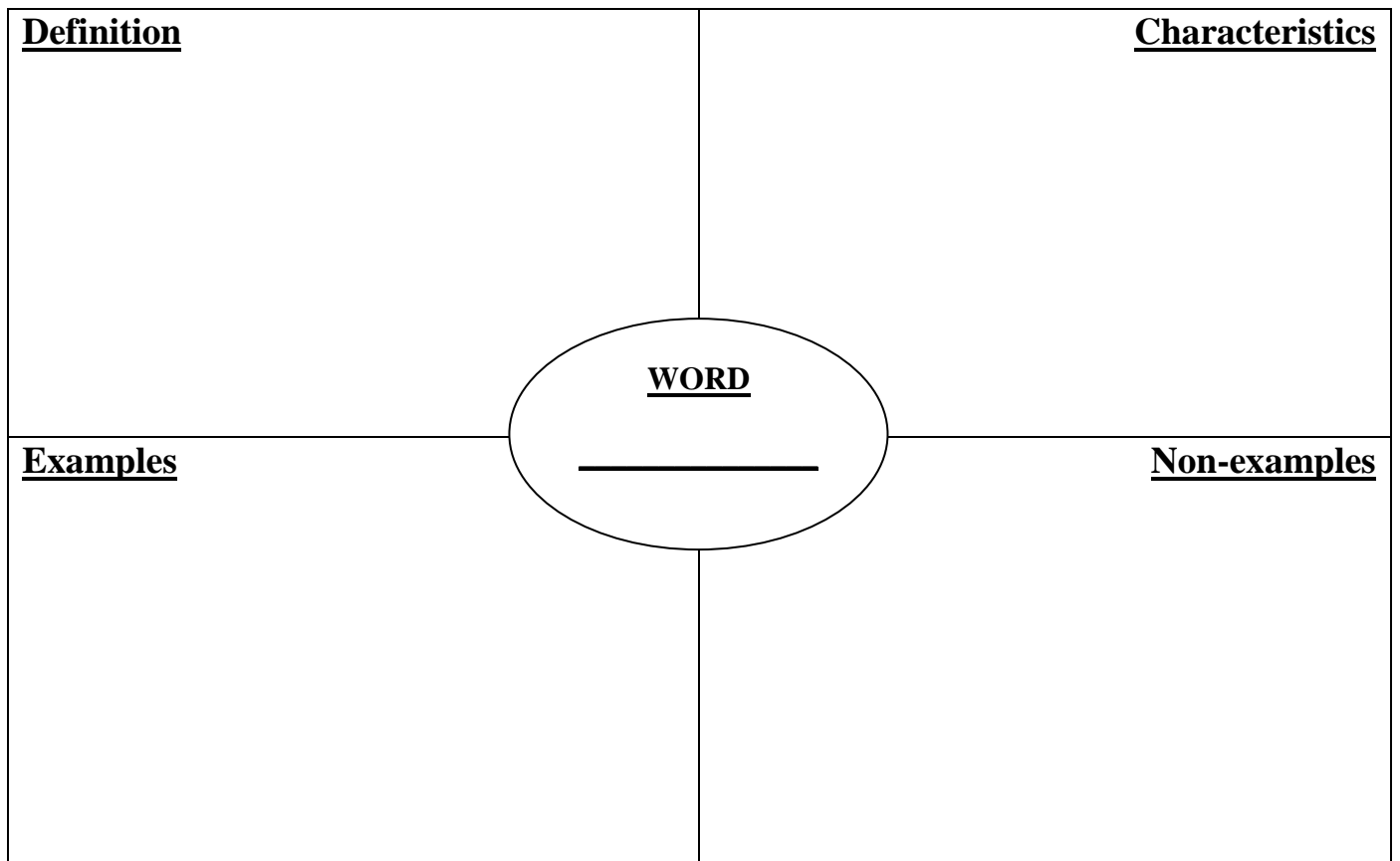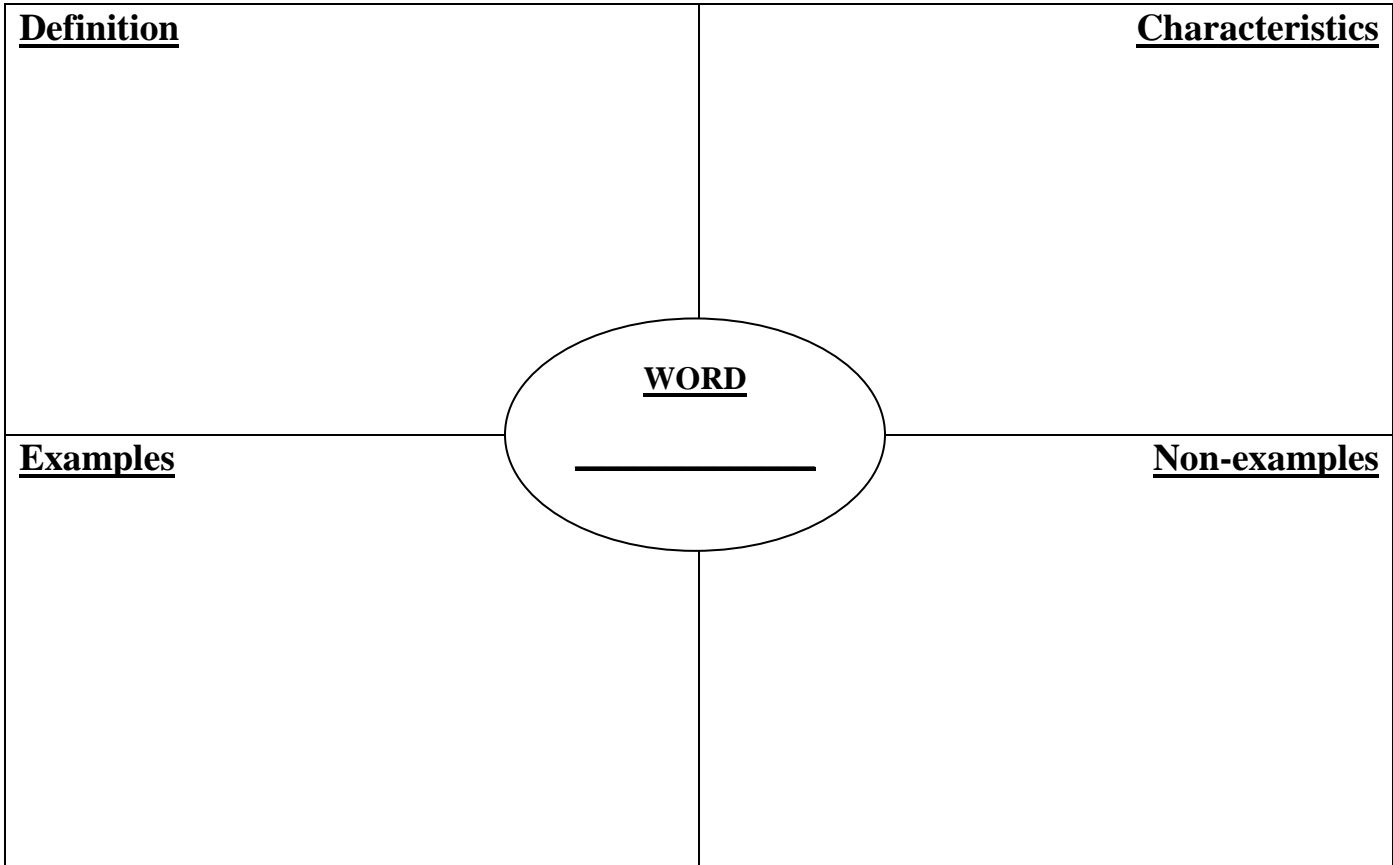*DEVIL PHYSICS*
BADDEST CLASS ON CAMPUS

GIANCOLI READING ACTIVITY
Sections 6-4 to 6-5

1. Big Idea(s):

    a. The interactions of an object with other objects can be described by forces.

    b. Interactions between systems can result in changes in those systems.

    c. Changes that occur as a result of interactions are constrained by conservation laws.

2. Enduring Understanding(s):

    a. All forces share certain common characteristics when considered by observers in inertial reference frames.

    b. Classically, the acceleration of an object interacting with other objects can be predicted by using $\vec{a} = \frac{\vec{F}}{m}$.

    c. Interactions with other objects or systems can change the total energy of a system.

    d. The energy of a system is conserved.

3. Essential Knowledge(s):

    a. An observer in a particular reference frame can describe the motion of an object using such quantities as position, displacement, distance, velocity, speed, and acceleration.

        i. A choice of reference frame determines the direction and the magnitude of each of these quantities.

    b. Free-body diagrams are useful tools for visualizing forces being exerted on a single object and writing the equations that represent a physical situation.

        i. An object can be drawn as if it was extracted from its environment and the interactions with the environment identified.

        ii. A force exerted on an object can be represented as an arrow whose length represents the magnitude of the force and whose direction shows the direction of the force.

        iii. A coordinate system with one axis parallel to the direction of the acceleration simplifies the translation from the free-body diagram to the algebraic representation.

    c. The energy of a system includes its kinetic energy, potential energy, and microscopic internal energy. Examples should include gravitational potential energy, elastic potential energy, and kinetic energy.

    d. Classically, an object can only have kinetic energy since potential energy requires an interaction between two or more objects.

    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 work done by a conservative force is independent of the path taken. The work description is used for forces external to the system. Potential energy is used when the forces are internal interactions between parts of the system.

     ii. Changes in the internal structure can result in changes in potential energy. Examples should include mass-spring oscillators, objects falling in a gravitational field.

4. Learning Objective(s):

   a. The student is able to create and use free-body diagrams to analyze physical situations to solve problems with motion qualitatively and quantitatively.

   b. The student is able to calculate the total energy of a system and justify the mathematical routines used in the calculation of component types of energy within the system whose sum is the total energy.

   c. The student is able to predict changes in the total energy of a system due to changes in position and speed of objects or frictional interactions within the system.

   d. The student is able to set up a representation or model showing that a single object can only have kinetic energy and use information about that object to calculate its kinetic energy.

   e. The student is able to translate between a representation of a single object, which can only have kinetic energy, and a system that includes the object, which may have both kinetic and potential energies.

   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 make quantitative calculations of the internal potential energy of a system from a description or diagram of that system.

   h. 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.

5. Read sections 6-4 to 6-5 in your textbook.

6. Choose one of the following activities and apply it to each of the terms listed in #4 below:

   a. Write a definition for each of the terms listed below.

   b. Take notes on the section using the Cornell Notetaking system. You must cover all the terms and concepts listed below.

   c. Develop a quiz of at least 10 questions covering the most important topics in the required reading. They can be multiple choice, true/false, short answer, fill-in-the blank, essay, or any combination of the previous. Creative or thought-provoking questions are encouraged. Humerous questions are also encouraged, BUT are accepted only in ADDITION TO the 10 serious ones. Secondary skills I would also *like* you to work on include:

      i. Use of Microsoft Equations to write equations.

     ii. Use of the outline functions of MS Word to make sequentially numbered questions and sub-questions.

    iii. Diagrams or shapes to accompany your quiz questions for clarification. Use of MS Shapes function or Insert Clipart is highly encouraged.

    iv. Using underlining in conjunction with the tab functions to make fill-in-the blank questions.

     v. Use of textboxes to create an area for name, date and period.

      vi.   Creating a boxed heading using the border function.

     vii.   Creating a logo of your own design (Devil Physics is already taken) with a picture or clipart and creative font.

   viii.   Items a-g above are not required for your grade, but offer an excellent opportunity to improve your computer skills for use in future assignments/projects/activities.

d. Draw a picture that adequately explains each term listed below to someone who is learning English as a second language.

e. Write a question regarding some aspect or characteristic of each of the terms listed below. The questions must start with either the word "How" or "Why".

f. Describe a situation for each term listed below in which you personally experienced the term in action.

g. For each term listed below, explain whether or not it would work differently on the moon and if so, why.

h. Write a poem that incorporates all of the terms listed below. (*Extra credit for the use of iambic pentameter*)

i. Describe a scenario using all of the terms listed below.

j. Create a diagram showing how the terms listed below are related to each other.

k. Use the attached Frayer Model worksheets to explore the terms assigned to you.

l. Choreograph an interpretive dance explaining the terms listed below.

m. Create an entire meal using dishes that portray the characteristics of the terms below.

n. Create and film an instructional video explaining the terms below. If you choose this option, you will be afforded additional time to complete this activity, however it must be complete before the test on this chapter. You may work in groups of up to 4 people. If the video is well done, you may be awarded additional bonus points.

7. Terms:

   a. potential energy

   b. gravitational potential energy

   c. reference level

   d. Hooke's Law (spring equation)

   e. elastic potential energy

   f. conservative forces

   g. nonconservative forces

   h. work-energy principle

   i. work done by nonconservative forces

8. This assignment may be typed or neatly printed. Drawings may be freehand, but try to make use of the 'Shapes' or 'Insert Clipart" functions of MS Word. If you submit this assignment electronically, the filename must be in the following format, "LastnameFirstinitialPerXReadActX-X". You **do not** need to include a copy of these instructions with the assignment you hand in.

Definition   **Characteristics**

WORD

_____

Examples   **Non-examples**

Definition   **Characteristics**

WORD

_____

Examples   **Non-examples**

Definition

Characteristics

WORD

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Examples

Non-examples

Definition

Characteristics

WORD

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Examples

Non-examples