Name Key

Date _____ Blk: ____

/103

Physics Key Terms

These are the vocabulary words that you should know for your final exam.

Chapter 7

conductors
coulomb
electric force
grounding
insulators
laws of static charge
static charge
Van de Graaff generator

Chapter 8

ammeter
amperes
circuit diagrams
current electricity
electric circuit
electric current
electric load
electric potential energy
electrical resistance
electrochemical cells
electrodes
energy
ohm
Ohm's law
potential difference
resistance
resistor
volt
voltage
voltmeter

Chapter 9

electrical power
joule
kilowatt-hour
parallel circuit
power
series circuit
watt

Physics Key Concepts

These are the main ideas from Physics. Fill-in-the-blanks to complete.

Chapter 7: Static electricity

- static charge is electric charge that is held in one place. (7.1)
- An atom or material becomes charged when electrons transfer into it or out of it. (Protons are not transferred to create a charge) (7.1)
- insulators keep charges in one place, whereas conductors allow charges to move more easily. (7.1)
- Like charges repel. Unlike, or opposite charges attract. Neutral objects are attracted to charged objects. (7.2)
- Electric force is a force at a distance. Electric force can be increased by increasing the amount of charge on objects and by decreasing the distance between charged objects. (7.2)

/4

Chapter 8: Ohm's law

- Unlike charges gain electric potential energy when they are moved farther apart. (8.1)
- Batteries are devices that store energy in electric charges so that it can be used at some later time to do work. They convert chemical energy to electrical energy and may be classified as wet or dry.(8.1)
- Voltage (or potential difference) is the change in potential energy per coulomb of charge. It is measured in volts by a voltmeter. (8.1)

/5

/12

- current is the amount of charge flowing in a circuit every second. It is measured in amps by an ammeter. (8.1)
- Resistance is a property of a material where a load slows down the charge in a circuit. It is measured in ohms. (8.1)
- Electrical energy depends on the amount of charge and the voltage. (8.1)
- Conventional current flows from + to −, but electrons really flow from − to +. (8.2)
- Symbols are used to represent parts of an electric circuit (8.2)
- Ohm's law states that the electrical resistance of the circuit is the ratio of the voltage to the current. (8.3) The three formulas are: V = I × R, I = V ÷ R, R = V ÷ I

/13

Chapter 9: Circuits

- series circuits have one path, and parallel circuits have multiple paths (9.1)
- The current is the same in each part of a series circuit, and each load uses a portion of the same voltage. (9.1)
- The current in each part of a parallel circuit depends on the resistance of that path. (9.1)
- When resistors are placed in series, the total resistance of the circuit increases. When resistors are placed in parallel, the total resistance decreases. (9.1)
- Electric power is the rate at which electric potential energy is transformed. The formula for Power is P = V x I (9.2)
- Power consumption multiplied by time of use equals the amount of electrical energy used by a device. (9.2)
- Energy used in the home is measured in kilowatt hours (symbol kw·h) (9.2)

/9

Static Questions:

1a. When an acetate strip is rubbed with paper towel, it becomes negatively charged. Why?

electrons move to the acetate strip

/1

b. What kind of charge will the paper towel have? Why?

Positive charge, b/c the P.T loses electrons

/1

2a. A positively charged object is brought near another object. If the two objects repel, what is the charge on the second object?

The second object is positively charged.

/1

b. If this positively charged object attracts an unknown object, what does this indicate about the charge on the unknown object? Explain.

either neutral or negatively charged.

/2

3. What effect does grounding have on a charged object?

allows electrons to flow to the ground

/1

/28

Physics Formulas. These will be provided for you on the final exam.

V = I x R		P = I x V		E = P x t	
where:	unit:	where:	unit:	where:	unit:
V = Voltage	V	P = power	W	E = energy	J
I = current	A	I = current	A	P = power	W
R = resistance	Ω	V = Voltage	V	t = time	sec

/18

Physics Calculations. Show all three steps: Formula / Substitution / Answers with units

1. A current through a resistor in a circuit is 1.2 A. If the potential difference across the resistor is 6 V, what is the resistance of the resistor?

/3 $R = \frac{V}{I} = \frac{6}{1.6} = \boxed{5\,\Omega}$

2. An electric iron plugged into a wall socket has a resistance of 30 ohms. If the current in the iron is 4 A, what is the voltage provided by the wall socket?

/3 $V = I \times R = 4 \times 30 = \boxed{120\ V}$

3. A 6 V battery is connected to a 10 ohm resistor. What is the current flowing in the circuit?

/3 $I = \frac{V}{R} = \frac{6}{10} = \boxed{0.6\ A}$

4. The current in a clothes dryer is 20 A when it is plugged into a 240 V outlet. What is the power rating of the dryer?

/3 $P = I \times V = 20 \times 240 = \boxed{4800\ W}$

5. Calculate the power of the light bulb with a current of 2.0 A and 30 V.

/3 $P = I \times V = 2 \times 30 = \boxed{60\ W}$

6. Determine the amount of current flowing into a 210 W computer plugged into a 120 V outlet.

/3 $I = \frac{P}{V} = \frac{210}{120} = \boxed{1.75\ A}$

7. A microwave oven operates on 1200 W of power and is used for 10 minutes. How much electrical energy is used by the microwave oven?

/3 $E = P \times t = 1200 \times 600 = \boxed{720\,000\ J}$

8. A kitchen light is left on for 6 h. If the amount of electrical energy used is 0.6 kW*h, what is the power rating of the light bulb?

/5 $P = \frac{E}{t} = \frac{600\ W \cdot h}{6\ h} = \boxed{100\ W}$ or $\frac{2160\,000\ W \cdot s}{21600\ s}$

9. A 15 A dryer on a 240 V circuit is on for two hours. If electricity costs $0.07 per kw*h, how much will it cost to operate the dryer?

$P = I \times V = 15 \times 240 = 3600\ W \times 2 = 7200\ W$ / 1000

/5 $= 7.2\ kW \cdot h \times 0.07 = \boxed{\$0.50}$

/47

Series vs. Parallel Circuits

	Series Circuit	Parallel Circuit
Total Voltage (↑)	$V_T = V_1 + V_2 + V_3$	$V_T = V_1 = V_2 = V_3$ (same)
Total Current (same)	$I_T = I_1 = I_2 = I_3$	$I_T = I_1 + I_2 + I_3$ (↑)
Total Resistance	$R_T = R_1 + R_2 + R_3$ (↑)	$R_T =$ * OMIT * (↓)

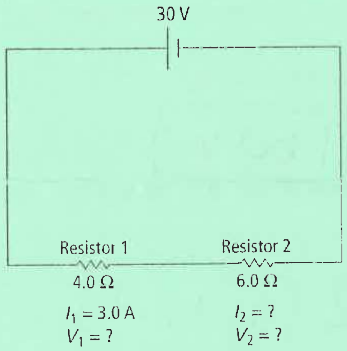
Indicate whether the statement applies to a series circuit (S) or a parallel circuit (P).

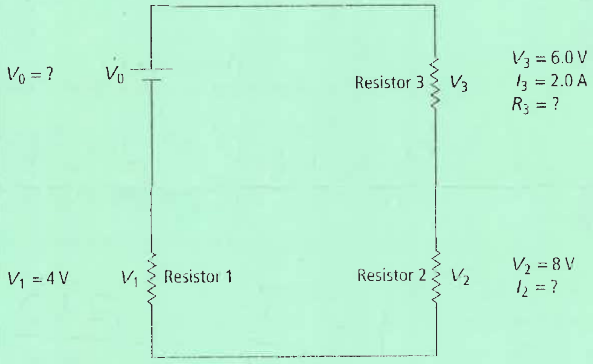
1. S — The current is the same throughout the circuit.
2. P — Adding a resistor will decrease the total resistance of the circuit.
3. S — There is only one pathway for electrons to flow.
4. S — As more cells are added to the circuit, the brightness of the light bulb increases.
5. P — There is more than one pathway for current to flow.
6. S — Adding a resistor will increase the total resistance of the circuit.
7. P — The voltage across each resistor in the circuit is the same.
8. P — There are junction points in the circuit.
9. P — The current through each pathway of the circuit adds up to the total current supplied by the source.

/9

Calculations with series circuits

Use the diagrams to answer the questions below.





1. (a) What is the total resistance in the circuit?
4 + 6 = 10 Ω

(b) What is the amount of current flowing through Resistor 2?
3 A

(c) Using Ohm's Law ($V = IR$), determine the voltage drop across Resistor 2.
$V = I \cdot R = 3 \cdot 6 = 18$ V

(d) What is the voltage drop across Resistor 1? 30 − 18 = 12 V

2. (a) What is the total voltage in the circuit?
4 + 8 + 6 = 18 V

(b) What is the amount of current flowing through Resistor 2?
2 A

(c) Ohm's law is $R = \frac{V}{I}$. Use Ohm's law to determine the resistance of Resistor 3. $R = \frac{V}{I} = \frac{6}{2} = 3\ \Omega$

/3

/16