PHYSICS ANNOUNCEMENTS

PRACTICE	LABS	TESTS
Unit 12 Problems (1-22)	Grade Balancing Act Lab	Unit 12 Test Thursday (4/4/19)

Zero Torque and Static Equilibrium

12.4	I can describe, interpret, and solve problems involving static equilibrium.

SUMMARY

Key Concepts

- Angular position and its changes are measured in radians. One complete revolution is 2π rad.
- Angular velocity is given by the following equation.

$$\omega = \frac{\Delta\theta}{\Delta t}$$

- Angular acceleration is given by the following equation.

$$\alpha = \frac{\Delta\omega}{\Delta t}$$

- For a rotating, rigid object, the angular displacement, velocity, and acceleration can be related to the linear displacement, velocity, and acceleration for any point on the object.

$$d = r\theta \qquad v = r\omega \qquad a = r\alpha$$

SUMMARY

Key Concepts

- When torque is exerted on an object, its angular velocity changes.
- Torque depends on the magnitude of the force, the distance from the axis of rotation at which it is applied, and the angle between the force and the radius from the axis of rotation to the point where the force is applied.

$$\tau = Fr\sin\theta$$

- The moment of inertia of an object depends on the way the object's mass is distributed about the rotational axis. For a point object:

$$I = mr^2$$

- Newton's second law for rotational motion states that angular acceleration is directly proportional to the net torque and inversely proportional to the moment of inertia.

$$\alpha = \frac{\tau_{net}}{I}$$

SUMMARY

$$K = \frac{1}{2}I\omega^2$$

$$L = I\omega$$

Angular Momentum

Angular Impulse - Angular Momentum Theorem

$$\tau\,\Delta t = \Delta L$$

Conservation of Angular Momentum Theorem

$$L_i = L_f$$

Center Of Mass

The center of mass of an object is the point on the object that moves in the same way that a point particle would move.

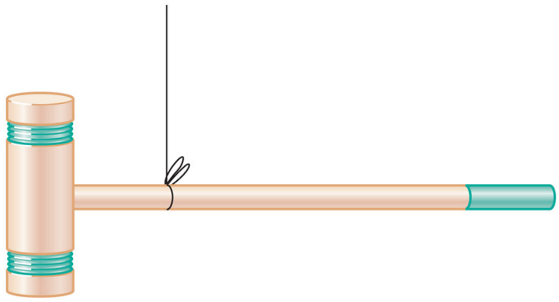
Finding the Center of Mass

1.) Balance Method

2.) Hanging Method

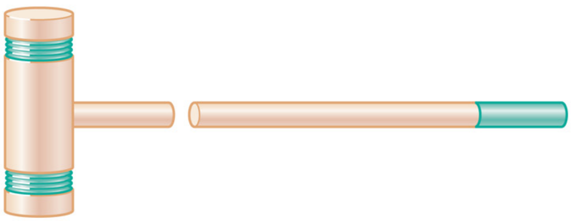
3.) Projectile Method

Center of Mass

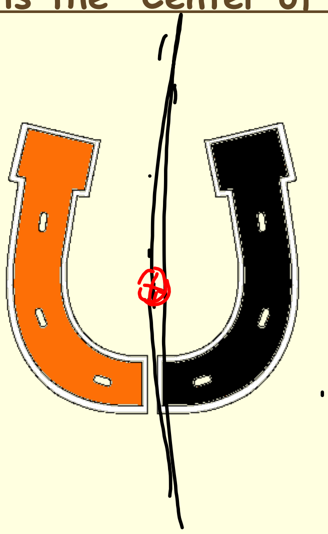


Center of Mass

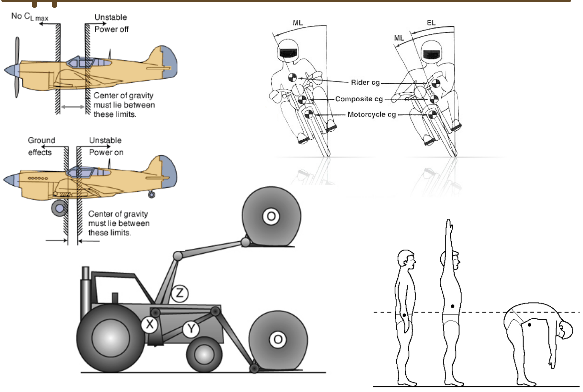
BACK

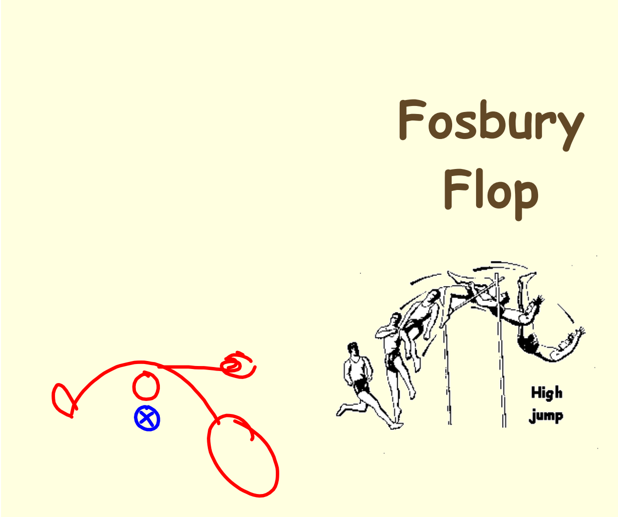


Where is the Center of Mass?



Applications of Center of Mass

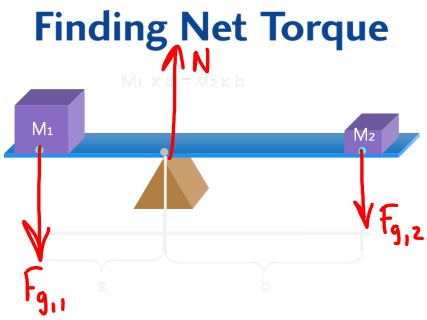


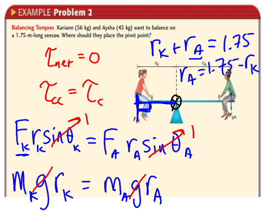


Conditions For Equilibrium

1.) Translational Equilibrium — Net Force = 0

2.) Rotational Equilibrium — Net Torque = 0





$56 r_K = 43 r_A$

$r_K = 0.77 r_A$

$r_K = 0.77(1.75 - r_K)$

$1 r_K = 1.35 - 0.77 r_K$

$1.77 r_K = 1.35$

$r_K = 0.76\ m$