

18650 Center of Mass (Earth/Moon)

Purpose:

To show that a system of masses tends to rotate about the system's center of mass, and not necessarily its geometric center.

Assembly:

You will find a small hole drilled through the side of the rod near one end. Thread the large sphere onto this end of the rod. Thread the small sphere onto the opposite end of the rod. Place the pin found in one end of the handle into the hole near the large sphere (the center of mass hole). Adjust the position of the two spheres until the system is balanced. **Finger tighten** the spheres to keep them in place. **Caution: overtightening the balls will strip the wood threads resulting in a projectile hazard.** These are not glued at the factory so that the user can sensitively adjust the center of mass to match the “near” hole location.

Demonstrations:

With the system balanced, support it on the pin at its center of mass and rotate it in both horizontal and vertical planes. Be sure to hold it at arm's length and rotate it slowly when rotating it in a horizontal plane. Rotate it also when the system is supported at its geometrical center. Note that when the system is rotated about the geometrical center it is much more difficult to keep the axis of rotation steady and that when spinning about the center of mass, the system rotates smoothly.

Description:

The Earth and Moon serve as a good illustration of two bodies rotating freely about their common center of mass. The mass of the earth is about 81 times that of the moon and the distance between their centers is about 240,000 miles. Equating moments about a point at the center of mass of the system and solving for distances will show that the center of mass of the system is about 1000 miles below the earth's surface.

Time Allocation:

To prepare this product for an experimental trial should take less than two minutes. Actual experiments will vary with needs of students and the method of instruction, but are easily concluded within one class period.

Feedback:

If you have a question, a comment, or a suggestion that would improve this product, you may call our toll free number.