

# Center of Mass

## HARMONY STEM SOS LEVEL II PROJECT



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### Center of Mass

**C**enter of mass is the scientific name for the point where the object will balance. This physics concept is used in many places from the construction site to the circus wherever there is a balancing object there is physics magic at work.

### How Does it Work?

One can find the center of mass by tying a string around the object and suspending it. Where the string falls is where the center of mass is and from there the object can be balanced. The center of mass is the even distribution of the mass within the object.

### Scientific Principle

These demonstrations are put together to show the Center of Mass or the balancing point of an object or system. There are two conditions that must be in place for an object to be balanced: transitional equilibrium and rotational equilibrium. Transitional equilibrium is when the net force on an object is zero. Rotational equilibrium is when net torque, on an object, equals zero.

Equation for force is;  $F = ma$

Where  $F$  is force and its unit is N.

$m$  is mass and its unit is kg.

$a$  is acceleration  $m/s^2$ .

The equation for torque is;  $\tau = F \times d$

Where  $\tau$  is torque and its unit is Nm

$F$  is force and its unit is N.

$d$  is the distance of the lever arm and its unit is meters

### Applications

The Center of Mass is a physics concept used in daily life. Every object has a center of mass, even us as humans. The center of mass for humans is in their abdomen, for women it's lower because of the widening of the hips. Knowing this helps with sports especially, as seen in the picture above the man and women are able to balance because both of their center of masses are lined up and supported by the girl on the bottom. The guy's shape is linear and the center of mass would be in the middle, his abdomen, where he then supports them with his arms on top of the center of mass of the girl. Gymnasts also use this physics concept to do many of their events.

