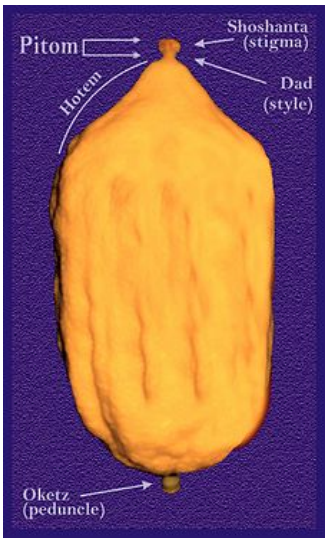
Protect the Pitom (PtP) Etrog Drop

The Charles E. Smith Jewish Day School
3rd Grade Science and Judaics Trsansdisciplinary Studies

Background The etrog is a citrus fruit found in Israel and used in ritual during the holiday of Sukkot. The *pitom* is the remnant of the part of the flower that receives pollen during fertilization. An etrog that sheds its pitom during the growing process is kosher. But an etrog with a pitom that breaks off during the holiday is considered damaged and no longer kosher for performing the mitzvah of the Four Species for this imperfection. The pitom is delicate, and preservation of the pitom is of concern when shipping or handling the etrog during the holiday. After the holiday is concluded, the fruit no longer needs to be perfect for ritual use and may be eaten, planted, etc.



Challenge Protect the Pitom! Design a container, device, or system to protect the pitom when the etrog is dropped from a high place. (*Note: The drop will take place after the holiday is concluded*)

Constraints:

- It must only be made with materials given by the teacher
- It must include the material from the lulav
- It must protect the pitom such that it does not break in the drop

Learning Standards

Science & Engineering (NGSS)

PS2.A: Forces and Motion Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.)

3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Judaics

Crosscutting Concept: Cause and Effect

Causes	Effects
Science: Gravity is a constant force pulling toward the earth.	• The etrog will fall toward the pull of the earth. • The force will produce motion. • Motion will include a change in position. It will have a direction and speed.
Science: The person holding the etrog releases it.	• The forces are no longer balanced (gravity against holding the etrog) and so the etrog falls.
Judaics: The pitom remains intact (during the holiday).	• We have a sense of completion and perfection in nature and the etrog.
Engineering: We have a goal- engineers solve problems.	• We design to meet a goal while working within constraints.
Engineering: There is not a single right solution.	• We may have multiple successful designs. • Designs may be partially successful (its not “all or nothing”)
Engineering: Part of the design process is	• We look for flaws and opportunities

examining our design tests and evaluating them.	to improve.

Science Lesson 1 of 2: Engineering and Design

Objectives:

- Introduce/reinforce the concept of engineering
- Introduce vocabulary
- Explore the etrog and understand the challenge goal
- Draw and label the forces that will be acting on the etrog using the following words:
    - Position 1 and Position 2
    - Direction
    - Motion
    - Gravity
    - Balanced/Unbalanced
    - Force
- Develop a plan for evaluating the container designs after the drop

Introduction

Time	Activity
5 Minutes	Review their learning about engineering from the cardboard sukkah. Reinforce that engineering begins with a problem to be solved.
5 Minutes	Watch: What is an engineer? https://www.youtube.com/watch?v=bipTWWHya8A Summarize- an engineer is someone who uses math and science to solve problems. Today, we will be engineers.

Lesson

Time	Activity
2 Minutes	Propose Challenge: **Protect the Pitom!** Design and build a container, device, or system to protect the pitom when the etrog is dropped from a high place. (Note: The drop will take place after the holiday is concluded) **Constraints:** - It must only be made with materials given by the teacher -It must include the material from the lulav -It must protect the pitom such that it does not break in the drop
3 Minutes	In small groups, explore etrog- identify pitom. Allow them to handle it, smell it, feel it. Have them share descriptive words.
10 Minutes	In small groups, hand out “Etrog Forces”. Students must use the words from the bank to map out the forces and motion in the etrog drop. Students will write about the things they think they will find most difficult.
20 Minutes	Etrog Engineering- students build their protective containers and describe verbally on seesaw why they think they will work to “PtP”.

Conclusion

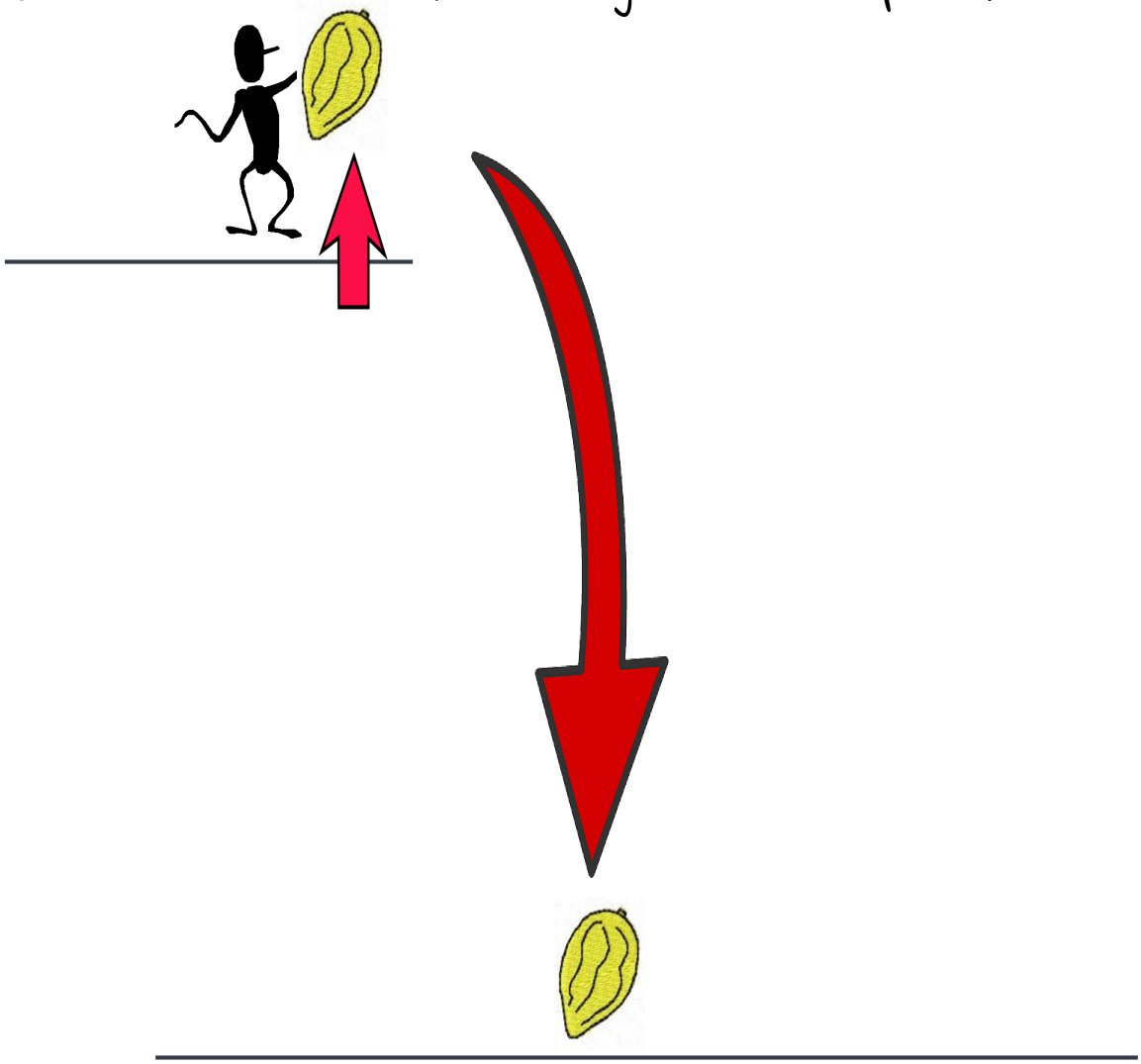
Time	Activity
5 Minutes	Clean up & put names on designs

Name: _____

Protect the Pitom (PtP) Etrog Drop

Use the drawing below to map out the etrog drop.

WORD BANK (use each one- write it next to where you see it in the picture):



Position 1	Motion	Force
Position 2	Gravity	Balanced

Science Lesson 2 of 2: Etrog Drop and Design Exploration

Objectives:

- Test etrog protection devices
- Observe and identify forces (gravity, balanced, and unbalanced)
- Use content vocabulary
- Evaluate prototypes and discuss models

Introduction

Time	Activity
5 Minutes	Prepare to go outside to observe drop.

Lesson

Time	Activity
25 minutes	Drop each group's etrog from the roof. Allow students to collect them afterward.
10 Minutes	Design evaluation- Was the pitom protection device effective? (Self evaluation sheet)
10 Minutes	Compare Models (discuss)- what are the design models that were successful? Did they share any characteristics? How would you change your design (use sheet).

Conclusion

Time	Activity
ASSESSMENT	Cause and Effect Sheet

HOW I'M DOING! BY: _____

My Pitom Protection device did its job.	
I can identify parts that I would change if we did this again.	
I can compare my design to other designs and discuss them.	
I understand the forces acting on the Etrog.	
I can identify its starting and ending position.	
I can tell you about the Etrog's motion – speed and direction.	
I know when the Etrog had balanced and unbalanced forces.	
I used things I learned in other classes to make my device better.	
I know why the pitom is important for the Etrog during Sukkot.	
I know where the Etrog comes from and why we have it in the Sukkah.	
In our group, we worked together.	
I know its not a competition, and I worked in a whole-class team.	
I can tell you at least one example I saw of "Cause and Effect".	

Name: _____

Protect the Pitom (PtP) Etrog Drop: Cause and Effect

Assessment

Cause	Effect
Gravity is a force all around us that pulls everything to the earth.	
When forces on the etrog were were BALANCED...	
When forces on the etrog were were UN-BALANCED...	
	We feel the perfection of nature in the sukkah.
We work together to share and compare design ideas.	
	Our engineering designs get better.

Additional Resources and Information:

3rd Grade NGSS Standards:
http://www.nextgenscience.org/sites/default/files/3%20combined%20DCI%20standards%206.13.13.pdf

About the Etrog (PJ Library):
https://www.pjlibrary.org/HGF_ResourceCenter/media/LiveResourceLib/The-Etrog-Resource-Guide.pdf