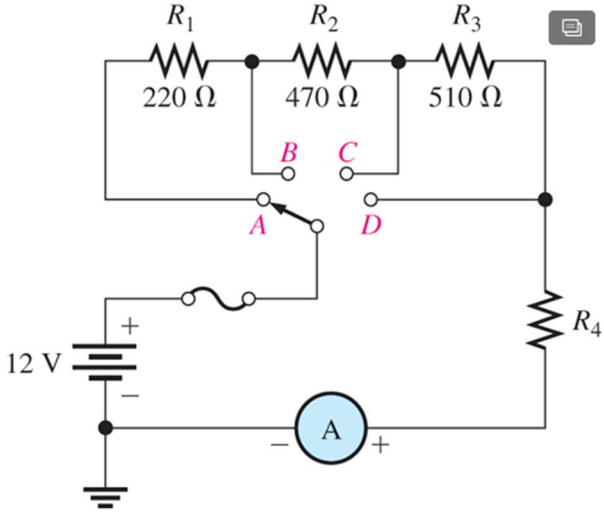
CPE 1140 - Homework # 5

Chapter 5

25. For the circuit in Figure 5–73 the meter reads 7.84 mA when the switch is in position A.
    a. What is the resistance of R_4?
    b. What should be the meter reading for switch positions B, C, and D?
    c. Will a ¼ A fuse blow in any position of the switch?

Figure 5–73



A)

$$V = IR$$

$$\frac{V}{I} = R_{series}$$

$$\frac{12}{7.84*10^{-3}} = 1530.612\Omega = R_{series}$$

$$R_{series} = R_1 + R_2 + R_3 + R_4$$

$$R_{series} = 220\ \Omega + 470\ \Omega + 510\ \Omega + R_4$$

$$R_{known} = 1200\ \Omega$$

$$R_{series} - R_{known} = R_4$$

$$1530.612 - 1200 = 330.612\Omega$$

$$R_4 = 330\ \Omega$$

Truncated due to the nearest real resistor.

B)

$$R_{series} - R_1 = R_{position\ B}$$

$$1530\ \Omega - 220\ \Omega = 1310\Omega$$

$$R_{position\ B} = 1310\Omega$$

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

$$\frac{12}{1310} = 9.160\ mA$$

$$R_{position\ C} = R_{series} - R_1 - R_2$$

$$R_{position\ C} = 1530\ \Omega - 220\ \Omega - 470\ \Omega$$

$$R_{position\ C} = 840\Omega$$

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

$$\frac{12}{840} = 14.285\ mA$$

$$R_{position\ D} = 330\Omega$$

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

$$\frac{12}{330} = 36.363\ mA$$

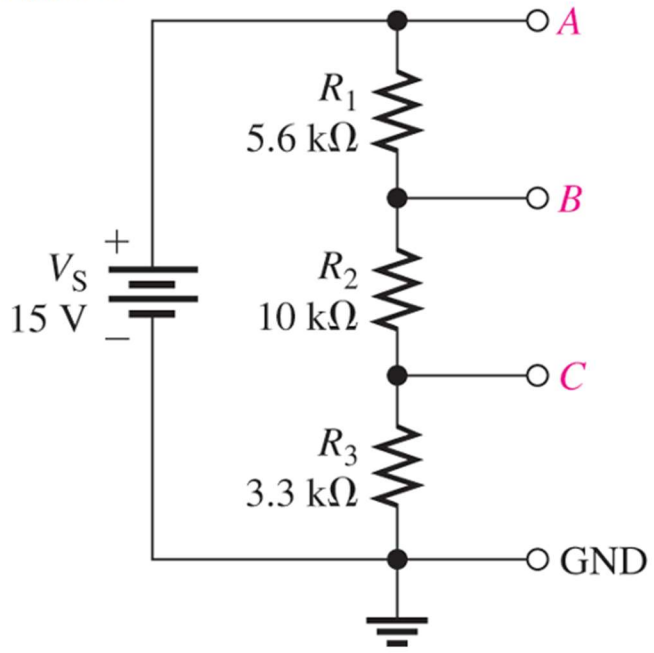
c)

$$\frac{1}{4} * 1000 = 250\ mA$$

All the positions are under 250 mA. Therefore, the circuit should be safe in all positions.

41. Determine the voltage with respect to ground for output A, B, and C in Figure 5–83(a).

Figure 5–83



(a)

$R_{series} = (5.6+10+3.3) * 10^3$

$R_{series} = 18.9\ k\Omega$

$$\text{Voltage divider} = V_{source} * \frac{R_{target\ resistors}}{R_{series}}$$

$V_{A\text{- Ground}} = 15V$ It gets all the voltage

$$V_{B\text{ - Ground}} = 15V * \frac{13.3}{18.9}$$

$V_{B\text{ - Ground}} = 10.555\ V$

$$V_{C\text{ - Ground}} = 15V * \frac{3.3}{18.9}$$

$V_{C\text{ - Ground}} = 2.619\ V$

49. If you double the voltage across a resistor, by how much does the power increase?

V = IR

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

P= IV

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

four times.