# You and Physics
# S1178

Teacher: Crystal Bray
November 14, 2010

## Forces

Newton's Third Law: For every action there is an and reaction!

Newton's Second Law: relates an objects mass and acceleration and applied force by this equation.

$$\text{Force} = \text{mass} \times \text{acceleration}$$
$$F = ma$$

Are you pulling or pushing your partner?

Is your partner pulling or pushing you?

## Gravity

$$\text{Force due to gravity} = \frac{\text{Gravitational constant} \times \text{Mass} \times \text{ mass}}{(\text{distance between Mass and mass})^2}$$

$$F = \frac{GMm}{r^2}$$

$$\text{define: } g_{Earth} = \frac{GM_{Earth}}{R_{Earth}^2}$$

What is $g_{Earth}$? $g_{Earth} =$ ?

$$F = m \times g_{Earth}$$

.

# Spin

$$\text{Potential Energy} = \frac{1}{2}(\text{moment of inertia}) \times (\text{angular velocity})^2$$
$$T = \frac{1}{2} I\omega^2$$
$$\text{Angular Momentum} = (\text{moment of inertia}) \times (\text{angular velocity})$$
$$L = I\omega$$

$$\text{Moment of Inertia of upright professor with arms tucked in} = 30,000,000 \frac{lb}{ft^2}$$
$$\text{Moment of Inertia of upright professor with arms sticking out of side} = 110,000,000 \frac{lb}{ft^2}$$

When does the professor spin faster with his arms out or his arms tucked in given the same amount of energy?

# Sound

$$\text{frequency you hear} = \left(1 - \frac{\text{velocity of ambulance} - \text{velocity of you}}{\text{velocity of sound}}\right) \times (\text{Original ambulance frequency})$$

$$f = \left(1 - \frac{v_a - v_y}{v_s}\right) f_0$$

$$f_0 = 330Hz = 330 \frac{1}{second}$$

What's the speed of sound? $v_s =$ ?

Is the frequency, pitch, higher or lower when the ambulance comes toward you ?

Is the frequency, pitch, higher or lower when the ambulance goes away you ?

Last updated: November 14, 2010