

TOPIC 4 REVIEW SHEET

ALL motions are due to rotation/revolution!

Star Celestial Motions

- rise in EAST, set in WEST – POLARIS is the only object that does not appear to move (it lies directly over the axis of the Earth – remember spinning in class?)
- 15° per hour (speed of rotation!)

Planetary Celestial Motions

Retrograde motion – planets appear to stop e→w, go backwards, then go forwards again. Due to us LAPPING another planet in our orbit. (Mars appears to be drunk!)

Solar Celestial Motions

Date	Sun rises	Sun sets	Overhead of?
June 21	north of east	north of west	$23\frac{1}{2}^\circ$ N
Sept 21	Due east	due west	0°
Dec 21	South of east	South of west	$23\frac{1}{2}^\circ$ S
March 21	Due east	Due west	0°

Days get longer between Dec 21st (winter solstice) and June 21st (summer solstice) – but everywhere on Earth has exactly 12 hours of daylight on MARCH 21st and SEPTEMBER 21st. The sun will be highest in the sky on JUNE 21st. How many days is the sun directly overhead of us here in Kenmore? ZERO. We aren't in the tropics!

Models of the Solar System

Geocentric Model: Earth in the center, everything else goes around it. Explains the celestial bodies going around us E→W, but cannot explain the following:

- Foucault Pendulum – swinging pendulum that turns throughout the day
- Coriolis Effect – curving of fluids on the surface of the Earth (in N. Hemisphere, winds/fluids curve to the RIGHT, and to the LEFT in the S. Hemisphere)
- Retrograde Motion – see above

Heliocentric Model: Sun in center, everything revolves around it. Had to add **ELLIPTICAL ORBITS** to explain the fact that *planets move faster in their orbits when they are closer to the sun*, but it does explain the rest of the oddities!

Motions of Earth

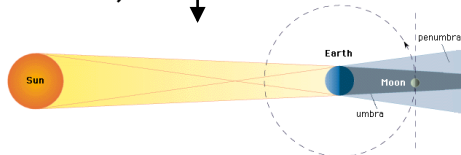
Rotation: Earth spins on its axis once every 24 hours. 15° per hour.

Revolution: Earth takes approximately 365 days to go around the sun once in its orbit. Since we are closer to the sun in winter, that is when we move fastest in our orbit.

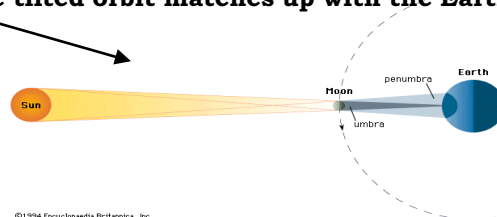
(KEPLER'S LAW OF EQUAL AREAS)

Motions of the Moon

- The moon's orbit is tilted 5° from the Earth's orbit.
- The full moon phase occurs when the Moon is lined up behind the Earth.
- The new moon phase occurs when the moon is between the sun and Earth.
- When the new moon phase occurs and the tilted orbit matches up with the Earth's orbit, a **SOLAR ECLIPSE** can occur.
- When the full moon phase occurs, and the tilted orbit matches up with the Earth's orbit, a **LUNAR ECLIPSE** can occur.



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Tides

The highest **HIGH TIDE** occurs when the moon, sun, and Earth line up on the same plane – there will be a high tide on either side of the Earth.

