

Unit 1 Task 3 Plan

[Task Directions](#) - This is the whole assessment.

Phenomena: [Moon Craters](#): Students will discuss what they could extrapolate or figure out from the picture. (Some things look discuss are the facts that there are more visible craters - less erosion and that you can figure out a relative date of some of the craters when one is on top of another - such as all the small ones in the large crater. Plus the idea that a larger crater probably somehow had more energy.)

Optional Supplement: Another possible **phenomena** to discuss are Rube Goldberg machines (<https://www.youtube.com/watch?v=qybUFnY7Y8w> http://www.successfulacademics.com/Math_n_Science/img/AlarmClock.jpg) Which would work if you wanted to discuss energy conversion in more detail, this is better as a supplemental phenomena during a lesson about energy conversion. These are only related activities if you need to break up the lessons as they do not focus strongly on the relationship between energy and mass/speed/height. You would want to connect in the idea that as height is increased more total (and potential) energy is put into the object and as the speed increases the object has more kinetic energy. Other Rube Goldberg resources:

- [Compilation of pictures of his cartoons](#)
- [Assignment to draw a Rube Goldberg Machine](#)
- [Extra credit to setup and film a Rube Goldberg Machine](#)

Part 1: Asteroid Data Collection

- **Task:** Students will collect real world data about asteroids, looking at their mass, speed (or velocity), and energy. They will be looking for any patterns in this data.
- **Note:** They should see that more mass = more energy and that more velocity = more energy.
- **Note:** It may be easier for students if this worksheet is printed so that they don't need to go back and forth between apps on the iPad.
- (To overlap this activity and start moving onto the next one I have an energy video I made for my students last year that they will be watching at home and answering some basic questions about on a Google Form.)

Part 2: Graphing Asteroid Data

- **Task:** Students will use their data from Part 1 to construct two graphs. One for speed and energy and one for mass and energy.
- **Note:** You may want to discuss how to pick numbers of the x and y axis so that the data is spread out and not clustered at one end.
- **Note:** For graphing it might be easier to print out this assignment.

Part 3: Asteroid Drop Lab

- Lecture: [Pear Deck](#) on the equations for Kinetic and Gravitational Potential Energy, the relationship between Force and Energy, and how collisions transfer energy.
- Possible Supplemental Activity: [Skate Park Simulation](#), this simulation is shown in the slides as well, but the students do not explore it as much.
- **Task:** Students will be dropping masses (can use pebbles or anything else) into flour and seeing how the crater left is related to mass or height. (The height value gives an idea of how speed relates as the higher the object is dropped from the greater the speed it will have on impact due to acceleration due to gravity.)

Part 4: Math of Energy Activity (Students will likely need to work at home to complete this, though parts like the ball drop activity and discussing calculations may need to have time allowed for in class.)

- **Task:** The aim with this task is to get students really thinking about how math explains the relationships between kinetic and potential energy for a falling object and how the variables (velocity and height) relate to the amount of energy in a system. (Some teacher guidance may be needed to model how we can use an equation to calculate a value.)
- Note: [Here](#) is some basic teacher background on the math behind this.

Phenomena: Return to the picture of the moon, have them discuss with their teammates what new assumptions can they make about the objects that made the different craters (i.e. that more mass or more speed equals more energy at the time of impact).