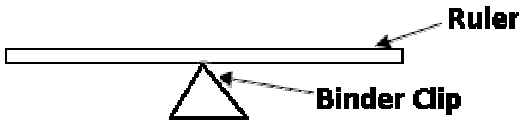
Name, Date, Hr/Per_____

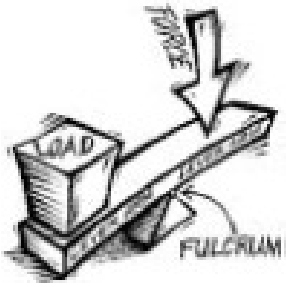
Lever Lab

Objective: Use the skill of controlling variables to investigate the properties of seesaws

Problem: What is the relationship between distance and weight for a balanced seesaw?

Materials: ruler, pennies, pencil





Procedure:

1. Set up your ruler as shown.
2. The smaller end of the ruler (the one-cm end) will be for the load or the resistance force.
3. The larger end of the ruler (the 30-cm end) will be for the effort force.
4. Put the fulcrum in the middle of the lever at the 15cm mark.
5. Put a load of one penny at the end of the LOAD END of the lever. Put the load as close as possible to the end of the lever. Be careful that the fulcrum stays in place.
6. Apply a force by putting pennies at the FORCE END of the lever. Keep them as close as possible to the end and be careful that the fulcrum stays in place. **Add just enough pennies to lift the load. You do not need to perfectly balance the load.**
7. Record the number of pennies you need to lift the load.
8. Leaving the single penny at the LOAD END of the lever, find 3 other placements of pennies along the effort arm of the ruler that will just lift the load.
9. Using a triple-beam balance, find the mass of 10 pennies. Then, use math to calculate the mass (in g and kg) and the force of weight for one penny. Record this data below.
    a. Mass of 10 Pennies b. Mass of 1 Penny c. Mass of 1 Penny d. Weight of 1 Penny

    _____ g _____ g _____ kg _____ N
10. Complete your data table by finding the Work you have completed in each trial

Data:

Fulcrum Position [cm]	**Resistance Load [# of pennies]**	**Effort Load [# of Pennies]**	**Effort <u>Force</u> Needed [# effort pennies * weight of 1 penny] [N]**	**Effort Distance [from fulcrum to effort force] [cm]**	**Effort Distance [m]**	**Weight of Effort Force (N) x Distance (m) [use appropriate unit!]**
15	1					
15	1					
15	1					
15	1					
17.5	1					
17.5	1					
17.5	1					
17.5	1					
20	1					
20	1					
20	1					
20	1					

***Analyze & Conclude*:**

1. What class of lever did you create in this lab? Explain how you know.

2. Draw a picture of your lever and label the fulcrum, input force, and output force.

3. In this experiment, what is the manipulated variable [IV]? How do you know?

4. In this experiment, what is the responding variable [DV]? How do you know?

5. What conclusion can you draw about the relationship between distances and weights needed to balance this type of lever?

6. Is the relationship between your effort force and effort distance inverse, or direct? Explain how you know this, *using data from your chart to support your answer.*

7. Compare your results with other groups. How do different positions of the fulcrum affect the results of the lab?