Gravity, Inertia, and Our Solar System

Astronomy #5: I can describe how the planets’ gravitational pull keeps satellites and moons in orbit around them
How Earth Moves:

Rotation: The counter-clockwise movement of Earth that causes day and night where the sun appears to move westward across the sky.
How Earth Moves:

**Revolution**: The counter-clockwise movement of Earth around the sun.

**Revolution** - the movement of one object around another.
How Earth Moves:

- **Orbit** - the path Earth follows around the sun.
- One revolution = 365.25 days/1 year
QUESTION: What is GRAVITY?

ANSWER: The force of attraction between any two objects.
Law of Universal Gravitation:
The scientific law that states that every object in the universe attracts every other object.
QUESTION: Who first determined the properties of gravity?

ANSWER: Sir Isaac Newton
• **Mass**: the amount of matter in an object
• **Weight**: the force of gravity on an object
• **Force**: a push or pull
The force of gravity is measured in units called newtons, named after Isaac Newton. The strength of the force of gravity between two objects depends on two factors: the masses of the objects and the distance between them.
QUESTION: What does GRAVITY depend on?

ANSWER: Mass and Distance

The force of gravity acts between all objects.
If mass increases, the force of gravity increases.
If distance increases, the force of gravity decreases.
The FORCE of GRAVITY depends upon MASS and DISTANCE:

The HIGHER the MASS, the more GRAVITY the object will have.

The GREATER the DISTANCE from an object, the less GRAVITY it will have.
Newton’s 1st Law of Motion:

The scientific law that states that an object at rest will stay at rest and an object in motion will stay in motion with a constant speed and direction unless acted on by a force.
Law #1: Inertia

(Law of Laziness)

With no outside forces, this object will never move.

With no outside forces, this object will never stop.
INERTIA
Your truck has brakes...the massive hunk of stone doesn't
Orbital Motion:

Newton concluded that two factors—\textit{inertia and gravity}—combine to keep Earth in orbit around the sun, and the moon in orbit around Earth.
Gravity and Inertia balancing each other out to create an orbit:
Gravity / Centripetal Force *(inward)* and Inertia / Momentum *(outward)* must be ***BALANCED***

in order for an object to be captured in an **ORBIT** around another object.

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**Object speeds by a planet with a lot of momentum**

**Gravity attracts the object to the planet and vice versa**

**Object continues to try to move forward, but is pulled down by gravity.**

**The result is a balance of forces pushing the object out and pulling it in, making a circular orbit.**
Why science teachers should not be given playground duty.