

Mechanical Advantage & Work Lab 2005

*** If you were absent or changed lab partners at all during this lab indicate when and why!!

Your Task: Investigate what factors determine the mechanical advantage in different types of simple machines.

For each set up: DRAW A PICTURE!!! Label the forces, distances, angles, and masses.
Calculate Force In, Work In, effort, distance effort moved, resistance, Force Out, Work out, distance resistance moved, Ideal and Actual Mechanical Advantage.

Important that the masses be moved at a steady constant rate. Average the force in over several trials. If you pull/push at an angle, remember to adjust for the force in the direction of motion.

INCLINED PLANE:

Pull/Push a mass up an inclined plane(3-5 angles/surfaces) and compare to lifting.

LEVER. FIRST CLASS: Lever, Resistance, Fulcrum (pull down to lift up)

SECOND CLASS: Effort, Resistance, Fulcrum (pull up at end with weight in middle)

Third Class: Resistance, Effort, Fulcrum (pull up in middle with weight at end)

Using tape, meter stick, string, scales, masses, fulcrum. Determine the mechanical advantage for at least three of each type.

PULLEYS: Try as many different combinations of single, double, triple, with fixed, movable, etc..

See picture sheet for ideas.

Draw a picture for each and carefully collect data. on the effort, resistance, distance effort moved, distance resistance moved.

***** CONCLUSIONS: (This is where most of your thinking should be done!!)

With 100% Efficiency, Work In=Work Out or Force times Dist = Force times Dist

Actual Mechanical Advantage = Force Out/Force In

Ideal Mechanical Advantage= Distance In/ Distance Out

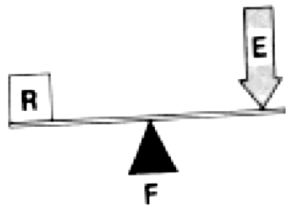
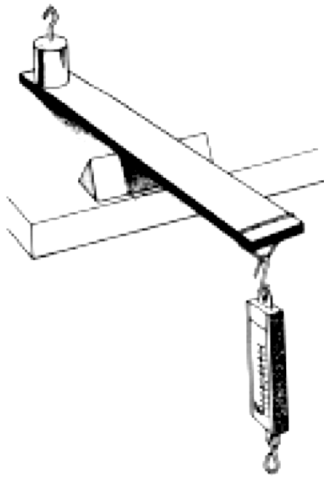
For each type of simple machine, find out what is the determining factor in figuring out the mechanical advantage of each.

How would you calculate the mechanical advantage WITHOUT knowing the input and output force? Prove this with your data. Also discuss the efficiency of each machine, and where the work is lost.

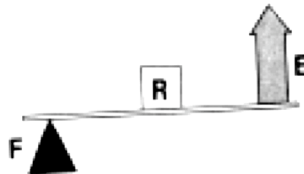
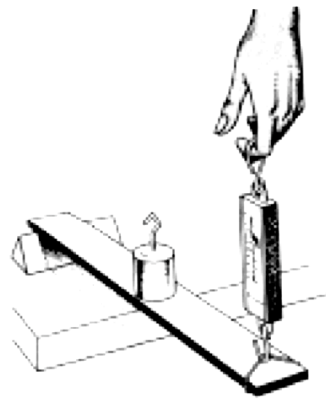
Which machines are most efficient?, Which are least efficient? Why?

How is energy transformed in each machine? Find examples of where we use each machine in real life.

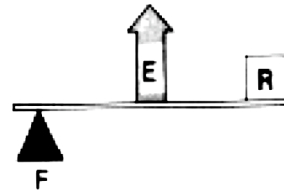
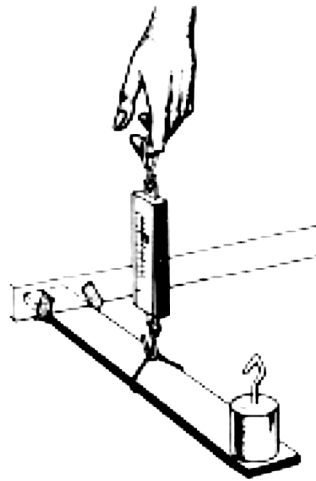
PICTURES:
First Class



Second Class



Third Class Lever



RAMPS:

