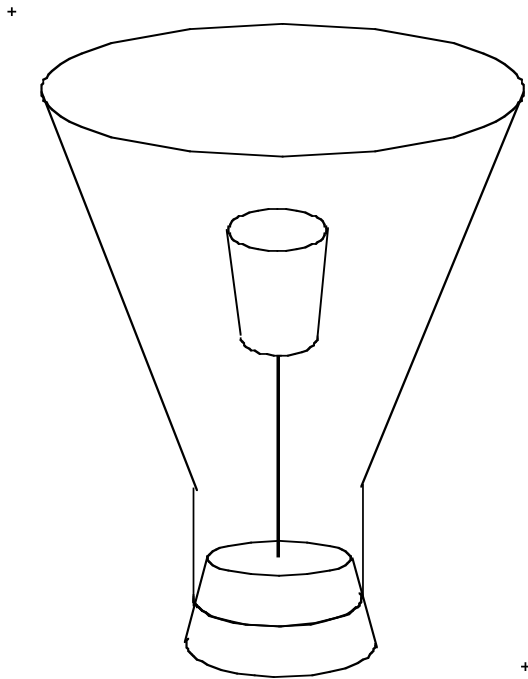


## The Flask Demonstration Accelerometer

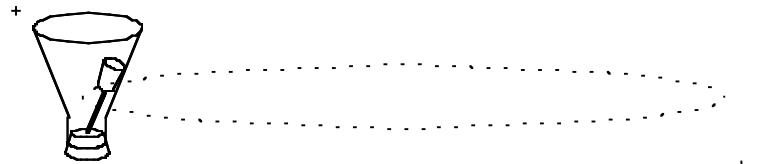
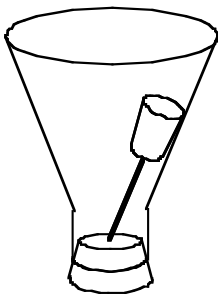
A useful demonstration device for showing the direction of acceleration under assorted conditions can be constructed with an Erlenmeyer flask, a rubber stopper and a cork. The essential construction is illustrated below:



An appropriate length string that will not allow the cork to reach the bottom when the stopper is firmly inserted into the flask joins the stopper and cork. The cork and the stopper can be drilled with a small diameter drill bit and a large needle can be used through the resulting holes to connect the string. Make sure the hole is quite small so that the stopper will not leak through this hole. The flask is completely filled with water, the cork is forced under water and the stopper is carefully inserted allowing the small amount of air left to pass by the sides of the stopper. Don't completely fill the flask with water since a very small amount of air is required to prevent breaking the flask should the stopper is tapped too hard. (See Pascal's principle and the story of how a tightly fitting container filled with water had the bottom fall out when the stopper at the top was given a sharp blow.)

When the flask containing the inverted cork is accelerated in any particular direction, the surprising result is that the cork will always lean in the direction of the acceleration. Once the students know this, you can engage in assorted accelerations and the leaning cork will illustrate the direction of acceleration. When accelerating forward, it will lean forward. When moving at a constant velocity it will not lean but when stopping it will lean in the direction opposing the direction of motion.

Direction of acceleration  
→



A particularly interesting demonstration is to move the accelerometer in a horizontal circle while you hold it at arms length. The direction of centripetal acceleration becomes clear.

Explaining why the cork moves the way it does while the flask is accelerated can be an interesting challenge. However the essential question to ask is: Which has the greater inertia, the cork or the more dense water it displaces?