Phase I – Research and Planning – Due Date: Midterm

1. Identify the "Big" concept to be covered by the engineering design challenge.
    a. Waves
    b. Patterns and motion
    c. Newton's 1st law of motion
    d. Newton's 2nd law of motion
    e. Create shaker table
2. Research appropriate learning standards associated with the topic.
    a. 4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object
    b. 4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat and electric currents
    c. 4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move
    d. 4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information
3. Identify and discuss the different types of problem solving and declarative/procedure knowledge needed.
    a. Declarative Knowledge
        i. Definition of amplitude
        ii. Definition of wave
        iii. Definition of seismic activity
        iv. What causes seismic activity
        v. Definition of pattern
        vi. Definition of motion
        vii. Definition of force
        viii. Definition of acceleration
        ix. Definition of mass
    b. Procedural Knowledge
        i. How seismic activity occurs
        ii. How waves create patterns and energy
4. Explore objectives and ancillary concepts/content covered by the project.
    a. Newton's 1st law examples
        i. Kicking soccer ball on grass vs gym floor
        ii. Tightening of seatbelt when car brakes suddenly
    b. Newton's 2nd law examples
        i. Pushing down pedals on a bike
        ii. Pushing a bowling ball and volley ball at same time
    c. Waves
        i.
    d. Patterns

5. Identify possible activities.

    a) Design Squad= Bristle Bots-equal and opposite reactions/ or electric waves

b) Design Squad= Build a better lunch box= how to prevent a lukewarm lunch, covers PS 2 standard with heat waves
c) Design Squad= Doggie Door= invisible force/magnetic energy standard
d) Design Squad= Extreme Kicking Challenge= working for Nike and need different balls for speed vs distance. Or for students to answer How to practice soccer with yourself, or how to play soccer with yourself?

6. Select the best activity for your classroom

a) Design Squad- Seismic Shake Up- My team mate and I will be dividing up this activity to span across an entire semester. I am starting off this unit/activity by having students learn about waves and patterns. From there students will dive deep into Newton's 1^{st} and 2^{nd} laws. With their knowledge on waves, patterns and physics laws students will create their shaker table.