Balancing Act

Purpose
To see why a heavy person and a lighter person can balance on a seesaw.

Materials
- Ruler with a hole in the center
- Transparent tape
- 1 foot (30 cm) of ribbon
- ¼ inch (0.63 cm) wide (Thick cord will do.)
- 3 spring-type clothespins

Procedure
1. Thread the ribbon through the hole in the ruler and tie the ends together to make a loop. The loop supports the ruler at its center, at the 6-inch (15-cm) mark.
2. Tape the knotted end of the loop to the edge of a table so the ruler hangs freely.
3. Clip a clothespin to the ruler at the 4-inch (10-cm) mark. Clip another clothespin at the 8-inch (20-cm) mark. The ruler should hang parallel with the floor. Reposition the clothespins if the ruler is not balanced.
4. Clip the remaining clothespin to the end of the first or second clothespin. Then move the single clothespin to a place on the ruler that causes the ruler to be balanced.

Results
The ruler is balanced when two single clothespins are at equal distances from its center. The single clothespin balances the other two when it is placed twice the distance from the center of the ruler as the two joined clothespins.

Why? The point about which an object can rotate if supported there is called the fulcrum. The ruler’s fulcrum is its center point where the ribbon supports it. The ruler balanced when the torque (turning effect of a force) on one side of the fulcrum equaled the torque on the other side. The torque on each side is determined by multiplying the weight of the clothespins times their distance from the fulcrum. It will be assumed that the clothespins have equal weights. The single clothespin had to be placed at twice the distance to balance the other two. Thus, a heavier person and a lighter one can balance on a seesaw if the lighter person is a greater distance from the seesaw’s fulcrum where it rotates.