Catapults

Summary

In this activity, we be looking at another engineering challenge as we build a simple machine. We will be making a catapult to help us visualize the work done by a lever and its fulcrum. Let's experiment with some variables to make the farthest launching catapult.

Materials

- 5 Craft sticks
    - *We used two jumbo sticks to make the arm for clarity in the build.*
- 3 rubber bands
- 1 Bottle cap
    - *Almost any size will work, or you can make your own basket for your catapult.*
- Hot glue or tape
    - *We used hot glue for durability, but many adhesives will work, like tape.*
- Cotton balls
    - *Any small item that can fit in the bucket*

Steps to Follow *(All activities must be done with adult supervision)*

1. This is a good time to review what a simple machine is and what kinds there are.
    a. *Levers, pulleys, inclined planes, screws, wheel & axle, and a wedge.*
    b. *These machines use forces to help us do work with little to no moving parts.*
    c. *A lever is a simple beam or board that is pivoted at a fixed point called a fulcrum.*
2. Attach your bottle cap to one of the jumbo craft sticks near an end.
3. Stack 3 craft sticks onto of each other and wrap a rubber band around one end. *Its just like making a ponytail.*
4. Slide the jumbo stick without the attached cap perpendicularly between the second and third stick of the stack. Use your second rubber band to secure the other end of the stack.
5. Align the jumbo stick with the attached cap with the other one in the stack so that you have two sticks between them. Use a rubber band to bind the large sticks together.
    a. *The result will look like a "t" or "x.*
6. Put a cotton ball into the cap (bucket). Use one finger to hold the front of the catapult down and another to pull and release the bucket end.
    a. *By pushing the arm down, potential energy is stored in the machine and it is converted into kinetic energy as the arm is released sending the item flying!*
    b. *Turn this into an experiment by changing a variable.*
        i. *What will happen if we change the number of sticks that make the fulcrum from 3 to 5, 6, 7, or 8 sticks?*
        ii. *Use a tape measure to record the launch distance of each?*
        iii. *Which design goes farthest? How about the highest?*

Ohio Early Learning and Development Standards

Cognition and General Knowledge/Science/Science Inquiry and Application/Inquiry
Cognition and General Knowledge/Science/Physical Science/Explorations of Energy

Ohio Learning Standards

5.PS.1, 6.PS.3, PS.EW.1, PS.FM.1, PS.FM.2, PS.FM.3

Next Generation Science Standards (NGSS)

3-PS2-2, 4-PS3-4, 3-5-ETS1-3, MS-PS2-2, MS-PW3-1, MS-PS3-5, MS-ETS1-4