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Evidence of Earths Shape

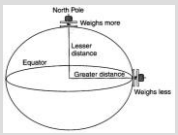
1. Photographs from outer space

2. Shadow of the Earth on the Moon during an eclipse

3. Gravity Measurements

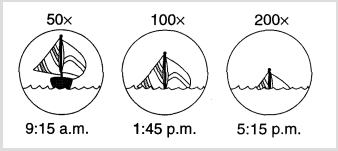
Gravity is the force of attraction between any two objects

Bigger the object - **stronger** the pull



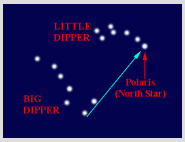
Closer the centers of two objects - *stronger the pull*.

4. Ships appear to sink as they sail away towards the horizon



5. The altitude of Polaris changes with a person's latitude.

If Earth was flat altitude of Polaris would NOT change!



What shape is the Earth?

Oblate Spheroid

- The Earth bulges at the Equator and is slightly flattened at the Poles

Always choose the roundest and smoothest object or drawing for Earth's shape.

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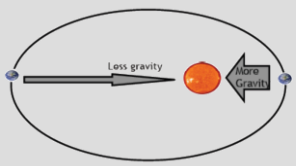
Gravity

- **The force of attraction between objects. Depends on mass & distance.**

Newton's Law of Gravitation -
Object's close to the focus have:

- **Strong gravitational pull**
- **Faster velocity**
- **Takes less time to orbit (revolve) the sun**

Planets move slow when far from the Sun



Planets move fast when close to the Sun

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Gravity & Orbits

- A **satellite** is any object that revolves around another object.
- It's gravity that keeps the planets & all **satellites** in orbit.
- Earth moves fastest when it's closest to the sun.

What time of year does Earth move slowest?
Which planet do you think moves slowest?

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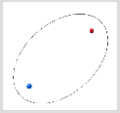
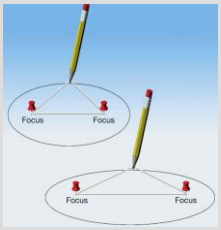
Earth's Orbit

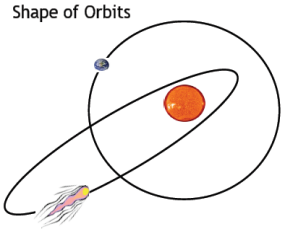
- Earth's orbit is an ELLIPSE
  - There are 2 foci in an ellipse
    - Plural of focus - fixed point
    - One focus may be imaginary.



An ellipse is much like a flattened circle.



Shape of Orbits



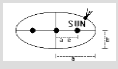
Planet orbits are very circular. Comets have very eliptical orbits (higher eccentricity)

NOT TO ANY SCALE!!!

Kepler's Laws of Planetary Motion

Law #1: All planets move around the sun in elliptical orbits.

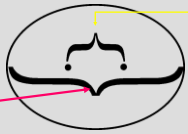
Eccentricity → the shape of an ellipse where 1 = a straight line & 0 = a circle



Eccentricity

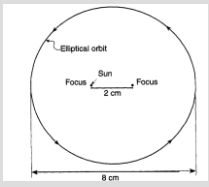
Eccentricity = $\frac{\text{Distance between foci}}{\text{Length of major axis}}$

Major axis - a line drawn through the foci extending to either end of the ellipse.



The constructed ellipse below is a true scale model of the orbit of a planet in our solar system. What is the eccentricity of this planet?

$\frac{2\text{ cm}}{8\text{ cm}} = .25$



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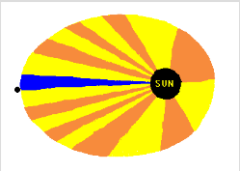
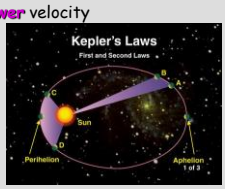
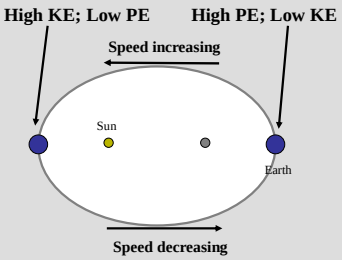
Law #2: A line joining a planet & it's star marks equal areas during equal time



- Planet is close to focus (star)
  - Faster orbital velocity (speed)
- Planet is far from focus
  - Slower velocity





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