Course: Physics 1 *Course Code: 2003380*

SEMESTER 2
QUARTER 4
UNIT 9

TOPIC of STUDY: Electricity
STANDARDS: 10: Energy
KEY LEARNING:
~The electric force between two charged particles depends upon the size of the charge and the distance between the charges.
~The position of electric charges affect the electric fields, the electric potential, the electric potential energy, and the electric force.
~Energy is transferred in an electric circuit.
~Electric circuits are series, parallel, or a combination of series and parallel.

RESOURCES COMMON CORE PACING GUIDE

VOCABULARY: electroscope, Coulomb's Law, electric field, electric force, electric potential, electric potential energy, electric current, voltage, resistance, conductor, insulator, semiconductor, electron, neutron, proton, charge, induction, conduction, Ohm, series circuit, parallel circuit

SUGGESTED LABS:
1. Series and Parallel Circuits
2. Ohm's Law

NGSSS	CONTENT	TARGETS
SC.912.P.10.1 Differentiate among the various forms of energy and recognize that they can be transformed from one form to another SC.912.P.10.13 Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy	**CONCEPT: Static Electricity** 1. Understand the Basic properties of electric charge. 2. Distinguish between charging by contact (conduction) or charging by induction 3. Determine the electric force between two charged objects using Coulomb's Law. 4. Determine electric field strength. 5. Draw and interpret electric field lines. **ESSENTIAL QUESTIONS:** A. Can you calculate the magnitude and direction of the electric force between two charged objects? B. In what ways are static charges displayed in nature? C. Can you identify electric filed vector diagrams around point charges, diploes, and parallel plate capacitors?	~Use Coulomb's Law to solve problems. ~Discuss the charge left on an electroscope when it is charged by conduction or induction. ~Draw and interpret electric field lines given charges in a specific arrangement. ~Calculate the charge, q, of an object given a number of excess electrons or excess protons.

SC.912.P.10.14 Differentiate among conductors, semiconductors, and insulators SC.912.P.10.15 Investigate and explain the relationships among current, voltage, resistance, and power SC.912.P.10.16 Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields and their application in modern technologies	**CONCEPT: Current Electricity and Ohm's Law** 1. Discuss the differences and similarities among a conductor, a semiconductor, and an insulator. 2. Describe the basic properties of electric current. 3. Construct circuit diagrams in series and in parallel. 4. Solve problems relating current, resistance, and voltage. 5. Calculate energy used and power in circuits. **ESSENTIAL QUESTIONS:** A. What conditions create current in an electric circuit? B. How does Ohm's Law explain the relationship among potential difference, current, and resistance? C. What are the benefits of a series circuit? D. What are the benefits of a parallel circuit?	~Classify materials as a conductor, a semiconductor, or an insulator. ~Identify circuits as series, parallel, or a combination. ~Use Ohm's Law to solve problems involving circuits. ~Interpret V vs I graphs to determine resistance. ~Calculate the equivalent resistance for a circuit of resistors in series, and find the current and potential difference across each resistor in the circuit. ~Calculate the equivalent resistance for a circuit of resistors in parallel, and find the current and potential difference across each resistor in the circuit. ~Calculate the power dissipated in a circuit.

SEMESTER 2
QUARTER 4
UNIT 10

TOPIC of STUDY: Magnetism
STANDARDS: 10: Energy
KEY LEARNING:
~Given the force on a charge in a magnetic field, determine the strength of the magnetic field.
~Magnetic forces and fields can compare with Electric forces and fields.

VOCABULARY: magnetic field, magnetic flux, electric motor, electromagnetic field, electromagnetic force, solenoid

SUGGESTED LABS:
1. Make a simple electric motor using a battery.

NGSSS	CONTENT	TARGETS
SC.912.P.10.1 Differentiate among the various forms of energy and recognize that they can be transformed from one form to another	**CONCEPT: Magnetic Fields** 1. Magnetic poles will attract or repel. A magnetic monopole has yet to be discovered. 2. Describe the orientation of the Earth's magnetic field. **ESSENTIAL QUESTIONS:** A. How is a charged particle affected within a magnetic field? B. How would a change in the Earth's magnetic field impact our environment?	~Describe the field around a permanent magnet. ~Discuss effects in our environment due to the Earth's magnetic field.
SC.912.P.10.16 Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields and their application in modern technologies	**CONCEPT: Electricity from Magnetism** 1. Describe the magnetic field produced by a current in a straight conductor and in a solenoid. 2. Use the Right Hand rule to determine the direction of the magnetic field in a current carrying wire. 3. Use the Right Hand Rule to determine the force on a charge moving in a magnetic field. **ESSENTIAL QUESTIONS:** A. How does a magnetic field affect the forces on a charged particle in the field? B. How can the strength of a magnetic field be varied? C. How does an electric motor work?	~Draw and interpret the magnetic field lines given different arrangements of magnets. ~Use the Right Hand Rule to determine •the force on a charged particle in a magnetic field •the direction of the magnetic field when a charged particle moves through it •the direction of motion of a charged particle traveling through a magnetic field. ~Given the force on a charged in a magnetic field, determine the strength of the magnetic field.

SEMESTER 2
QUARTER 4
UNIT 11

TOPIC of STUDY: Atomic theory and Nuclear Physics
STANDARDS: : 8:Matter, 10: Energy,
KEY LEARNING:
~The atom is the source of energy
~Energy can be released from an atom

VOCABULARY: nucleus, atomic number, hydrogen ion, isotope, nuclear mass, radioactive isotope, mass number, nuclear force, photon, quantum mechanics, atomic energy, atomic reaction, atomic theory, binding energy, half-life, nuclear decay rate, radioactive dating, radioactive decay, nuclear fission, nuclear fusion

SUGGESTED LABS:

NGSSS	CONTENT	TARGETS
SC.912.P.8.1 Differentiate among the four states of matter. SC.912.P.8.3 Explore the scientific theory of atoms (also known as the atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence	**CONCEPT: Models of the Atom** 1. Explain the evolution of the model of the atom from Democritus through Thompson's Plum Pudding model, to Rutherford's model, to Bohr's model, to the present model of the atom 2. Recognize that each element has a unique atom categorized by its emission and absorption spectrum **ESSENTIAL QUESTIONS:** 1. How have the various models of the atom contributed to our present model of the atom? 2. How has the increase in the knowledge of the atomic model affected society (nuclear power, weapons, medicine, etc.)?	~Discuss the evolution of the atomic model mentioning strengths and weaknesses of each of the different models. ~Describe and illustrate the structure of an atom. ~Describe and illustrate the masses and the charges associated with the proton, neutron, and electron. ~Interpret energy level diagrams
SC.912.P.10.9 Describe the quantization of energy at the atomic level.	**CONCEPT: Quantum Mechanics** 1. Discuss the dual nature of light and matter. 2. Distinguish between classical ideas of measurement and the Heisenberg Uncertainty Principle. **ESSENTIAL QUESTIONS:** 1. How are energy-level diagrams related to emission spectra? 2. How does our model of the atom explain the wave and particle duality of light?	~ Describe the quantum Mechanical picture of the atom, including the electron cloud and probability waves.
SC.912.P.10.10 Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear)	**CONCEPT: Nuclear Physics** 1. Identify the properties of the nucleus of the atom and explain why some nuclei are unstable.	~Describe what happens when a nucleus decays. ~Compare and contrast nuclear

	2. Describe the three modes of nuclear decay. 3. Determine the decay constant and the half-life of a radioactive substance. 4. Distinguish between nuclear fusion and nuclear fission. **ESSENTIAL QUESTIONS:** A. What is the relationship between nuclear binding and the stability of the nucleus? B. What is the difference between fusion and fission? C. What happens when a nucleus decays?	fusion and nuclear fission. ~Calculate the decay constant and the half-life given information on a radioactive substance.