

Thursday, May 5

- Do Now: Worksheet
- Agenda:
 - Hand in Late Work
 - Notes/Demos
 - Lab Discussion (and hand it in)
- Homework: Come to class with questions tomorrow.
- Notes:
 - If you need to finish the lab, X Block today.
 - Class tomorrow (I may be late but I will be here.)

Center of Gravity

Amy Winston

Definition

- The center of gravity of an object is the point located at the object's average position of weight.
- Symmetrical:
- Asymmetrical:
- Varying Density:

Locating the CoG

- Symmetric = geometric center
- The balance point:
- Example: Hang a pendulum
- Example: Multiple plumb bob lines
- Note: The CoG may be located somewhere that there is no matter.

Examples:

- Where is the CoG of a donut?
- Where is the CoG of a banana?
- Where is the CoG of a chair?

Toppling

- If the CoG of an object is above the area of support, the object will remain upright.
- If the CoG extends outside the area of support, the object will topple.
- Examples: Leaning Tower of Pisa, Double Decker Bus
- Note: The support base does not have to be solid.

Examples

- Carrying a heavy load
- Standing with your feet wide apart
- Removing one leg from a chair.

Stability

- Unstable Equilibrium: Any displacement

its CoG.
- Stable Equilibrium: Any displacement

its CoG.
- Neutral Equilibrium: Any displacement

its CoG.

Low CoG

- Generally more stable.
- More work to move its CoG out from over the support.
- Examples: Weights and meter stick.
- Example: Tall Buildings
- Example: Floating and Sinking

CoG of People

- Typically 2 to 3 cm below the navel.
- Lower in women.
- Higher in children.
- Ways to adjust to increase stability:

Big Idea

- If the CoG extends beyond the support base, toppling occurs.
- But why?...

Torque

- Turning Force
- If you want to make an object move, apply a _____
- If you want to make an object turn or rotate, apply a _____.
- Torque produces _____.

Torque

- Torque = Force x lever arm
- Maximum torque: Force and lever arm are _____
- Minimum (zero) torque: Force and lever arm are _____.
- Only the component of the force that is perpendicular to the lever arm matters.

Why do you topple?

Amy Winston