#Penny Boat Wars

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Learning Objectives:

Participants will learn how design and structure affects the mass carrying capabilities.

Participants will learn how water displacement is effected by the weight of the loaded craft.

Participants will learn about surface tension and how craft design effects a loaded craft.

Making Objective:

Participants will design a craft using aluminum foil that will float on water.
Participants will create a craft to carry the most mass possible.
Participants will learn how different designs can affect the amount of mass carried.

Materials/Resources:

- Aluminum foil
- Washers
- Containers for water
- 3D models of boats for younger children

Step by Step Directions:

- Use a piece of 6” by 6” precut aluminum foil to create a craft that will be able to float on water.
- For younger children, use a premade model to create a craft.
- If the children are using a model, simply shape the foil around the model.
- For the older children, they will come up with their own design using the precut aluminum foil.
- Once the craft is created, place your craft in the tub of water.
- Make sure the craft floats before placing washers into the craft.
- Using the washers on the table, place one washer at a time into the boat. Continue this process until the boat sinks. Keep track of how many washers you placed on your craft.
- As the participants place washers into the boat, make sure the leaders discuss water displacement with the participants as it pertains to placing the washers in the boat.
- Once your boat has sunk, record the number of washers that it took to sink the boat with one of leaders of the project.

- Be sure to inform participants to check twitter #spartansmake and #pennyboatwars for leader in the Penny Boat Wars. Participants can also check back in the room for the score.

This is the link to the video that also gives step by step directions:
https://www.youtube.com/watch?v=E-jvYPvpzc8

Introduction/Brief Description:

Our booth at the Maker Faire will allow participants of various ages to use their creative skills to design and create a craft that will can hold a large mass of washers. For the younger children, we have created 3D models that they can use to create their crafts. The trial and error method will be used when designing their crafts. Also when designing their crafts, they will have to be able to create a craft that is able to float before proceeding onto the next step. We believe keeping track of the amount of washers that are being used will encourage friendly competition to design the best craft that will carry a large amount of washers.

John and Ashley chose to do this activity because it aims towards all age levels. Since we both teach at very different age levels, this activity can be adapted for children who are at the preschool level and high school students. To complete this activity in our classroom, we have the basic idea of what we did at the Maker Faire and will be able to adapt it to meet the needs of our students. We both want to encourage our students to be thinkers and creators. We believe this activity encourages students to use their creative thinking skills of how can I create this craft so I can carry a lot of washers.

Outline of the Activity/lesson

- As the participants come to our booth, we will direct them to station one. Station one contains an one minute video of directions of how to participate in this activity. We will also have handouts on the table for the participants to have a visual of the directions.
- Participants will then move onto station 2. This is where the design process begins by creating their crafts. Ashley will be in this area to provide any guidance.

- They will then proceed to station 3 which is the sensory tubs. They will have test their crafts to make sure they float before placing washers into them.
- They will place washers into their crafts until it sinks. Participants will be encouraged to keep track of how many washers they used.
- As they are loading washers into their crafts, John will discuss the topic of water displacement and how increasing the mass of the boat affects water displacement in the tub.
- Some questions to ask the children after they completed the task are:
    - What design was able to carry the most washers?
    - What design carried the least amount of washers?
    - Which design worked the best for carrying the washers? Why?
    - What is water displacement?
- After the participants have sunk their crafts with washers, they will go to Ashley to record their scores, The score will be kept track in a Google Doc.
- The scores will be tweeted out on twitter every 15 minutes to keep participants to informed of who is the leader.
- Participants will encouraged to come back to this station if they would like to create another craft and try to beat the winning score.