Circuits Practice

1.) Determine the equivalent (total) resistance for each of the following circuits below.
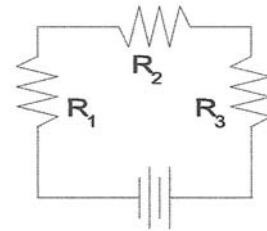
a) 7Ω 5Ω 2Ω

b) 2Ω 5Ω

c) 2Ω 5Ω 7Ω
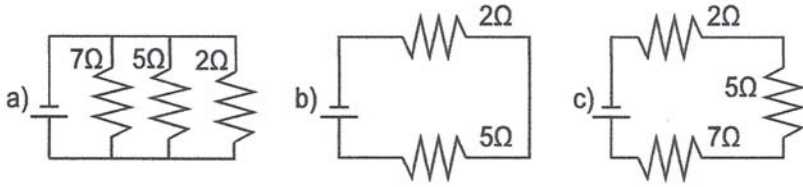
2.) Determine the total voltage (electric potential) for each of the following circuits below.

a) 3V 4V 6V

b) 6V 6V

3.) Fill out the table for the circuit diagramed at the right.

Circuit Position	Voltage (V)	Current (A)	Resistance (Ω)
1			10.0
2			20.0
3			30.0
Total	6.00		

4.) Fill out the table for the circuit diagramed at the right.

Circuit Position	Voltage (V)	Current (A)	Resistance (Ω)
1			10.0
2			20.0
3			30.0
Total	6.00		

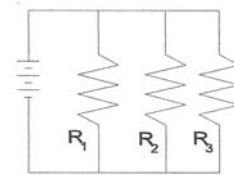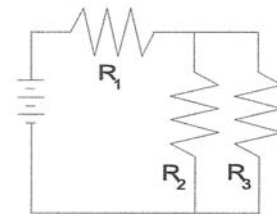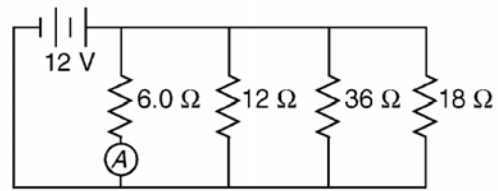5.) Fill out the table for the circuit diagramed at the right.

| Circuit Position	Voltage (V)	Current (A)	Resistance (Ω)
1			10.0
2			20.0
3			30.0
Total	6.00		

Questions 6 and 7 refer to the following:
The diagram to the right represents an electric
circuit consisting of four resistors and a 12-volt
battery.

12 V

$6.0\ \Omega$ $12\ \Omega$ $36\ \Omega$ $18\ \Omega$

A
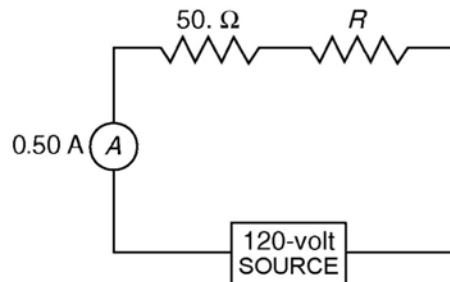
6.) What is the equivalent resistance of the circuit shown?

7.) What is the current measured by ammeter A shown in the diagram?

8.) A 6.0 Ω lamp requires 0.25 A of current to operate. In which circuit below would the lamp operate correctly
   when switch S is closed?

A) 1.5 V   6.0 Ω S

C) 1.5 V   6.0 Ω S

B) 1.5 V   S   6.0 Ω

D) S   1.5 V   6.0 Ω
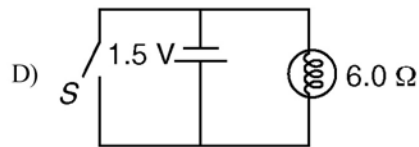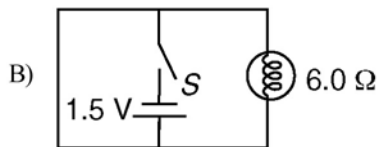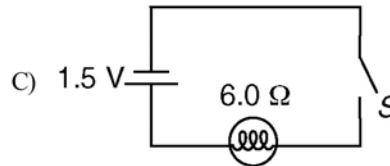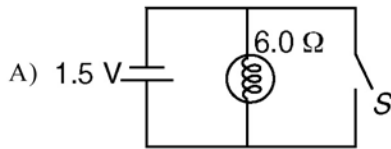
Questions 9 and 10 refer to the following:
A 50. Ω resistor, an unknown resistor R, a 120. V source, and an ammeter are connected in a complete circuit. The
ammeter reads 0.50 A.

50. Ω R

0.50 A A

120-volt
SOURCE

9.) Calculate the equivalent resistance of the circuit shown.

10.) Determine the resistance of resistor R shown in the diagram.

Questions 11 through 13 refer to the following:
A 3.0 Ω resistor, an unknown resistor, R, and two ammeters, A_1 and A_2, are connected as shown below with a 12 V
source. Ammeter A_2 reads a current of 5.0 A.

11.) Determine the equivalent resistance of the circuit shown.

5.0 A
A_2

A_1

12.) Calculate the current measured by ammeter A_1 in the diagram shown.

12 V   3.0 Ω R

13.) Calculate the resistance of the unknown resistor, R in the diagram shown.

2
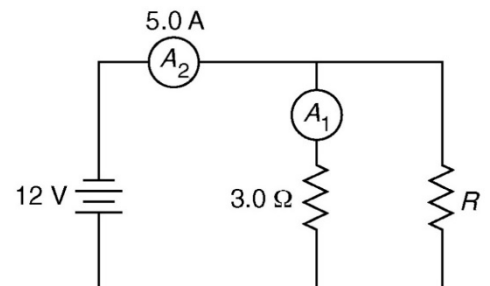
14.) The load across a $50.0\ V$ battery consists of a series combination of two lamps with resistances of $125\ \Omega$, and $225\ \Omega$.
   a. Find the total resistance of the circuit.
   b. Find the current in the circuit.
   c. Find the potential difference across the $125\ \Omega$ lamp.

15.) The load across a $12\ V$ battery consists of a series combination of three resistances are $15\ \Omega$, $21\ \Omega$, and $24\ \Omega$, respectively.
   a. Draw the circuit diagram.
   b. What is the total resistance of the load?
   c. What is the magnitude of the circuit current?

16.) The load across a $40\ V$ battery consists of a series combination of three resistances R_1, R_2, and R_3. R_1 is $240.\ \Omega$ and R_3 is $120.\ \Omega$. The potential difference across R_1 is $24\ V$.
   a. Find the current in the circuit.
   b. Find the equivalent resistance of the circuit.
   c. Find the resistance of R_2.

17.) The load across a $12\ V$ battery consists of a series combination of three resistances R_1, R_2, and R_3. R_1 is $210.\ \Omega$, R_2 is $350.\ \Omega$, and R_3 is $120.\ \Omega$.
   a. Find the equivalent resistance of the circuit.
   b. Find the current in the circuit.
   c. Find the potential difference across R_3.

18.) Two resistances, one $12\ \Omega$ and the other $18\ \Omega$, are connected in parallel. What is the equivalent resistance of the parallel combination?

19.) Three resistances of $12\ \Omega$ each are connected in parallel. What is the equivalent resistance?

20.) Two resistances, one $62\ \Omega$ and the other $88\ \Omega$, are connected in parallel. The resistors are then connected to a $12\ V$ battery.
   a. What is the equivalent resistance of the parallel combination?
   b. What is the current through each resistor?

21.) A $110.\ V$ household circuit that contains an $1800.\ W$ microwave, a $1000.\ W$ toaster, and an $800.\ W$ coffeemaker is connected to a $20.\ A$ fuse. Determine the current. Will the fuse melt if the microwave and the coffeemaker are both on?

22.) A $35\ \Omega$, $55\ \Omega$, and $85\ \Omega$ resistor are connected in parallel. The resistors are then connected to a $35\ V$ battery.
   a. What is the equivalent resistance of the parallel combination?
   b. What is the current through each resistor?

23.) Resistors R_1, R_2, and R_3 have resistances of $15.0\ \Omega$, $9.0\ \Omega$, and $8.0\ \Omega$ respectively. R_1 and R_2 are connected in series, and their combination is in parallel with R_3 to form a load across a $6.0\ V$ battery.
   a. Draw the circuit diagram.
   b. What is the total resistance of the load?
   c. What is the current in R_3?
   d. What is the potential difference across R_2?

24.) A $15.0\ \Omega$ resistor is connected in series to a $120\ V$ generator and two $10.0\ \Omega$ resistors that are connected in parallel to each other.
   a. Draw the circuit diagram.
   b. What is the total resistance of the load?
   c. What is the magnitude of the circuit current?
   d. What is the current in one of the $10.0\ \Omega$ resistors?
   e. What is the potential difference across the $15.0\ \Omega$ resistor?

Answers

1a) $1.2\ \Omega$	1b) $7\ \Omega$	1c) $14\ \Omega$
2a) $13\ V$	2b) $12\ V$	6) $3.0\ \Omega$
7) $2.0\ A$	8) C	9) $240.\ \Omega$
10) $190\ \Omega$	11) $2.4\ \Omega$	12) $4.0\ A$
13) $12\ \Omega$	14a) $350.\ \Omega$	14b) $0.143\ A$
14c) $17.9\ V$	15b) $60.\ \Omega$	15c) $0.20\ A$
16a) $0.10\ A$	16b) $400.\ \Omega$	16c) $40.\ \Omega$
17a) $680.\ \Omega$	17b) $0.018\ A$	17c) $2.2\ V$
18) $7.2\ \Omega$	19) $4.0\ \Omega$	20a) $36\ \Omega$

20b) $I62\ \Omega = 0.19\ A$; $I88\ \Omega = 0.14\ A$
21) $I = 23.6\ A$ so fuse will pop   22a) $17\ \Omega$
22b) $I35\ \Omega = 1.0\ A$; $I55\ \Omega = 0.64\ A$; $I85\ \Omega = 0.41\ A$

23b) $6.0\ \Omega$	23c) $0.75\ A$	23d) $2.3\ V$
24b) $20.0\ \Omega$	24c) $6.0\ A$	24d) $3.0\ A$
24e) $90.\ V$		