

# INTERMEDIATE ACTIVITY: Exploring Balancing Forces

**GOAL:** To develop students' critical thinking skills and introduce them to the concepts of force, balancing forces, and force relationships.

**MATERIALS:**

- 12 rulers (2 per group)
- 6 pencils (1 per group)
- 6 nickels (1 per group)
- 6 quarters (1 per group)
- 6 dimes (1 per group)



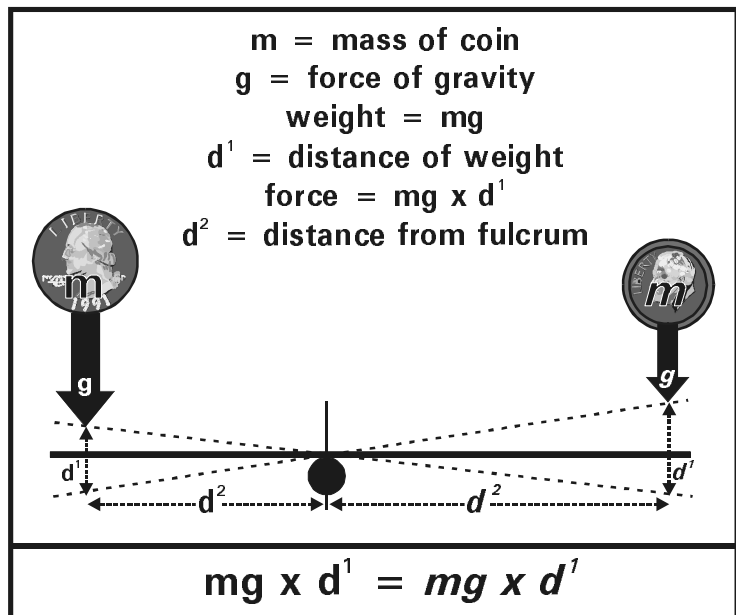
**PROCEDURE:**

- Place students into six groups. Give each group one set of the materials listed above.
- Using the diagram, explain that the force of the coin equals the weight of the coin over the distance it is moved. Instruct the students to work together to complete the assignment below.
- After 20 minutes, discuss and evaluate the activity with the students.

## BALANCING FORCES

**Questions:** If a nickel weighs 0.05 N (newtons), how much does a quarter weigh? A dime?  
What is the relationship between the distances  $d^1$  and  $d^2$ ?

**Hypotheses:**



- Procedure:**
- Make a balance with the pencil and ruler.
  - Place the nickel at one end of the ruler and the quarter at the other. Move the ruler over the pencil until it is in balance.
  - Use the other ruler to measure the  $d^1$  and  $d^2$  distances, as well as the  $d^2$  and  $d^2$  distances.
  - Calculate the weight of the quarter using the information and formula above.
  - Repeat Steps 2–4 with the nickel and the dime. Calculate the weight of the dime.
  - Repeat your calculations using the  $d^2$  measurements.

**Results:**

**Conclusion:** Is there a relationship between  $d^1$  and  $d^2$ ? Explain the relationship.