Resource Review

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Physical Science in Motion - Elective 3

Rockets Educator Guide

Rockets Educator Guide. (2012, July 30). Retrieved from https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Rockets.html
United States, & Teaching from Space Program (Lyndon B. Johnson Space Center). (2003).

NASA's, Rockets Educator Guide is an excellent resource with hands on activities to integrate space science into our classes in many subject areas. A hard copy of this resource is available for print/purchase as well (which I bought my copy on Amazon for a cost less than $15). The book has all the necessary information that will make implantation of its activities to teachers from novice to expert. Background information includes a pictorial history of rockets, how rockets work, how to make connection with Newton's Laws (forces applying on rocket-friction, air pressure-..., , inertia and rockets, how mass of rockets affect on its flight. There are multiple activities from basic to advance levels. All of the activities are designed with the classroom in mind. They include clear, easy to follow descriptions with background information for both students and teachers. Worksheets provided can be used directly, or modified according to students levels.

I used this source for my 8th grade physical science class. Out of several rocket activities, we integrated the high power paper rocket activity to our motion unit. With the help of colleagues, we build the high power rocket launcher, which all the information how to build is explained in the book as well. See Figure 1 and Figure 2, the launcher I used for this activity. Designing the launcher can be a limitation for teachers. And also an air compressor is essential to launch the rockets.

Figure 1


Figure 2

At the beginning of activity, students design individual model then a group model (working in groups of two) as “what are the forces acting on a rocket during the fly?”.
Our first rocket activity was an introductory step, where students used only a letter size copy paper and tape to build their rockets. Using the the air powered launcher students collected data and get a chance to see different rocket designs (with different nose cones, fin numbers, fin designs). The distance of the flight was the final data to compare different rocket designs. After the initial launch, students were able to make connections with the Newton’s Laws of Motion and their rockets and come up with alternative ideas for new models.
In second phase, students were not limited to use only same kind of paper, but with a variety of materials-different papers, tapes, designs. The only limitation was, students were given a predetermined budget(Figure 3) where they can not exceed and each item they use (from paper to scissors, rulers, tapes etc.) has a cost. While building their second rockets, students input the design specification on a shared google sheet (viewable by students). The second launch data was better than the first launch. Learning from prior experience was an essential unit of engineering design process, where students practiced.
During the 3rd phase, students designed better rockets with the consideration of mass, center of gravity of the rocket, fin/nose cone design merged with the Newton’s Laws.

Rocket Science Budget

Equipment/Materials	Specific Type of Unit	Cost Per Unit	Quantity Needed	Planned Expense (cost x quantity)	Actual Expense (how much did you end up spending in the end?)
Body Tube Material					
Fin Material					
Nose Cone Material					
Added Mass Material (optional)					
Type of tape			_____ cm		
Type of Tape**			_____ cm		
1st Color					
2nd Color**					
3rd Color**					
Rentals*					
Rentals*					
Rentals*					
Rentals*					

Figure 3

I am planning to include a parachute system for the next time I use this activity. For sure, the parachute design will bring more inquiry process to our Rocket Design activity, providing better understanding of Newton's Laws and its application in real life.

Photos from the activity: