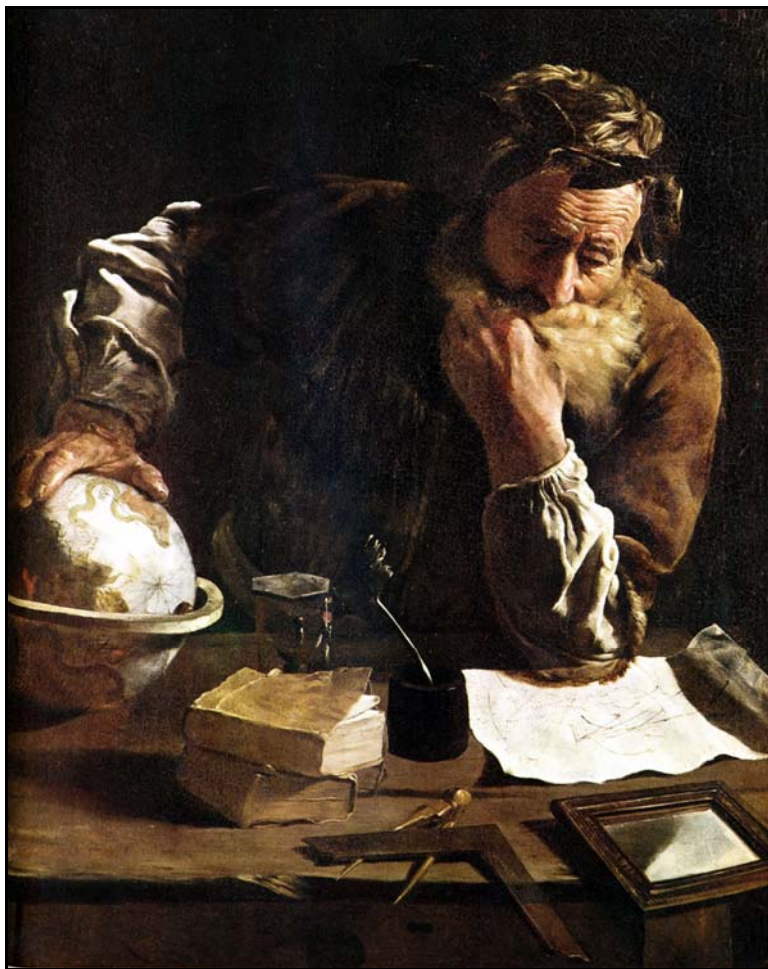


EXPERIMENT 10 SUPPLEMENTAL LAB

Torques, Equilibrium, and Center of Gravity



*“Give me a place to stand and a lever long enough
and I will move the world.” -- Archimedes*

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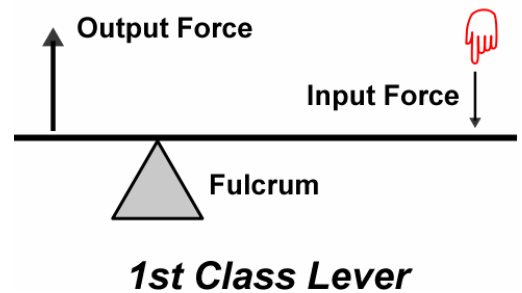
Levers

A lever is a rigid object that is used with an appropriate fulcrum or pivot point to multiply the mechanical force that can be applied to another object. A lever is one of the six simple machines. The amount of work done when using a lever is always the same and independent of the dimensions of the lever. The lever only allows to trade force for distance, so the more force a lever generates, the less distance it moves.

There are three classes of levers which represent variations in the location of the fulcrum and the input and output forces.

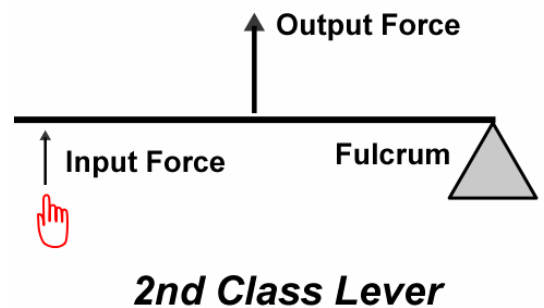
First class lever

A first-class lever is a lever in which the fulcrum is located between the input force and the output force. In operation, a force is applied (by pulling or pushing) to a section of the bar, which causes the lever to swing about the fulcrum, overcoming the resistance force on the opposite side. The fulcrum may be at the center point of the lever as in a seesaw or at any point between the input and output. This supports the effort arm and the load.



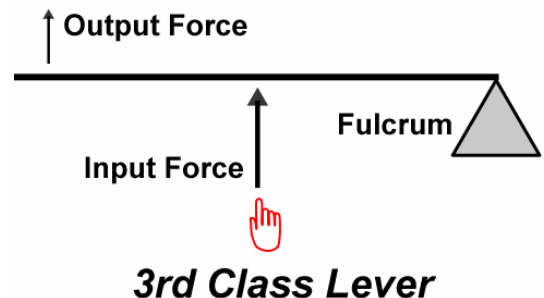
Second class lever

In a second class lever the input force is located at the end of the bar and the fulcrum is located at the other end of the bar, opposite to the input, with the output load at a point between these two forces.



Third class lever

Third class lever. For the lever in this diagram to work correctly, one must assume that the fulcrum is attached to the bar.



Procedure:

Using a meterstick and any other available equipment or items, construct an operating example of each class of lever. For each lever, have your instructor verify its class.

Name: _____

Section: _____

Classify each of the following as a 1st, 2nd, or 3rd class lever:

- _____ Mousetrap
- _____ Nail clippers
- _____ Shovel
- _____ CrowbarNutcracker
- _____ Paddle
- _____ Wheelbarrow
- _____ Wrench
- _____ Boat paddle
- _____ Stapler
- _____ Broom
- _____ Sit-up
- _____ Baseball bat
- _____ Bicycle hand brakes
- _____ Push-up
- _____ Doorknob
- _____ Oars
- _____ Pliers
- _____ Scissors
- _____ Biceps muscle acting on the forearm
- _____ Tongs
- _____ Tweezers
- _____ Hammer
- _____ Bottle opener
- _____ Seesaw
- _____ Triceps muscle acting on the forearm
- _____ Fishing rod
- _____ Hockey stick
- _____ Diving Board