

PIRATE X AND LADY Y

Brief Description:

The pirate ship acts as a balance. On each side, there are three posts, spaced at equal intervals, from which the participant can hang weights. A weight on post 2 has twice the effect of one on post 1, and a weight on post 3 has 3 times the effect. Participants can choose from brass disks marked with weights ranging from 1 to 10. The goal is for the two sides of the ship to balance.

Objectives:

Algebraic equations are fun to solve at this tactile exhibit. Students set up equations and demonstrate solutions by literally keeping everything balanced. They can also translate their set-ups into algebraic notation and discover the many strategies for solving equations. An equation or inequality can be modeled here. Students can even learn about solving equations with two variables by using both Pirate X and Lady Y in their equations. Additionally, students discover that for a fulcrum to maintain balance the distribution of weight multiplied by the distance to the fulcrum must be the same on each side.

Links to Websites:

<http://mathmidway.org/Training/pirate.php>

http://nlvm.usu.edu/en/nav/frames_asid_201_g_4_t_2.html?open=instructions

<http://www2.stetson.edu/~efriedma/weight/>

Vocabulary:

Algebraic notation

Equation

Fulcrum

Inequality

Torque

Variable

Before:

- ⊙ (Levels 2, 3) The following website is an interactive introduction to the solving of equations.
http://nlvm.usu.edu/en/nav/frames_asid_201_g_4_t_2.html?open=instructions
- ⊙ (Levels 1, 2, 3) Constructing coin mobiles: students will use a wire hanger to place different weights of coins so it will balance evenly.
 1. Collect the following materials: wire hangers, coins, plastic sandwich bags, and string.
 2. Demonstrate by hanging the wire hanger from a piece of string.
 3. Place coins in a sandwich bag and place at one end of the wire hanger. Notice how the wire hanger will dip to one side.
 4. Have students discuss what should be placed on the other side to get it balanced. See what works.
 5. Give students a chance to make their own balanced coin mobile. One may replace coins with standardized weights.

During:

- ⊙ (Levels 1, 2, 3) Take a single weight and place it on the 1 hook. Notice how the ship “sinks.” Ask students to think about what would happen if they placed the single weight on the 2 hook.
Would the ship sink more, less, or the same as being on the 1 hook?

Set up random weights that are unbalanced. Ask students to figure out the weight to balance the ship. Write the representation as an equation.

- ⊙ (Levels 2, 3) Set up two different equalities with one x and one y . Make sure to use the same x and y for both. Ask students to figure out what the x and y must weigh.
- ⊙ (Levels 1, 2, 3) The training video associated with this exhibit includes many suggestions for student activities.

After:

- ⊙ (Levels 1, 2, 3) Nested balance puzzles, including a discussion of torque is found at: <http://www2.stetson.edu/~efriedma/weight/>
Ask students to record the equation that balances the weights.