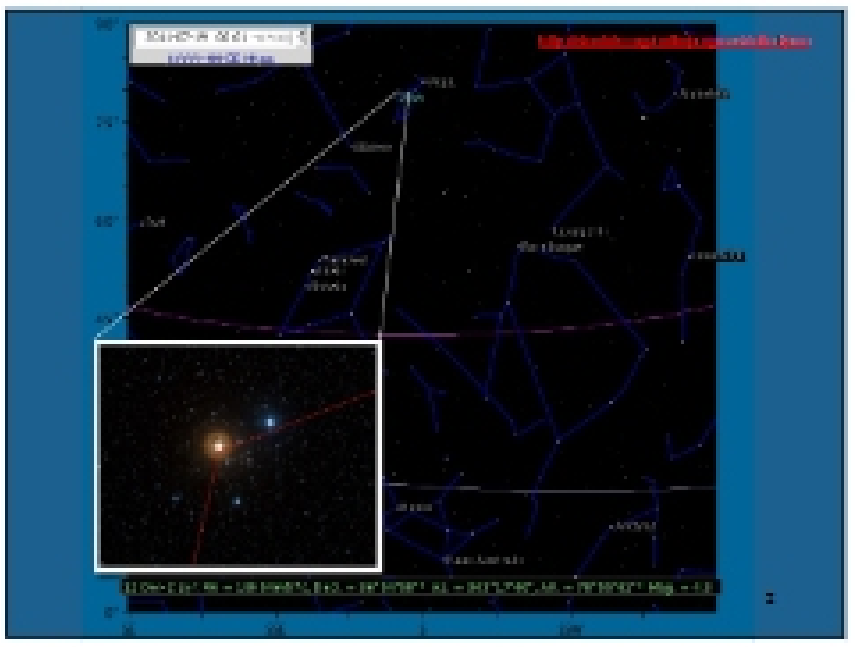


Learning goals:

- Explain what is meant by the parallax of a star, how we measure it and use it to find the distance to a star.
- Define brightness, parallax effect, arc second, parsec, apparent magnitude, absolute magnitude.
- Describe the methods used to determine: temperature, luminosity, radius

3

Questions:

Which stars are the brightest?

Which stars are putting out the most watts? (energy per second)

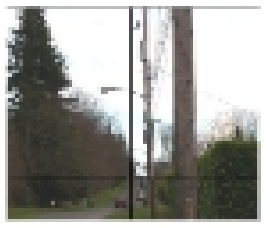
NEED TO KNOW:

Distances

The most fundamental and accurate (within a certain range) means of finding distances is measuring the parallaxes of stars.

4

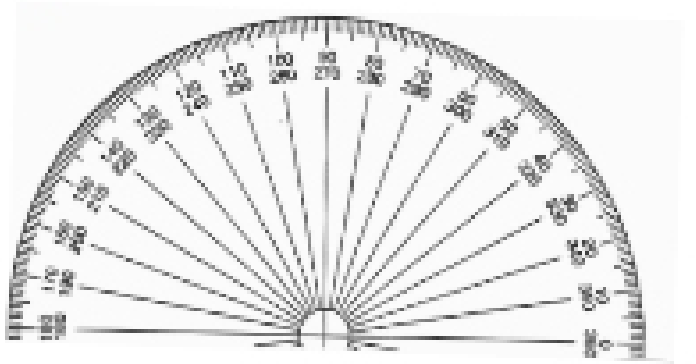
You already know about the parallax effect:



http://video.google.com/videoplay?docid=-5736135487330161351&ei=-8T1SNXWBIKIrQKXh

Definitions:

Arc Degree, Arc Minute, Arc Second



➢Define arc second

How many degrees in a circle?
How many arc minutes in a degree?
How many arc seconds in an arc minute?
How many arc seconds in a degree?
How many arc seconds in a circle?

__?__ radians = 360 degrees
1 radian = 57.3 degrees

How many arc seconds in 1 radian?

ANSWERS: 360, 60, 60, 3600; 1,296,000

2 pi; 206,265 arc sec/rad

PARSEC: Parallax ARc SECond

A star having a parallax of 1 arc second is 1 parsec away

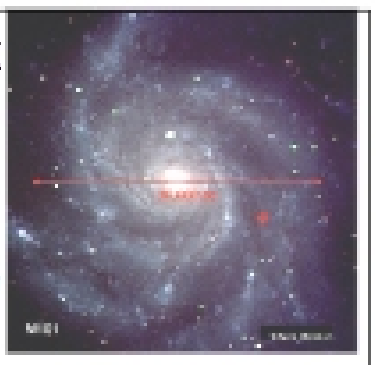
1 parsec (pc) = 3.26 light years

1 kiloparsec (1 kpc) = 1000 pc; 1 megaparsec (1 Mpc) = 1,000,000 pc

Baseline is 1 Astronomical Unit

Small angle formula for distance in AU's

Measured Parallax of Stars



- Works accurately for stars within about 200 pc (Hipparchos satellite)
- Biggest problem: measuring the miniscule shift of a star against more distant stars

parallax = 0.75 arcseconds

$$\text{distance} = \frac{1}{0.75} = 1.3 \text{ pc} = 4.3 \text{ ly}$$

parallax = 0.15 arcseconds

$$\text{distance} = \frac{1}{0.15} = 6.7 \text{ pc} = 22 \text{ ly}$$

parallax = 0.0015 arcseconds

$$\text{distance} = \frac{1}{0.0015} = 667 \text{ pc} = 2170 \text{ ly}$$

- Define brightness, parallax effect, arc second, parsec, apparent magnitude, absolute magnitude

- Define parallax

Brightness

How the star looks to US HERE ON EARTH

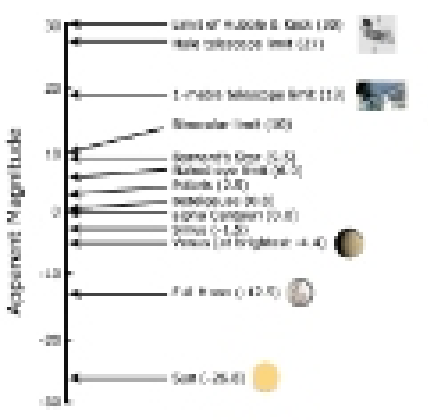
Depends On:

- Distance
- Luminosity

Inverse square law:

- Define brightness, parallax effect, arc second, parsec, apparent magnitude, absolute magnitude

Apparent Magnitude



- Every 5 magnitudes difference means 100 x difference in brightness
- One magnitude difference is 2.512 times in brightness. ($2.512^5 = 100$)