Chapter 19

(1) A (2) B (3) B (4) D (5) A

(7) A (8) B

(9) A $P = \frac{V^2}{R}$ (10) B $P = I^2 R$, $(2I)^2 R$

(11) D $I = \frac{q}{t}$ In one second $q = 2(1.6\times10^{-19})(2\times10^{6})(10^{8})$

$$I = \frac{2(1.6\times10^{-19})(2\times10^{6})10^{8}}{1} = 6.4\times10^{-5}\,A$$

(12) A

(13) A

option A: $I = \frac{V}{R} = \frac{5+9}{30+50} = \frac{14}{80} = .175$

option B: $I = \frac{V}{R} = \frac{5+12}{10+20+40} = \frac{17}{70} = .243$

option C: $I = \frac{V}{R} = \frac{5+9+12}{10+20+30} = \frac{26}{60} = 0.433$

(14) B $100 + 40 = 140\Omega$

(16) A

(17) A

The three resistors are in parallel.

$$\frac{1}{R_{eq}} = \frac{1}{75} + \frac{1}{20} + \frac{1}{100} = .07333$$

$$R_{eq} = 13.64\ \Omega$$

(18) D

(a) in parallel, the voltage drop across both is the same.

$P = \frac{V^2}{R}$ therefore, the lamp with the smaller resistance will dissipate more power (brighter)

(b) in series, the current is the same through both.

$P = I^2 R$ therefore, the lamp with the greater resistance will dissipate more power (brighter)

(19) D

$$P_{on} - P_{off} = P_{screen}$$

$$I_{on} V - I_{off} V = P_{screen}$$

$$(.9 - .4)16 = P_{screen}$$

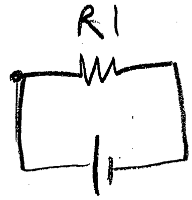
8W

(20) B

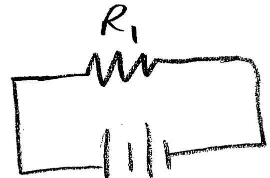
$I = \frac{q}{t}$ $V = IR$

$$V = \frac{qR}{t} = \frac{(6)(100)}{60} = 10V$$

(22) D



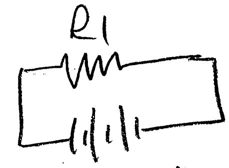
V_1



$V_1 + V_2$

$V = V_1 + 9$

$I = .3A$



$V_1 + V_2 + V_3$

$V = V_1 + 18$

$I = .4A$

$V = IR$

$V_1 + 9 = .3R_1 \qquad V_1 + 18 = .4R_1$

$V_1 = .3R_1 - 9 \qquad V_1 = .4R1 - 18$

$.3R_1 - 9 = .4R_1 - 18$

$9 = .1R_1$

$R_1 = 90\Omega$

(23) B

$R_{eq} = (80) \times 2 = 160\Omega$

$V = IR = .15(160) = 24V$

(24) C

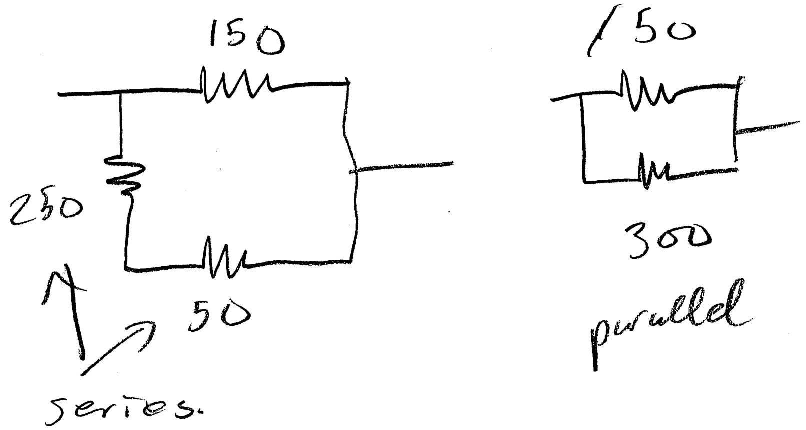
$I_{30} = \frac{V_{30}}{R_{30}} = \frac{4.5}{30} = .15A$

$I_{50} = I_{30}$ series.

$V_{50} = I_{50} R_{50} = (.15)(50) = 7.5V$

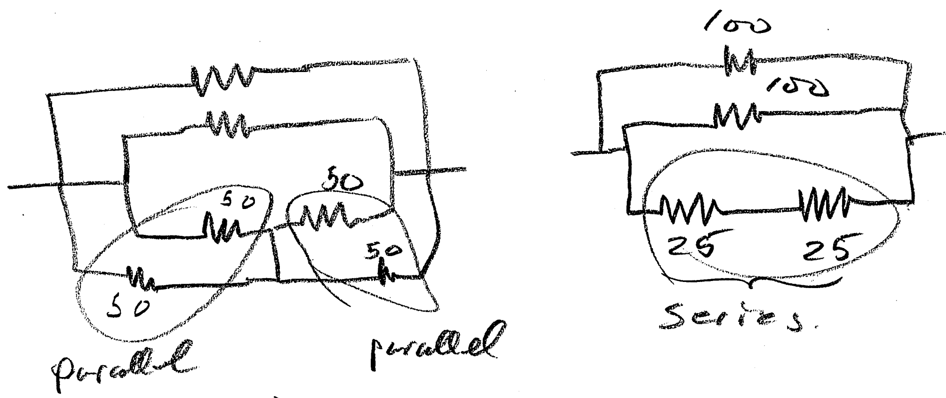
$V_{battery} = V_{30} + V_{50} = 4.5 + 7.5 = 12V$

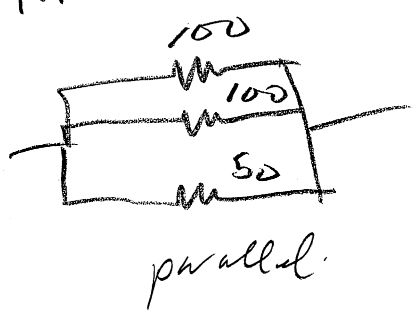
(25) B



100Ω

(26) A





25Ω

(27) B

$P = IV$

$I = \frac{P}{V} = \frac{120}{12} = 10\ A$

(33) D

$V = IR_1 \qquad V = 2IR_2$

$R_1 = \frac{V}{I} \qquad R_2 = \frac{V}{2I}$

$\frac{R_1}{R_2} = \frac{\frac{V}{I}}{\frac{V}{2I}} = 2$

(35) B

(37) A

$V = IR$

$I = \frac{V}{R} = \frac{10}{100} = .1$

(38) D

$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$

$80R\frac{1}{8} = 80R\frac{1}{10} + 80R\frac{1}{R}$

$10R = 8R + 80$

$2R = 80$

$R = 40\Omega$

(39) C

(40) B

(41) A

$P = IV$

$= (0.12)(3) = 0.36W$

(42) A

(48) B

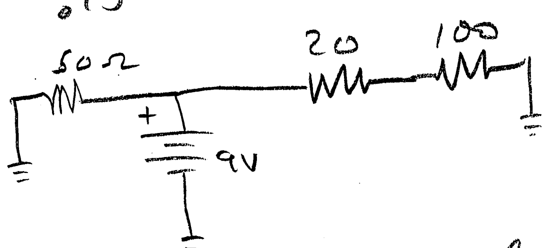
$V = IR$

$I = \frac{V}{R} = \frac{12}{100} = .12$

(49) C

$R = \frac{V}{I} = \frac{9}{.15} = 60\Omega$

(50) A



Branches are parallel, voltage drop across each is the same.

$V = IR$

$I = \frac{V}{R} = \frac{9}{120}$

(51) B (52) B

$V = IR$

$I = \frac{V}{R} = \frac{9}{75} = .12A$

(53) C

$V = IR$

$R = \frac{V}{I} = \frac{9}{.25} = 36\ \Omega$

(54) C

(55) B

in parallel - increasing one resistor increases the equivalent resistance

$V = IR$ increased R, decreases I (constant voltage)

(56) B (57) B

increasing current with constant resistance increases power ($P = I^2 R$)

increasing resistance with constant voltage decreases power ($P = \frac{V^2}{R}$)

(58) C

reducing voltage with constant resistance decreases power ($P = \frac{V^2}{R}$)

decreasing resistance with constant current decreases power ($P = I^2 R$)

(59) C

$P = \frac{V^2}{R} = \frac{(9)^2}{(3 \times 10)} = 2.7$

(61) A (62) B (63) D

(65) A

resistors are in parallel so voltage is the same across all resistors.

$I_1 = \frac{V}{R_1} = \frac{24}{50} = 0.48A$ $I_2 = \frac{V}{R_2} = \frac{24}{80} = .3A$

$I_3 = \frac{V}{R_3} = \frac{24}{20} = 1.2A$ $I_4 = \frac{V}{R_4} = \frac{24}{100} = 0.24A$

(66) B

(67) C

Adding a second resistor increases the total resistance.
The voltage remains the same.
$P = \frac{V^2}{R}$, so power decreases.