Name: KEY

Period: _____
Pre-AP Physics

Circuit Diagram Problems – Part 2

Answer each question in the space provided. Show all work and box your answer(s).

1. A light bulb with a resistance of 36 Ohms has 0.25 Amperes of current flowing through it.
   a. What is the potential difference (voltage) across the bulb?

$V = IR$
$V = (.25)(36)$ → $\boxed{V = 9 \text{ Volts}}$

   b. What is its power output?

$P = IV$
$P = (.25)(9)$ → $\boxed{P = 2.25 \text{ watts}}$

   c. How much charge flows through the light bulb in one minute? → 60 seconds

$I = \frac{Q}{t}$ → $Q = (.25)(60)$
$Q = It$ → $\boxed{Q = 15 \text{ Coulombs}}$

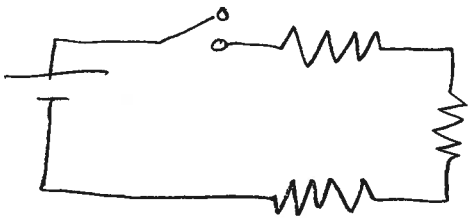
2. Roger purchases a blender with a power rating of 20 Watts. He goes home and plugs it into the power outlet in his kitchen, which is 110 Volts.
   a. How much electric current does the blender require in order to operate?

$P = IV$ → $I = \frac{20}{110}$
$I = \frac{P}{V}$ → $\boxed{I = 0.18 \text{ Amps}}$

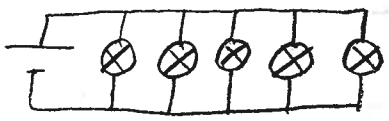
   b. What is its electrical resistance?

$V = IR$ → $R = \frac{110}{0.18}$
$R = \frac{V}{I}$ → $\boxed{R = 605 \Omega}$

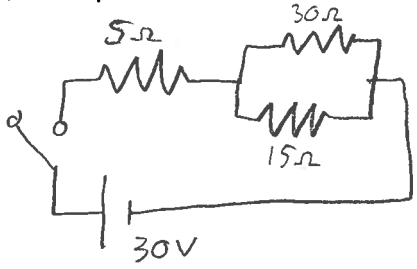
3. Draw a sketch for each of the following circuits, as they are described:
   a. A power source is connected in series with 3 resistors and a switch.



   b. Five light bulbs are all connected in parallel with a battery.

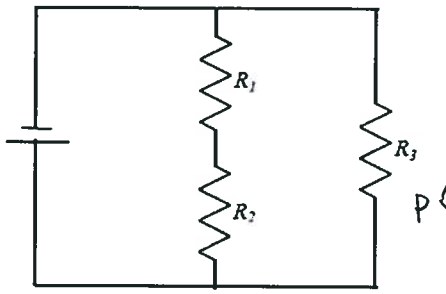


   c. A 30.0 Ω resistor is connected in parallel to a 15.0 Ω resistor. These are joined in series to a 5.00 Ω resistor, a switch, and a potential difference of 30.0 V.



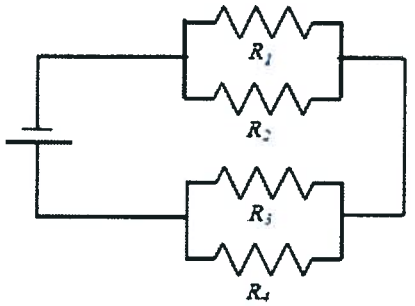
Problems 4-10: Complete the table of values for each circuit.

4.



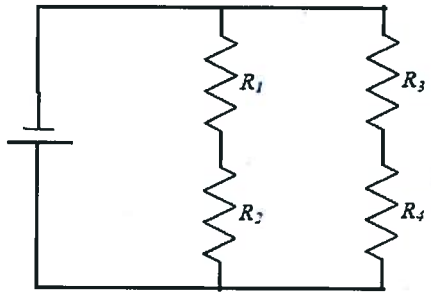
	V	I	R
Battery	12.00 V	2.00 A	6 Ω
R_1	7.2 V	1.2 A	6.00 Ω
R_2	4.8 V	1.2 A	4.00 Ω
R_3	12 V	0.8 A	15.00 Ω

5.



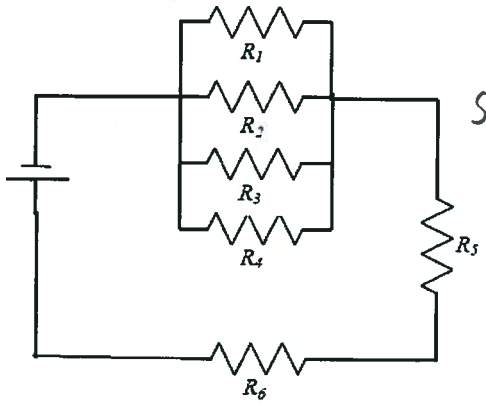
	V	I	R
Battery	36 V	9 A	4 Ω
R_1	12.00 V	6 A	2.00 Ω
R_2	12 V	3 A	4.00 Ω
R_3	24.00 V	6 A	4.00 Ω
R_4	24 V	3 A	8.00 Ω

6.



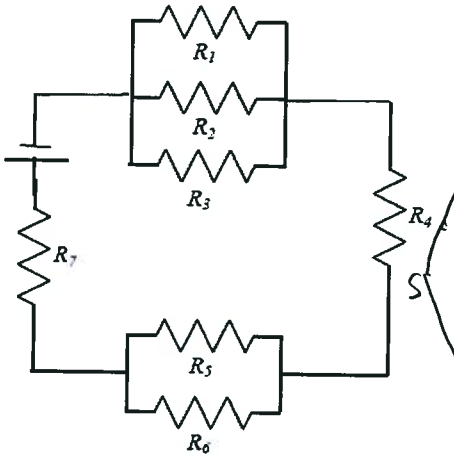
	V	I	R
Battery	50.00 V	5.00 A	10 Ω
R_1	25 V	2.00 A	12.5 Ω
R_2	25.00 V	2 A	12.5 Ω
R_3	10.00 V	3 A	3.33 Ω
R_4	40 V	3.00 A	13.33 Ω

7.



	V	I	R
Battery	65 V	5 A	13 Ω
R_1	10 V	0.5 A	20.00 Ω
R_2	10.00 V	1 A	10 Ω
R_3	10 V	2.5 A	4.00 Ω
R_4	10 V	1.00 A	10 Ω
R_5	25 V	5.00 A	5.00 Ω
R_6	30 V	5 A	6.00 Ω

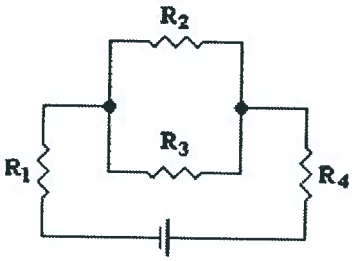
8.



	V	I	R
Battery	80 V	12.00 A	6,67 Ω
R_1	18 V	4 A	4.5 Ω
R_2	18.00 V	2.00 A	9 Ω
R_3	18 V	6 A	3.00 Ω
R_4	48 V	12 A	4.00 Ω
R_5	8 V	4 A	2.00 Ω
R_6	8 V	8.00 A	1 Ω
R_7	6.00 V	12 A	0.5 Ω

P, S, P

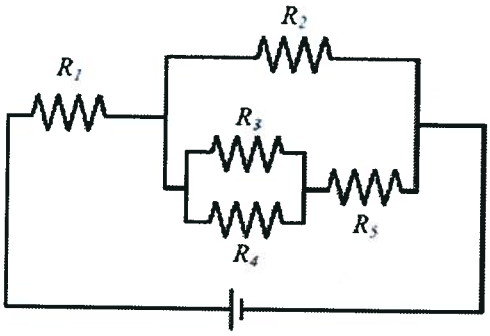
9.



	V	I	R	P
Total	800V	4A	200Ω	3,200 W
R_1	440V	4A	110Ω	1,760W
R_2	96V	2.4A	40Ω	230.4W
R_3	96V	1.6A	60Ω	153.6 W
R_4	264V	4A	66Ω	1,056W

S, P

10.



	V	I	R
Battery	24.0 V	2.4A	10 Ω
R1	6V	2.4A	2.5 Ω
R2	18V	0.9 A	20.0 Ω
R3	9V	0.9A	10.0 Ω
R4	9.0 V	0.6A	15Ω
R5	9V	1.5 A	6Ω

P, S, P

$$I = \frac{Q}{t} \qquad V = IR \qquad P = IV$$

$$V_S = V_1 + V_2 + V_3 \ldots + V_n \qquad V_P = V_1 = V_2 = V_3 \ldots = V_n$$

$$I_S = I_1 = I_2 = I_3 \ldots = I_n \qquad I_P = I_1 + I_2 + I_3 \ldots + I_n$$

$$R_S = R_1 + R_2 + R_3 \ldots + R_n \qquad \frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ldots + \frac{1}{R_n}$$