## Circuits 6

①

$$\frac{1}{R} = \frac{1}{16} + \frac{1}{8}$$

$$\frac{1}{R} = \frac{1}{16} + \frac{2}{16}$$

$$\frac{1}{R} = \frac{3}{16}$$

$$R = \frac{16}{3} = \boxed{5.3 \Omega}$$

②

$$\frac{1}{115} = \frac{1}{R} + \frac{1}{155}$$

$$\frac{1}{R} = \frac{1}{115} - \frac{1}{155}$$

$$\frac{1}{R} = 0.00224$$

$$R = \boxed{445.6 \Omega}$$

③

1 resistor:

$$\frac{1}{R} = \frac{1}{4}$$

$$R = 4 \Omega$$

2 resistors:

$$\frac{1}{R} = \frac{1}{4} + \frac{1}{4}$$

$$\frac{1}{R} = \frac{2}{4}$$

$$R = \frac{4}{2} = 2 \Omega$$

3 resistors:

$$\frac{1}{R} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$$

$$\frac{1}{R} = \frac{3}{4}$$

$$R = \frac{4}{3} = 1.3 \Omega$$

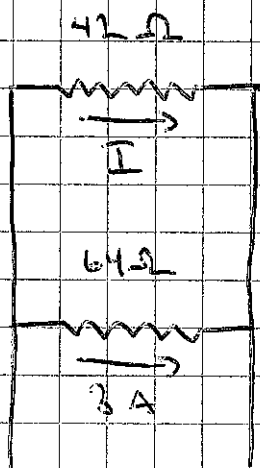
3) continued

Note the pattern  $R = \frac{4}{\# \text{ of resistors}}$

$$\infty \quad \frac{1}{16} = \frac{4}{x} \quad \text{where } x = \# \text{ of resistors}$$

$$x = (16)(4) = \boxed{64}$$

4) a)



$$\underline{64 \Omega}$$

$$V = IR$$

$$= (3)(64)$$

$$V = 192 \text{ V}$$

Since the resistors are in parallel,  $V$  is the same in both.

$$\underline{42 \Omega}$$

$$I = \frac{V}{R} = \frac{192}{42} = \boxed{4.57 \text{ A}}$$

$$b) \quad \frac{1}{R} = \frac{1}{42} + \frac{1}{64}$$

$$P = \frac{V^2}{R}$$

$$\frac{1}{R} = 0.0394$$

$$= \frac{192^2}{25.358}$$

$$R = 25.358 \Omega$$

$$P = \boxed{1454 \text{ W}}$$

⑤

Total Current

$$P = IV$$

$$84 = I(120)$$

$$I = 0.7 \text{ A}$$

Current in Heater

$$I = \frac{V}{R}$$

$$= \frac{120}{600}$$

$$I_1 = 0.2 \text{ A}$$

Current in Lamp

$$I = I_1 + I_2$$

$$0.7 = 0.2 + I_2$$

$$I_2 = 0.5 \text{ A}$$

R of Lamp

$$V = IR$$

$$120 = 0.5 R$$

$$R = \boxed{240 \Omega}$$