

HW 54

p 613 MC 12, C 26

p 615 Problem 34, 42

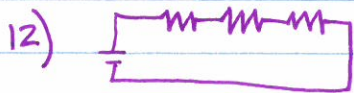
Online Brightness of Bulb Rank

4 5

p 613 - Multiple Choice

(7)

(1)



• compare I_2 to I_3

$$I_2 = I_3$$

- Concept

26) Most modern Christmas tree lights are in //

A) one advantage

• If one goes out, rest stay lit

(1)

B) If connect in series, brightness?

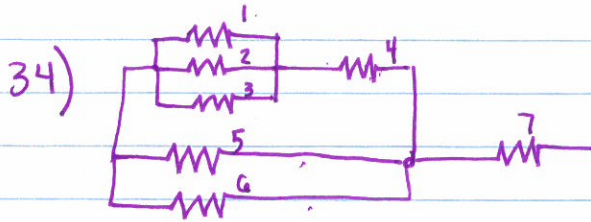
• They will be darker

C) What modify to make lights equal bright?

• Increase overall pot diff

④
4

pg 16 - Problems



$$R_1 = 60\Omega$$

$$R_4 = 20\Omega$$

$$R_2 = 30\Omega$$

$$R_5 = 60\Omega$$

$$R_3 = 20\Omega$$

$$R_6 = 20\Omega$$

$$R_7 = 10\Omega$$

Determine R_{eq}

$$\textcircled{1} R_{123} = \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right)^{-1} = \left(\frac{1}{60\Omega} + \frac{1}{30\Omega} + \frac{1}{20\Omega} \right)^{-1} = 10\Omega$$

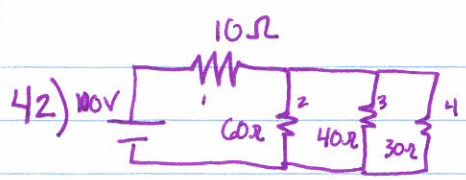
$$\textcircled{2} R_{1234} = R_{123} + R_4 = 10\Omega + 20\Omega = 30\Omega$$

$$\textcircled{3} R_{1-6} = \left(\frac{1}{R_{1-4}} + \frac{1}{R_5} + \frac{1}{R_6} \right)^{-1} = \left(\frac{1}{30\Omega} + \frac{1}{60\Omega} + \frac{1}{20\Omega} \right)^{-1} = 10\Omega$$

$$\textcircled{4} R_{eq} = R_{1-6} + R_7 = 10\Omega + 10\Omega = 20\Omega$$

(1)

⑤
4



$$V_2 = V_3 = V_4 \quad I_T = I_1$$

$$V_T = V_1 - V_{234} \quad I_T = I_2 + I_3 + I_4$$

a) Req

$$\textcircled{1} R_{234} = \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right)^{-1} = \left(\frac{1}{60\Omega} + \frac{1}{40\Omega} + \frac{1}{30\Omega} \right)^{-1}$$

$$R_{234} = 13\Omega \quad 13.3$$

$$\textcircled{2} R_{eq} = R_1 + R_{234} = 10\Omega + 13\Omega = 23\Omega \quad 23.3$$

b) $I_T = ?$

$$I_T = \frac{V_T}{R_{eq}} = \frac{100V}{23\Omega} = 4.3A$$

4.29

c) $P_T = ?$

$$P_T = I_T V_T = 4.3A (100V) = 430W$$

4.29 429

d) $I_2 = ?$

$$\textcircled{1} V_{234} = I_T R_{234} = (4.3A)(13\Omega) = 56V$$

4.29 13.3 57.1

$$\textcircled{2} I_2 = \frac{V_2}{R_2} = \frac{57.1V}{60\Omega} = .93A$$

.95A

or

$$\textcircled{1} V_1 = I_1 R_1 = (4.3A)(10\Omega) = 43V$$

$$\textcircled{2} V_{234} = V_T - V_1 = 100V - 43V = 57V$$

$$\textcircled{3} I_2 = V_2 / R_2 = 57V / 60\Omega = .95A$$

e) $I_3 = ?$

$$I_3 = \frac{V_3}{R_3} = \frac{57.1V}{40\Omega} = 1.4A$$

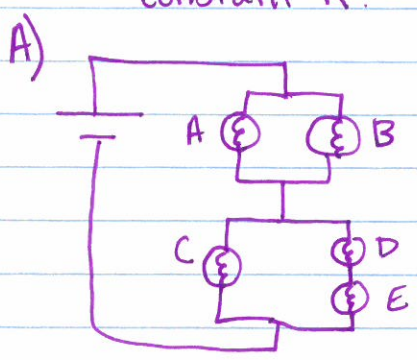
f) $I_4 = ?$

$$I_4 = \frac{V_4}{R_4} = \frac{57.1V}{30\Omega} = 1.9A$$

(3)

- Online Brightness of Bulbs

• circuit w/ 5 identical bulbs & ideal battery, constant R. Rank bulbs based on brightness

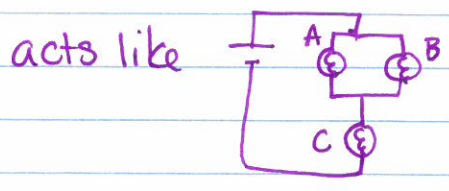
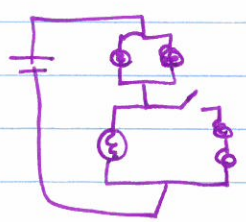


• $A = B$ • $D = E$ • $C > DE$

C AB DE

(1)

B) switch open



brightness of A?

dimmer remove // branch $\uparrow R_{eq} \downarrow I_T$

c) brightness of C?

brighter now gets all I_T instead of split