AP PHYSICS

Name: _____

Period: _____ Date: _____

DEVIL PHYSICS

BADDEST CLASS ON CAMPUS

GIANCOLI READING ACTIVITY
Section(s) 16-5 to 16-6 (4 Points)

1. Big Idea(s):
   a. Objects and systems have properties such as mass and charge. Systems may have internal structure.
   b. The interactions of an object with other objects can be described by forces.
   c. Changes that occur as a result of interactions are constrained by conservation laws.
2. Enduring Understanding(s):
   a. Electric charge is a property of an object or system that affects its interactions with other objects or systems containing charge.
   b. Materials have many macroscopic properties that result from the arrangement and interactions of the atoms and molecules that make up the material.
   c. At the macroscopic level, forces can be categorized as either long-range (action-at-a-distance) forces or contact forces.
   d. The energy of a system is conserved.
   e. The electric charge of a system is conserved.
3. Essential Knowledge(s):
   a. There are only two kinds of electric charge. Neutral objects or systems contain equal quantities of positive and negative charge, with the exception of some fundamental particles that have no electric charge.
      i. Like-charged objects and systems repel, and unlikecharged objects and systems attract.
      ii. Charged objects or systems may attract neutral systems by changing the distribution of charge in the neutral system.
   b. The smallest observed unit of charge that can be isolated is the electron charge, also known as the elementary charge.
      i. The magnitude of the elementary charge is equal to 1.6×10^{-19} coulombs.
      ii. Electrons have a negative elementary charge; protons have a positive elementary charge of equal magnitude, although the mass of a proton is much larger than the mass of an electron.
   c. Matter has a property called electric permittivity.
      i. Free space has a constant value of the permittivity that appears in physical relationships.
      ii. The permittivity of matter has a value different from that of free space.
   d. Electric force results from the interaction of one object that has an electric charge with another object that has an electric charge.

i. Electric forces dominate the properties of the objects in our everyday experiences. However, the large number of particle interactions that occur make it more convenient to treat everyday forces in terms of nonfundamental forces called contact forces, such as normal force, friction, and tension.

ii. Electric forces may be attractive or repulsive, depending upon the charges on the objects involved.

e. A system with internal structure can have potential energy. Potential energy exists within a system if the objects within that system interact with conservative forces.

i. The change in electric potential in a circuit is the change in potential energy per unit charge. [Physics 1: only in the context of circuits.]

f. The exchange of electric charges among a set of objects in a system conserves electric charge.

i. Charging by conduction between objects in a system conserves the electric charge of the entire system.

ii. Charge separation in a neutral system can be induced by an external charged object placed close to the neutral system.

iii. Grounding involves the transfer of excess charge to another larger system (e.g., the earth).

4. Learning Objective(s):

a. The student is able to construct an explanation of the two-charge model of electric charge based on evidence produced through scientific practices.

b. The student is able to make a qualitative prediction about the distribution of positive and negative electric charges within neutral systems as they undergo various processes.

c. The student is able to challenge claims that polarization of electric charge or separation of charge must result in a net charge on the object.

d. The student is able to challenge the claim that an electric charge smaller than the elementary charge has been isolated.

e. The student is able to use Coulomb's law qualitatively and quantitatively to make predictions about the interaction between two electric point charges (interactions between collections of electric point charges are not covered in Physics 1 and instead are restricted to Physics 2).

f. The student is able to describe and make qualitative and/or quantitative predictions about everyday examples of systems with internal potential energy.

g. The student is able to connect the concepts of gravitational force and electric force to compare similarities and differences between the forces.

h. The student is able to make quantitative calculations of the internal potential energy of a system from a description or diagram of that system.

i. The student is able to apply mathematical reasoning to create a description of the internal potential energy of a system from a description or diagram of the objects and interactions in that system.

j. The student is able to predict electric charges on objects within a system by application of the principle of charge conservation within a system.

k. The student is able to design a plan to collect data on the electrical charging of objects and electric charge induction on neutral objects and qualitatively analyze that data.

l. The student is able to justify the selection of data relevant to an investigation of the electrical charging of objects and electric charge induction on neutral objects.

5. Read section(s) 16-1 to 16-6 in your textbook.
6. Use the Cornell Notes system to take notes on the lesson material. You have the following options:
   a. You can print multiple copies of one of the forms on the following pages of this document and handwrite your notes.
   b. You can use the MS Word form supplied below and type your notes.
      i. You can then print your work and submit a hardcopy, or
      ii. You can upload your work to Focus. If you choose this option, you must use a filename in the format, "LastnameFirstinitialPerXAsgnmtName". For example, "SmithKPer4ReadActT9-3.doc"
   c. You can take notes on notebook paper using the Cornell Notes format and submit the hardcopy.
7. When using this form, remember the **Five R's of Notetaking**:
   a. ***Record*** – the most important or emphasized information
   b. ***Reduce*** – and synthesize information wherever possible, making it as concise as you can
   c. ***Recite*** – read your notes out loud
   d. ***Reflect*** – and consider how this information is connected to your personal experiences and what you already know
   e. ***Review*** – look over your notes more than once
8. As a minimum, you must include notes on the following topics:
   a. Coulomb's law (which looks a lot like Newton's law of universal gravitation)
   b. Coulomb
   c. elementary charge
   d. quantization
   e. permittivity of free space
   f. point charge
   g. electrostatics
   h. principle of superposition
   i. electrostatic force (Coulomb force)
9. Answers may be typed or neatly printed. You do not need to include this page of instructions with your assignment.
10. ***Note: The following computer skills should be practiced:***
    a. Use Microsoft Equation to type any equations.
    b. Drawings may be freehand, but try to make use of the 'Shapes', 'Insert Picture' or 'Insert Clipart" functions of MS Word.

c. A reading assignment may contain drawings that would be useful in your notes. If you have scanning capability, you should practice scanning pictures and inserting them into documents. As you prepare for college, you should consider investing in a desktop printer-scanner-copier.

d. Just remember that for formal reports you have to cite any images that you insert into your document. You don't have to cite scanned images for this exercise unless you use a source other than the textbook.

CORNELL NOTES and the 5 R's

Record – the most important or emphasized information
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Recite – read your notes out loud
Reflect – and consider how this information is connected to your personal experiences and what you already know
Review – look over your notes more than once

Name:

Date:

Topic:

Questions/Key Points	**Notes**

SUMMARY:

Name _____

Date _____

CORNELL NOTES

Topic _____

Questions/key points	Notes

Summary