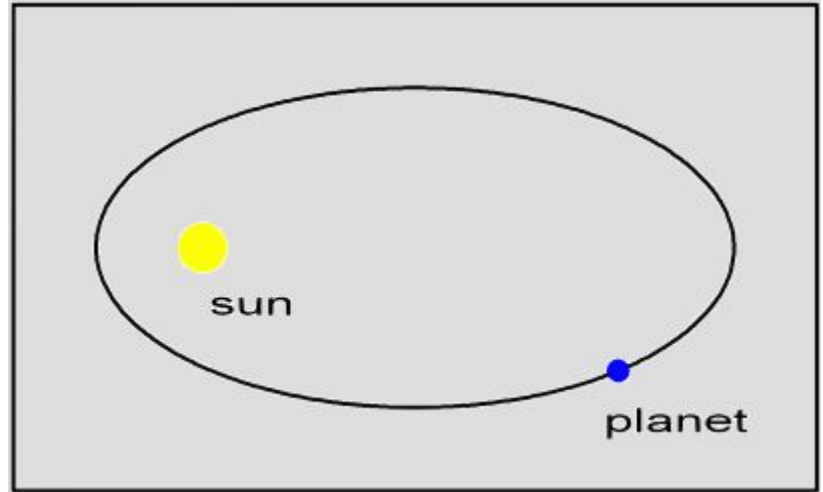


MOVEMENT IN THE
SOLAR SYSTEM: KEPLER'S
LAWS AND OTHER
MOTIONS

KEPLER'S LAWS

Kepler's 1st Law:

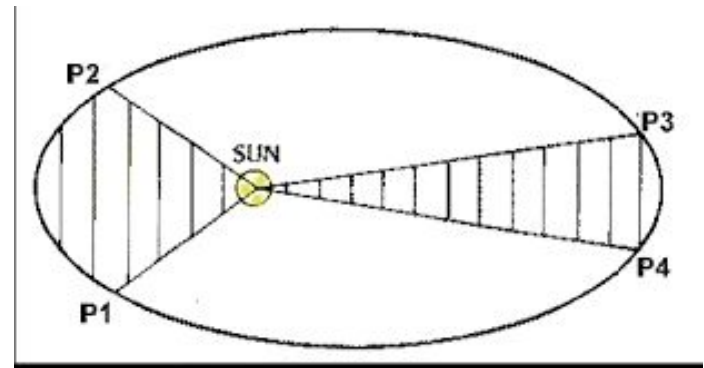
The orbit of a planet is an ELLIPSE



KEPLER'S LAWS

Kepler's Second Law

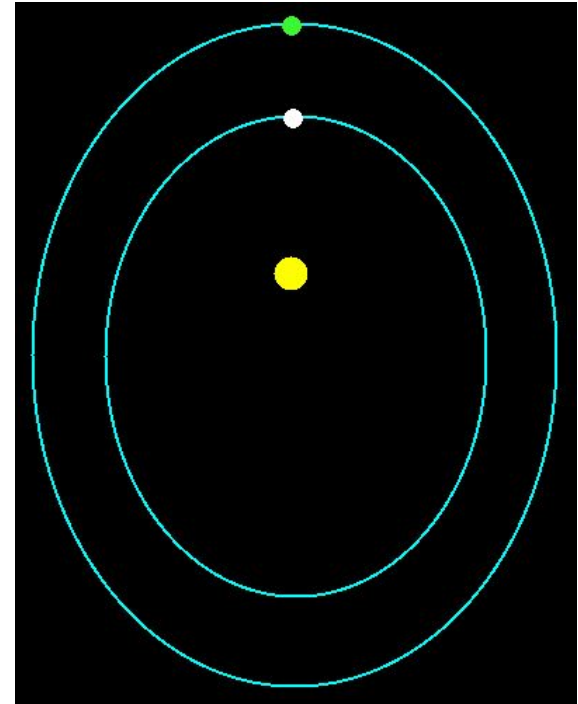
A planet moves FASTER when it is CLOSER to the Sun



KEPLER'S LAWS

Kepler's 3rd Law:

More DISTANCE between a planet and the Sun, the LONGER its ORBIT



EARTH'S MOVEMENT

The Earth is tilted on its axis

- ❖ Tilt= a sloping position (*una posición en pendiente*)

- ❖ Axis= an imaginary line about which a body rotates (*una línea imaginaria sobre la cual un cuerpo se gira*)



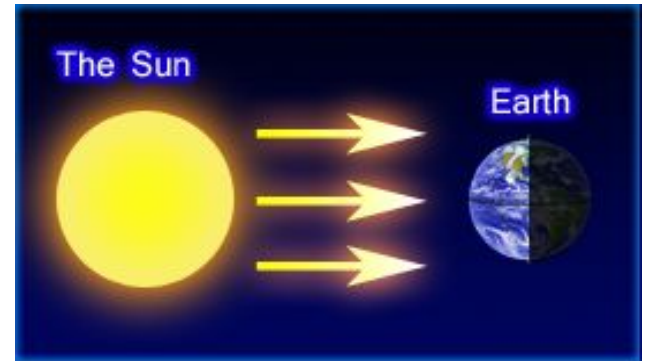
http://cals.arizona.edu/watershedsteward/resources/module/Climate/climate-intro_pg2.htm

EARTH'S MOVEMENT

- ❖ The Earth rotates about its axis
 - This causes DAY and NIGHT
- ❖ It is DAY on the side of Earth that is facing the Sun (*Es el día en el lado de la Tierra que se enfrenta el Sol*)
- ❖ It is NIGHT on the side of Earth that is not facing the Sun (*Es de noche en el lado de la Tierra que no está expuesta al sol*)



<http://www.physicalgeography.net/fundamentals/6h.html>

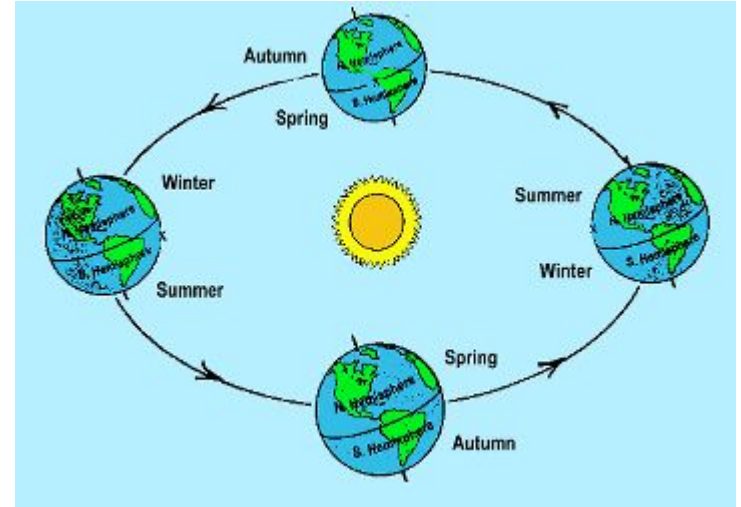


EARTH'S MOVEMENT

The Earth revolves around the Sun

The Earth's tilt about its axis cause the SEASONS

- ❖ It is warmer in whichever part of the world is tilted closer to the sun
(Es más caliente en cualquier parte del mundo se inclina más cerca del Sol)



<http://www.thinglink.com/scene/612704256599785474>

EARTH'S MOVEMENT

For example, in Australia Christmas is often celebrated on the beach because it is SUMMER in DECEMBER



<http://houseofgeekery.com/2013/12/20/10-christmas-traditions-australians-cant-enjoy/>

EARTH'S MOVEMENT

Precession: a change in orientation of an axis of a rotating body (*un cambio en la orientación de un eje de un cuerpo en rotación*)

<https://www.youtube.com/watch?v=qIVgEoZDjok>

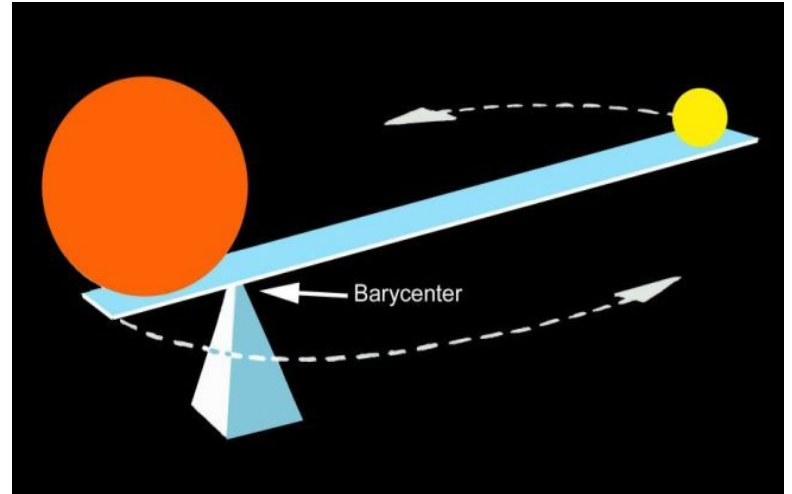
Nutation: a rocking motion in the axis of rotation (*un movimiento de balanceo en el eje de rotación*)

<https://www.youtube.com/watch?v=75BM2O8ytZs>

BARYCENTER

The point between two objects where they balance one another.

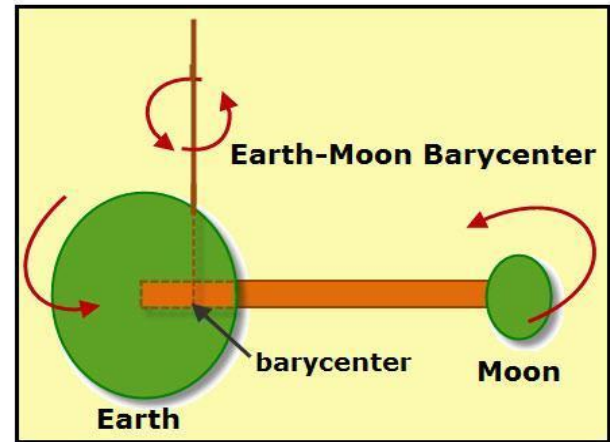
(El punto entre dos objetos donde se equilibran entre sí.)



BARYCENTER

When the moon orbits the Earth, or the Earth orbits the Sun, both bodies are actually orbiting around a point that lies outside the center of the larger body.

(Cuando la luna gira alrededor de la Tierra o la Tierra gira alrededor del Sol, ambos cuerpos están realmente orbitando alrededor de un punto que se encuentra fuera del centro del cuerpo más grande.)

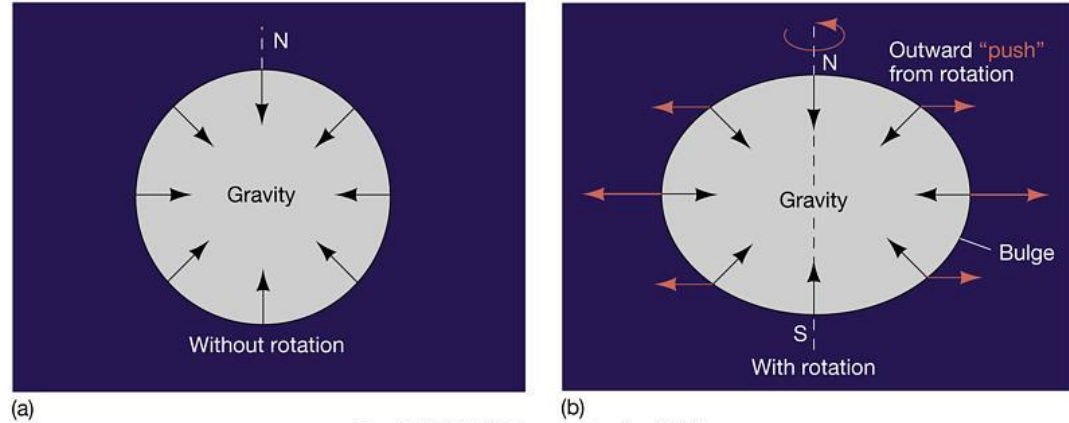


<https://www.youtube.com/watch?v=uGBANgbRkws>

EARTH'S SHAPE

The Earth's shape is NOT a perfect circle! (*La forma de la Tierra no es un círculo perfecto!*)

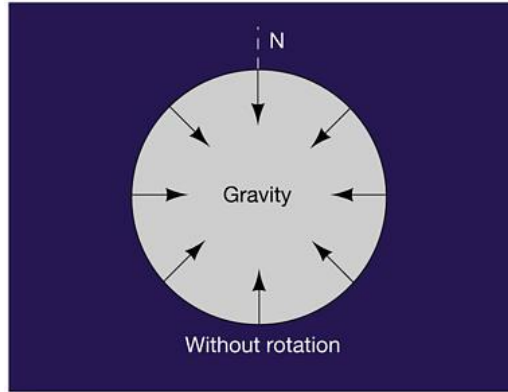
The Earth is 13 miles wider at the equator than at the poles! (*La Tierra es de 13 millas más ancha en el ecuador que en los polos!*)



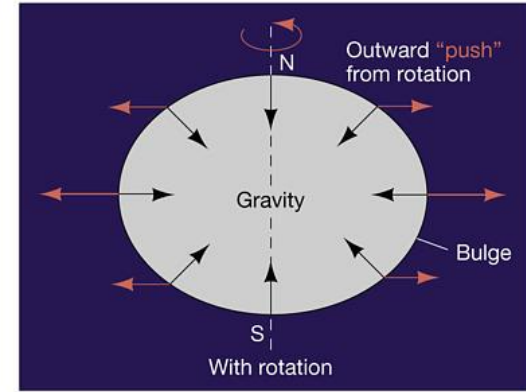
WHY? The outward PUSH from rotation due to centripetal force!
(*El EMPUJE hacia el exterior de la rotación debido a la fuerza centrípeta!*)

EARTH'S SHAPE

Equatorial Bulge= a difference between the diameter of the Earth at the equator and at the poles (*la diferencia entre el diámetro de la Tierra en el ecuador y en los polos*)



(a)



(b)

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http://www.snipview.com/q/Equatorial_bulge

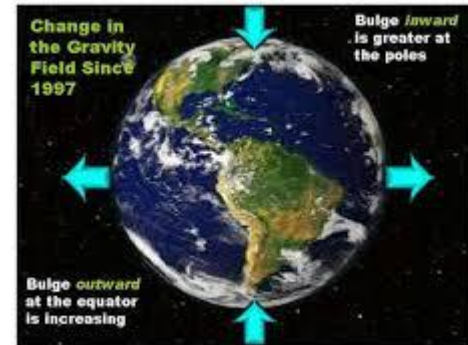
EQUATORIAL BULGE

What is the shape of the Earth?!

- ❖ The Earth is not *perfectly* round, but we also know that it's not flat
- ❖ Equatorial Bulge- a bulge (*abombamiento*) at the equator of the Earth

WHY?!

- ❖ The Earth is spinning (*girando*) very quickly
- ❖ The Earth is attracted by the Sun
- ❖ The Equatorial Bulge is due to *Centripetal force*



MOON'S MOVEMENT

The moon also rotates around the Earth.

- ❖ The gravitational pull of the moon causes TIDES on the Earth
 - *(La atracción gravitatoria de la Luna causa las mareas en la Tierra)*
- ❖ There are two HIGH TIDES and two LOW TIDES on each side of the Earth, every day
 - *(Hay dos mareas altas y dos mareas bajas a cada lado de la Tierra, todos los días)*

