

B.1.4 Leaning Tower

Key Concepts:	Center of Gravity
Materials:	Two sets of apparatus.
Set A:	Two piece leaning tower (Optional) Inclined plane
Set B:	Rotating top leaning tower
Set Up Time:	
Time Estimate:	

Set Up And Display

Set A: The lower section of the two piece tower will stand in equilibrium on a level surface, despite its noticeable tilt. When the top piece is added to the tower, it topples. This demonstration can be further extended by standing the tower on an inclined plane. Adjusting the angle will restore stability at about 3° .

Set B: The top of this tower is asymmetrically weighted towards a white line. When the top is oriented so that the white line points up away from the table, the tower stands. When the top is rotated so that white line points down towards the table, the tower falls. In practice, the stable and unstable positions are within a roughly 60° zone around the straight up and straight down positions.

Explanation

Both set ups demonstrate that for an object to stand, its center of gravity must be directly supported by its base. The first set somewhat complicates the display by adding a mass to the top of the tower to shift the center of gravity. The second set simply rotates weight so that the center of gravity shifts. If the center of gravity is directly over the base on the table, it is supported and the towers stand. If the center of gravity is over empty space, it is not supported and the towers fall.

Related Demonstrations: B 1.1 B 1.5 B 1.8 B 1.9
B 1.10 B 2.9 B 4.2 B 4.5