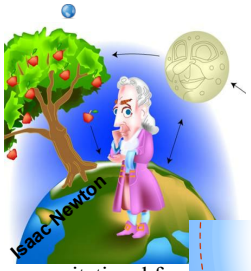
April 20, 2018

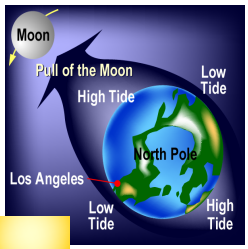
Review intertia and gravitational force

The Force of Gravity

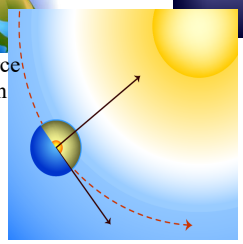
When do you as an individual notice inertia?

The Force of Gravity





F_g : gravitational force (force of *gravity*) - an attractive force that acts over a distance between masses



- What object is responsible for the tides on Earth, the Sun or Moon?
- What object pair has the stronger gravitational pull: Earth-Sun or Earth-Moon?

Read pgs 130-133 (take annotated notes)

and complete

Introduction to Forces Problem Set

Introduction to Forces

1. Define Inertia

Inertia is the tendency of an object to resist a change in motion, not an objects tendency to resist motion

2. Describe inertial and gravitational mass.

Inertial Mass = inertia restated

Gravitational Mass = the strength of the gravitational force experienced by the body

3. Suppose a baseball and a table-tennis ball were traveling with the same velocity and you caught one in each hand - which would hurt more and why?

The baseball because it has a higher level of inertia. The greater the mass the greater the inertia.

4. Forces break down into which two groups? Give 3 examples of each.

Contact Force i.e/ Friction, tension, normal, applied
Non-contact force i.e/ gravitational, magnetic, electric

5. Define and compare an objects weight and mass.

Weight is the measure of the force of gravity

Mass is the measure of matter

7. Is the force of gravity acting on objects in Earth's orbit?

Force of gravity is acting on objects in Earth's orbit, however as the distance from the center of the earth increases, we see that the force weakens

8. Suppose you are on the ISS, would you need to push a 50kg object with a different force than a 100kg object? Explain

Yes the forces would be different because gravity is still working on each of the objects

Dynamics - Forces, Impulse, Torque, Momentum, & Circular Motion

Symbol	Quantity (Unit)	Symbol	Quantity (Unit)	Symbol	Quantity (Unit)
$\vec{F}_{net}$	Net force (N)	$\vec{F}_T$	Force of Tension (N)	$\vec{J}$	Impulse (N·s)
$\vec{F}_A$	Force applied (N)	$\vec{F}_N$	Normal Force (N)	$\vec{p}$	Momentum (kg·m/s)
$\vec{F}_g$	Force of gravity (N)	$\vec{F}_c$	Centripetal Force (N)	$\vec{p}_{iT}$	Initial total momentums (kg·m/s)
$\vec{F}_f$	Force of friction (N)	m	Mass (kg)	$\vec{p}_{fT}$	Final total momentums (kg·m/s)
$\vec{F}_s$	Restoring Force (N)	μ	Coefficient of friction (no units)	f	Frequency (Hz)
$\vec{a}_c$	Centripetal Acceleration (m/s^2)	T	Period (s)	r	Circular & Orbital Radius (m)
τ	Torque ($N \cdot m$)	$F_\perp$	Perpendicular Component of Force (N)	v	Circular Speed (m/s)
k	Spring Constant (N/m)				

$\vec{F}_{net} = \sum Forces$	$\sum \vec{F} = \sum m \times \vec{a}$	$\vec{F}_{net} = m\vec{a}$	$\vec{F}_g = m\vec{g}$	$\vec{F}_f = \mu \vec{F}_N$	$F_s = -kx$	$\vec{p} = m\vec{v}$	$\vec{J} = \Delta\vec{p}$ $\vec{F}t = m\Delta\vec{v}$	$\vec{p}_{iT} = \vec{p}_{fT}$
$v = \frac{2\pi r}{T}$	$a_c = \frac{v^2}{r}$	$F_c = \frac{mv^2}{r}$	$f = \frac{1}{T}$	$v = \sqrt{rg\mu_s}$	$v = \sqrt{rg\tan\theta}$	$\tau = rF_\perp$	$\vec{\tau}_{net} = \sum Torques$	
$\vec{J} = \vec{F}t$ $\vec{J}$ = Area under F - t curve	$T = 2\pi\sqrt{\frac{m}{k}}$							