



Chapter 5

Matter in Motion

Section 4

Gravity: A Force of Attraction

Gravity

- A force of attraction between two objects that is due to their masses
- Can change an objects motion by changing its speed, direction or both



GRAVITY

In the end it always wins...

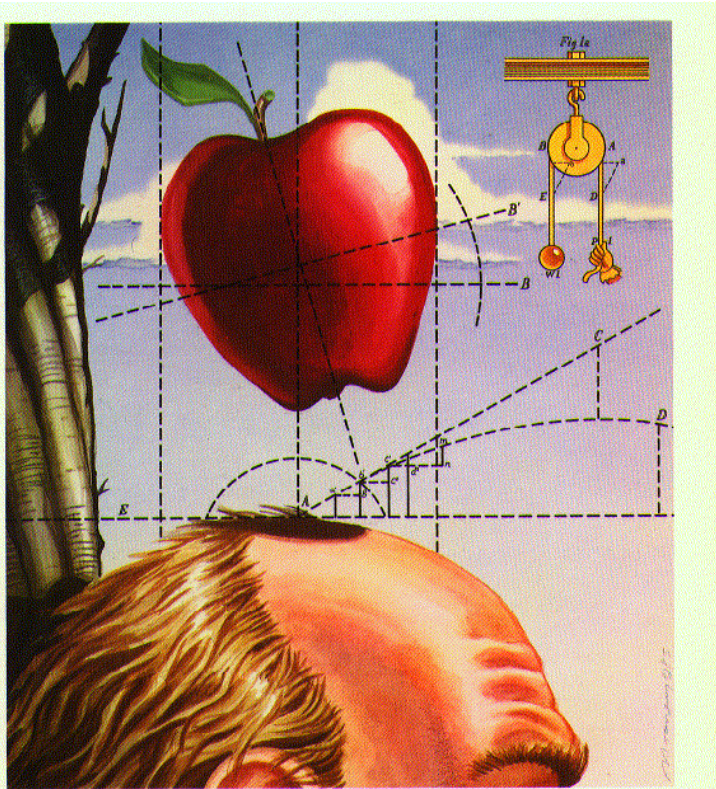
Effects of Gravity on Matter

- All matter has mass
- Gravity is the result of mass
 - Therefore, all matter is effected by gravity
- Gravitational force pulls objects toward each other
 - Mass of most objects is too small to notice its' gravitational force
 - Easiest example of gravity: the pull of objects toward the center of the Earth (including the moon!)



Newton Discovers Gravity

- Discovered by Sir Isaac Newton
- Realized unbalanced forces make objects fall toward the Earth and planets move in an orbit all due to gravity



Gravity.

**It isn't just a good idea.
It's the law.**

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The Law of Universal Gravitation

- “All objects in the universe attract each other through gravitational force. The size of the force depends on the masses of the objects and the distance between the objects.”
- Consider it in two parts...

Gravitational Force Increases as Mass Increases

- The larger the mass, the larger the gravitational force

– Ex: elephant versus kitten



← More mass, greater gravitational pull, and the more weight an object has

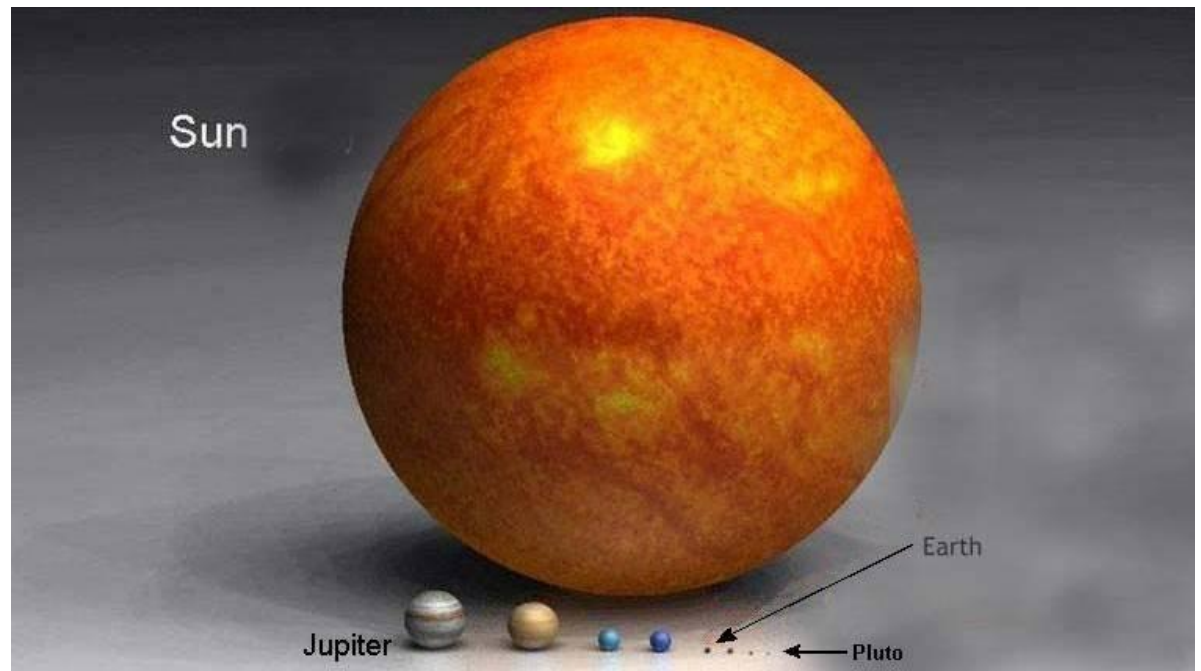


↑
Less mass, smaller gravitational pull, and less weight

- This is why astronauts bounce on the moon when they walk: moon has a smaller mass, so the gravitational pull is smaller

Gravitational Force Decreases as Distance Increases

- More distance = less gravitational pull
- The sun is more than 300,000 times bigger than the Earth, but its' gravitational force effects us much less because we are so far away



Weight versus Mass

- Weight – measure of the gravitational force on an object
- Mass – the amount of matter in an object

Weight and Mass



Weight is measured by using a spring scale.



Mass is measured by using a balance.

