

Equilibrium

Description

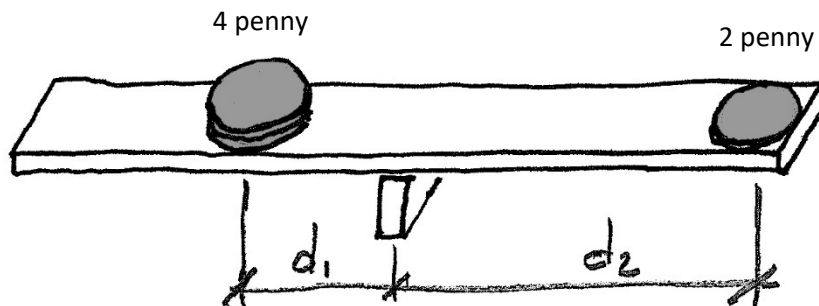
This project provides opportunity to experiment with the equilibrium of a balanced beam. It makes use of Archimedes' equations for forces on a lever to determine end reactions.

Goals

- To observe balanced conditions using a beam balance.
- To experiment with different combinations of balanced forces
- To calculate the balanced forces using Archimedes' method

Procedure

1. Set up the beam balance with the fulcrum block at the center balance point.
2. Place 2 penny weights at one end. Use the ruled scale at the bottom of this page to measure the distance from the fulcrum to the center of the stack of pennies (d_2). You can adjust the pennies to an even distance.
3. Calculate a point on the opposite side of the balance (d_1) where 4 pennies will balance the 2 using Archimedes' equation. $d_2 \times 2 = d_1 \times 4$ so, $d_1 = d_2 \times 2/4$
4. Place 4 pennies at your calculated distance d_1 and verify that they balance the 2 pennies.
5. Calculate the moment caused by each stack of pennies around the fulcrum (in US pennyweight-inches).
6. Now, leaving the 2 penny stack at one end, spread the 4 pennies out next to each other and again find the balance point.
7. Observe that the center of the line of pennies still lies at d_1 when the beam is balanced.
8. Finally, for the inverted case (point load on a simple beam) with $P = 6$ pwt at 2" from one end of the 12" beam, what would each end reaction be. Show this in a sketch.



Due

During recitation

