CALCULATING CURRENT

Name _____

Ohm's Law states that $I = \frac{V}{R}$

where I = current (amperes)
V = voltage (volts)
R = resistance (ohms)

Solve the following problems.

1. What is the current produced with a 9-volt battery through a resistance of 100 ohms?

_____

2. Find the current when a 12-volt battery is connected through a resistance of 25 ohms.

_____

3. If the potential difference is 120 volts and the resistance is 50 ohms, what is the current?

_____

4. What would be the current in Problem 3 if the potential difference were doubled?

_____

5. What would be the current in Problem 3 if the resistance were doubled?

_____

CALCULATING VOLTAGE

Name _____

V	=	I	x	R
Voltage (volts)	=	Current (amperes)	x	Resistance (ohms)

Solve the following problems.

1. What voltage produces a current of 50 amps with a resistance of 20 ohms?

   _____

2. Silver has a resistance of 1.98×10^{-4} ohms. What voltage would produce a current of 100 amps?

   _____

3. A current of 250 amps is flowing through a copper wire with a resistance of 2.09×10^{-4} ohms. What is the voltage?

   _____

4. What voltage produces a current of 500 amps with a resistance of 50 ohms?

   _____

5. What voltage would produce a current of 100 amps through an aluminum wire which has a resistance of 3.44×10^{-4} ohms?

   _____

CALCULATING RESISTANCE

Name _____

$$R = \frac{V}{I} \qquad \text{Resistance (ohms)} = \frac{\text{Voltage (volts)}}{\text{Current (amperes)}}$$

Solve the following problems.

1. What resistance would produce a current of 200 amperes with a potential difference of 2,000 volts?

_____

2. A 12-volt battery produces a current of 25 amperes. What is the resistance?

_____

3. A 9-volt battery produces a current of 2.0 amperes. What is the resistance?

_____

4. An overhead wire has a potential difference of 2,000 volts. If the current flowing through the wire is one million amperes, what is the resistance of the wire?

_____

5. What is the resistance of a light bulb if a 120-volt potential difference produces a current of 0.8 amperes?

_____

OHM'S LAW PROBLEMS

Name _____

Using Ohm's Law, solve the following problems.

1. What is the current produced by a potential difference of 240 volts through a resistance of 0.2 ohms?

_____

2. What resistance would produce a current of 120 amps from a 6-volt battery?

_____

3. What voltage is necessary to produce a current of 200 amperes through a resistance of 1×10^{-3} ohms?

_____

4. What is the current produced by a 9-volt battery flowing through a resistance of 2×10^{-4} ohms?

_____

5. What is the potential difference if a resistance of 25 ohms produces a current of 250 amperes?

_____

CALCULATING POWER

Name _____

$P = V \times I$

Power (watts) = Voltage (volts) x current (amperes)

Solve the following problems.

1. A 6-volt battery produces a current of 0.5 amps. What is the power in the circuit?

_____

2. A 100-watt light bulb is operating on 1.2 amperes current. What is the voltage?

_____

3. A potential difference of 120 volts is operating on a 500-watt microwave oven. What is the current being used?

_____

4. A light bulb uses 0.625 amperes from a source of 120 volts. How much power is used by the bulb?

_____

5. What voltage is necessary to run a 500-watt motor with a current of 200 amperes?

_____

CALCULATING ELECTRICAL ENERGY AND COST

Name _____

One kilowatt hour is 1,000 watts of power for one hour of time. The abbreviation for kilowatt hour is kWh.

Example: A coffee pot operates on 2 amperes of current on a 110-volt circuit for 3 hours. Calculate the total kWh used.

1. Determine power: $P = V \times I$
   $= 110 \text{ volts} \times 2 \text{ amps}$
   $= 220 \text{ watts}$

   $kWh = P \times \text{hours}$

   $kWh = \frac{V \times I \times \text{hours}}{1{,}000}$

2. Convert watts to kilowatts:

   $220 \text{ watts} \times \frac{1 \text{ kilowatt}}{1{,}000 \text{ watts}} = 0.22 \text{ kW}$

3. Multiply by the hours given in the problem:
   $0.22 \text{ kW} \times 3 \text{ hrs} = 0.66 \text{ kWh}$

Solve the following problems.

1. A microwave oven operates on 5 amps of current on a 110-volt circuit for one hour. Calculate the total kilowatt hours used. _____

2. How much would it cost to run the microwave in Problem 1 if the cost of energy is $0.10 per kWh? _____

3. An electric stove operates on 20 amps of current on a 220-volt circuit for one hour. Calculate the total kilowatt hours used. _____

4. What is the cost of using the stove in Problem 3 if the cost of energy if $0.10 per kWh? _____

5. A refrigerator operates on 15 amps of current on a 220-volt circuit for 18 hours per day. How many kilowatt hours are used per day? _____

6. If the electric costs are 15¢ per kWh, how much does it cost to run the refrigerator in Problem 5 per day? _____

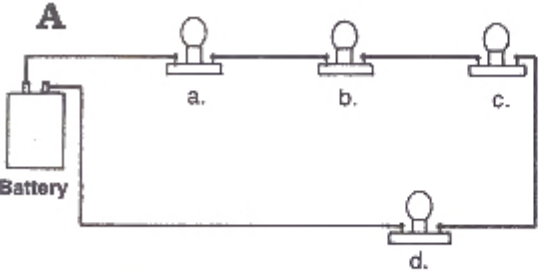
7. The meter reading on June 1 was 84502 kWh. On July 1, the meter read 87498 kWh. If the cost of electricity in the area was 12¢ per kWh, what was the electric bill for the month of June? _____

8. A room was lighted with three 100-watt bulbs for 5 hours per day. If the cost of electricity was 9¢ per kWh, how much would be saved per day by switching to 60-watt bulbs? _____

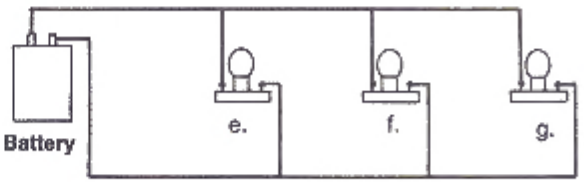
SERIES AND PARALLEL CIRCUITS

Name _____

A



B



_____ _____

Answer the following questions regarding circuits A and B above.

1. Label circuits A and B as series or parallel.
2. If bulb a burns out, will bulb d still light? _____
3. If bulb f burns out, will bulb g still light? _____
4. If bulbs b, c and d are burned out, will bulb a still light? _____
5. If bulbs f and g are missing, will bulb e still light? _____
6. Draw a diagram of a parallel circuit having 3 light bulbs, 3 switches and a battery. Each light bulb is on a separate switch.

7. Draw a diagram of a series circuit having 3 light bulbs, one switch and a battery.

8. Would series or parallel circuits be better for wiring light in a house? _____

   Why? _____

   _____

AN ELECTRIC MOTOR

Name _____

Label the following parts on the picture of the electric motor below. List the function/ purpose of each part.

horseshoe electromagnet (or permanent magnet) _____

_____

armature _____

_____

commutator _____

_____

brushes (+ and –) _____

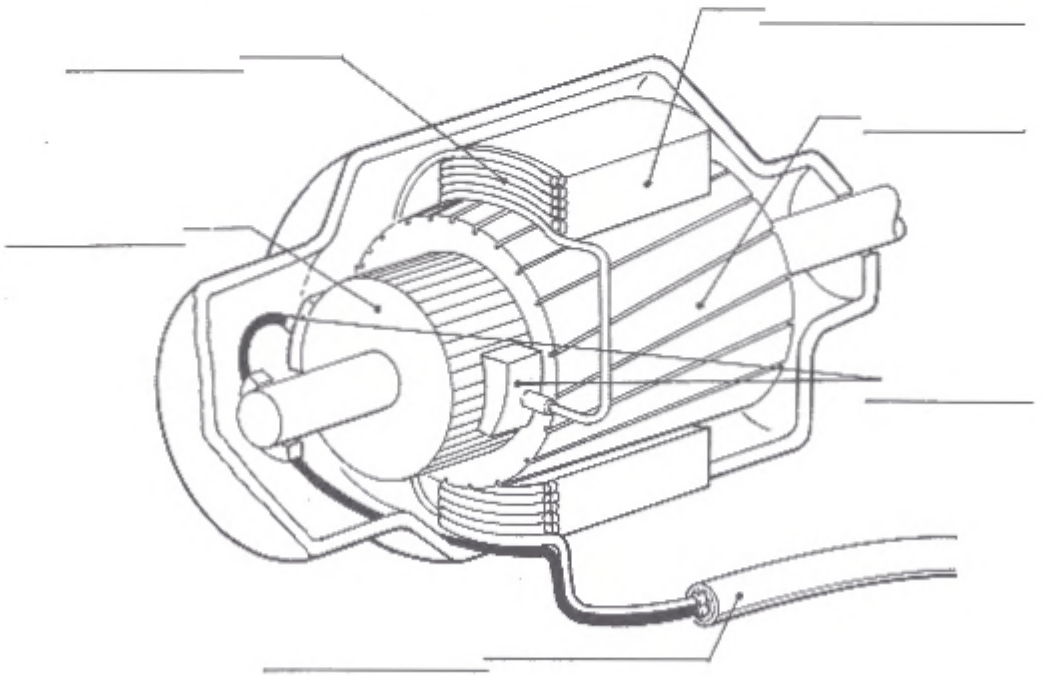
_____

field coil _____

_____

current source _____

_____



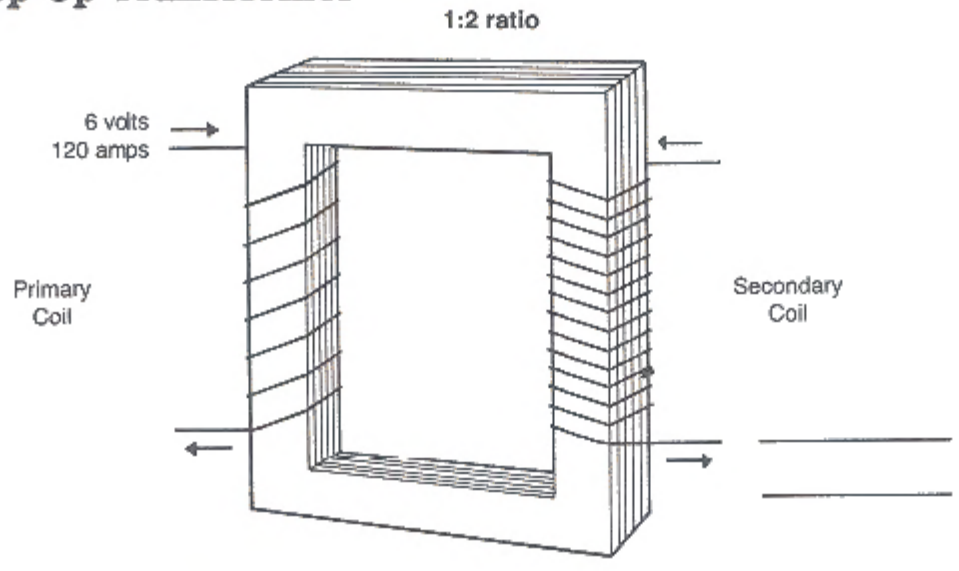
TRANSFORMERS

Name _____

Determine the voltage and current in the following transformers.

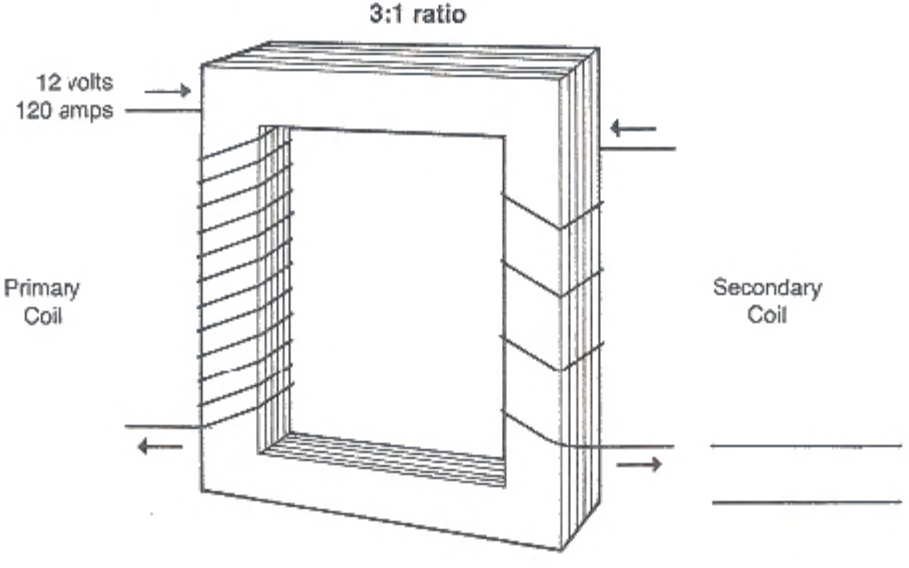
Step-Up Transformer

1:2 ratio



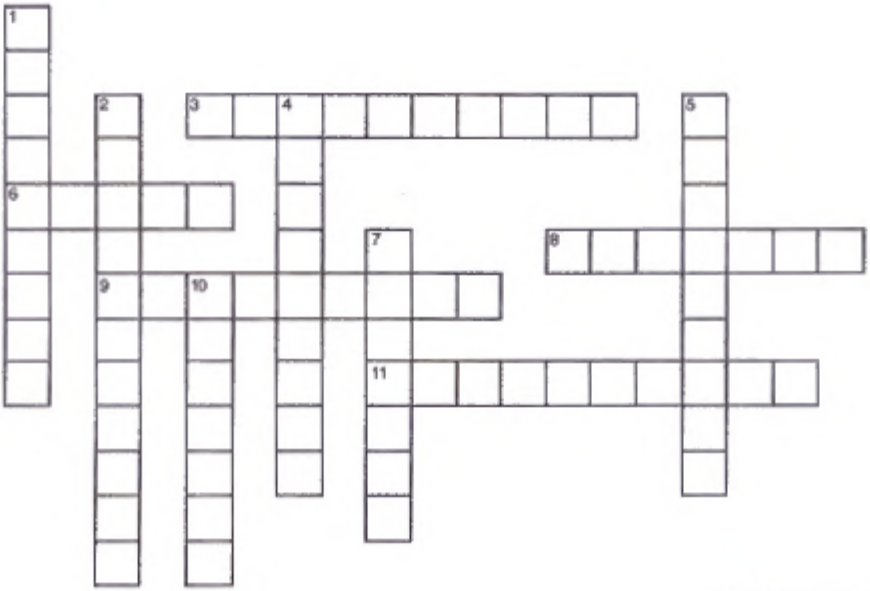
Step-Down Transformer

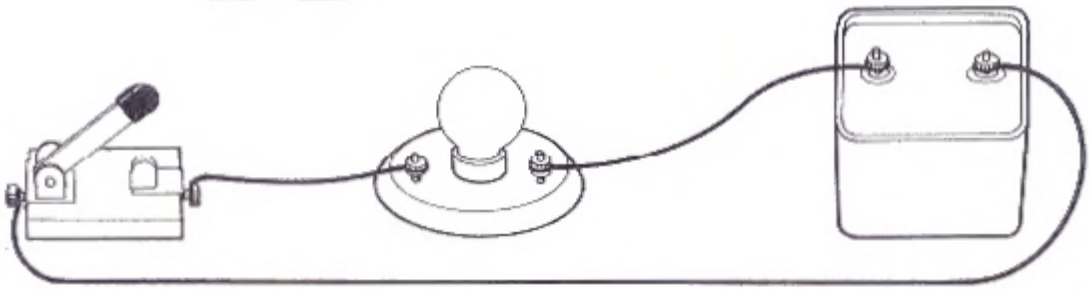
3:1 ratio



ELECTRICITY CROSSWORD

Name _____





ACROSS

3. Made from semiconductors and need little voltage
6. An electric _____ converts electrical energy to kinetic energy.
8. Measures current
9. Changes alternating current to direct current
11. This type of circuit may contain thousands of tiny transistors

DOWN

1. Measures potential difference
2. Current that changes direction
4. Magnifies a small electric signal
5. A device that produces current by moving a magnetic field across a wire
7. A semiconductor material
10. A device that uses electrons to produce images on a screen is a _____ ray tube.