

EVALUATE

CRATER INVESTIGATION: CATAPULTS UNDER SUSPICION

60 MINUTES

SUMMARY

Now that we've experimented with trajectories and impact craters, we're going to put those two together to investigate which crater came from which catapult.

First up is building a catapult or trebuchet and testing it out. Then comes the investigation. The machines will be all lined up randomly like an identity parade, separate to the craters. Using their knowledge of trajectories, craters and their experience building a trebuchet, their challenge is to determine which crater belongs to which machine.

OUTCOMES

1. Students make their own catapult and investigate craters to determine which trebuchet made them.
2. Students choose appropriate units of measure for length and measure, order and compare craters and their object's trajectories
3. students estimate, measure and compare angles in everyday situations to identify an unknown.

EQUIPMENT

- Construction materials such as paper, cardboard, sticky tape, glue, elastic bands, cardboard boxes,
- Sand pit, trays of flour or similar
- Rake or similar for smoothing out sand
- Objects for launching - e.g. marbles, plasticine balls
- Flags or notes and pins
- Worksheet (page 69)

THE EXPERIMENT - CATAPULTS

Plan

Students in small groups research and build a trebuchet (or catapult) using the materials provided, and taking care to make theirs work differently from other groups (such as a different launch angle), so it's impact crater is identifiable. Students need to understand the challenge: they will be matching up craters to trebuchets. What is important to look for in the design of the machine with respect to the crater it makes?

With a small group of students the teacher will line up each of the trebuchets in a launch zone facing the sand pit. Make impact craters in the sand pit by activating each of the catapults. If each group used a different launch object, remove that too. Don't forget to take a photo of the culprits!

Then line the machines up randomly like an identity parade for each of the student groups to investigate the scene.

Predict:

Students will enter the 'crime scene' with their group to investigate. Their job is to predict which catapult made which crater, without testing the trebuchets. Students measure and record the crater size, distance from launch record and their guesses for trebuchet culprit.

Test:

As a class, or in groups, it's time to test out each of the catapults to get an idea of their range and impact. Follow the template to gather repeat data to create an average.

Analyse

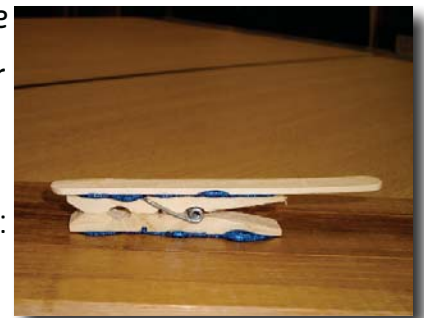
Students make an informed prediction as to which trebuchet made which crater, based on the test results. Reveal the photo of each trebuchet lined up with it's crater. Were the students right? Why or why not?

Communicate:

Students turn their catapults into an exhibit for a classroom gallery for visitors. They'll create an engaging poster that explains:

- Furthest height and length range
- Average crater impact
- Affect of changing the angle of launch
- Compare and contrast their trebuchet with others

How are the catapult craters similar to and different from a meteorite impact crater?



Various trebuchet and catapult ideas - see suggestions for weblinks

SUGGESTIONS FOR THE CLASSROOM

Here are some links to catapult and trebuchet ideas:

<http://cooltrebuchets.weebly.com/trebuchets-vs-catapults.html>

<http://www.teachwithfergy.com/popsicle-stick-catapult/>

<http://mrsmclennan.blogspot.com.au/2010/10/catapults.html>

<http://www.instructables.com/id/Mini-Siege-Engines/>

