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Physics125

<u>Summary for Tuesday 9/12 class:</u>

The fact that the Earth is spherical is a piece of foundational knowledge for mapping the heavens. The methods used to pinpoint locations on Earth, namely longitudes and latitudes, are similar to those used for mapping the stars. Great circles and small circles are also an essential concept: any plane intersecting the sphere's center creates a "great circle" and any plane that doesn't, results in a "small circle".

There are also two different views for modeling our solar system–Heliocentric and geocentric. The heliocentric perspective states that the Earth revolves around the Sun, which is at the center of the solar system. The geocentric perspective has the Earth in the center, with all other bodies revolving around it, which is not accurate. This perspective was once popular among ancient civilizations, but is long outdated.

The concept of a celestial sphere, a useful construct for describing locations of objects in space, was also covered. The center of the Earth is the center of the celestial sphere and all objects in the sky can be seen as projected onto the inside surface of this sphere.

During class, we also saw a demonstration of the earth in relation to the Sun and how the equator is closer (due to the axis being on a tilt), making it warmer.

<u>Summary for Thursday 9/14 class:</u>

The focus of today's lecture was tracing back the development of astronomy back from prehistoric times through various ancient civilizations and into the Renaissance era. In ancient times, astronomy was interrelated with other disciplines, such as religion, agriculture, and various other aspects of society. The ancient Egyptians observed variable stars, and by the third millennium BCE, they utilized a 365 day calendar influenced by star observations in order to predict when the Nile river would flood.

In Mesopotamia in 3100 BCE, the people saw the development of the Babylonian star catalogues. They made advancements such as the sexagesimal system, which forms the basis for time measurements. They also proposed the Heliocentric theory, which states that the sun lies in the center of the universe, although this was later rejected by the Greeks.

Greek astronomy was largely influenced by civilizations that had come before, such as Egypt. Greek philosophers Anaxagoras and Aristarchus also proposed heliocentric views. Aristarchus even went so far as to place planets in order according to their distance from the sun. The heliocentric theory became irrelevant later, under the influence of Aristotle and Ptolemy. Eratosthenes, another significant Greek figure who was a mathematician and geographer, used sundials and other methods to estimate the radius of the Earth. Claudius Ptolemy's "Almagest" is a vital compilation of astronomy knowledge of his time.

Hw 3 problem 1:

Physics 125 HW 3:

1.) latitudes: 30° 40° 45° 60°

$\angle$ of elevation (A): 90° − latitude

length of shadow = height of stick × tan(90° − A)
(L) (h)

$L = h \times \tan(90° - A)$

a. lat = 30°: $L = 1 \times \tan(60) \approx$ 1.73 meters

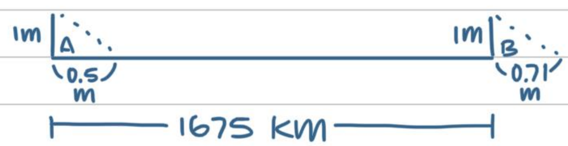
b. lat = 40° $L = 1 \times \tan(50) \approx$ 1.19 meters

c. lat = 45° $L = 1 \times \tan(45) =$ 1 meter

d. lat = 60° $L = 1 \times \tan(30) =$ 0.58 meters

Hw 3 problem 2:

2.)



$r_{earth} = \dfrac{\text{distance}}{\Delta \text{angles}}$

$\tan A = \dfrac{0.5}{1}$ $A = 0.46$ rad

$\tan B = \dfrac{0.71}{1}$ $B = 0.62$ rad

$r_{earth} = \dfrac{1675}{0.62 - 0.46} = \dfrac{1675}{0.16} = 10468.75$ km

HW 3 extended:

Distance = 1000 km → 1000 km / 0.162 rad = 6172.8 km