

Earth and the Universe

Objective...

Relate how science and technology affect people's beliefs, practices and ways of thinking;

WORLD

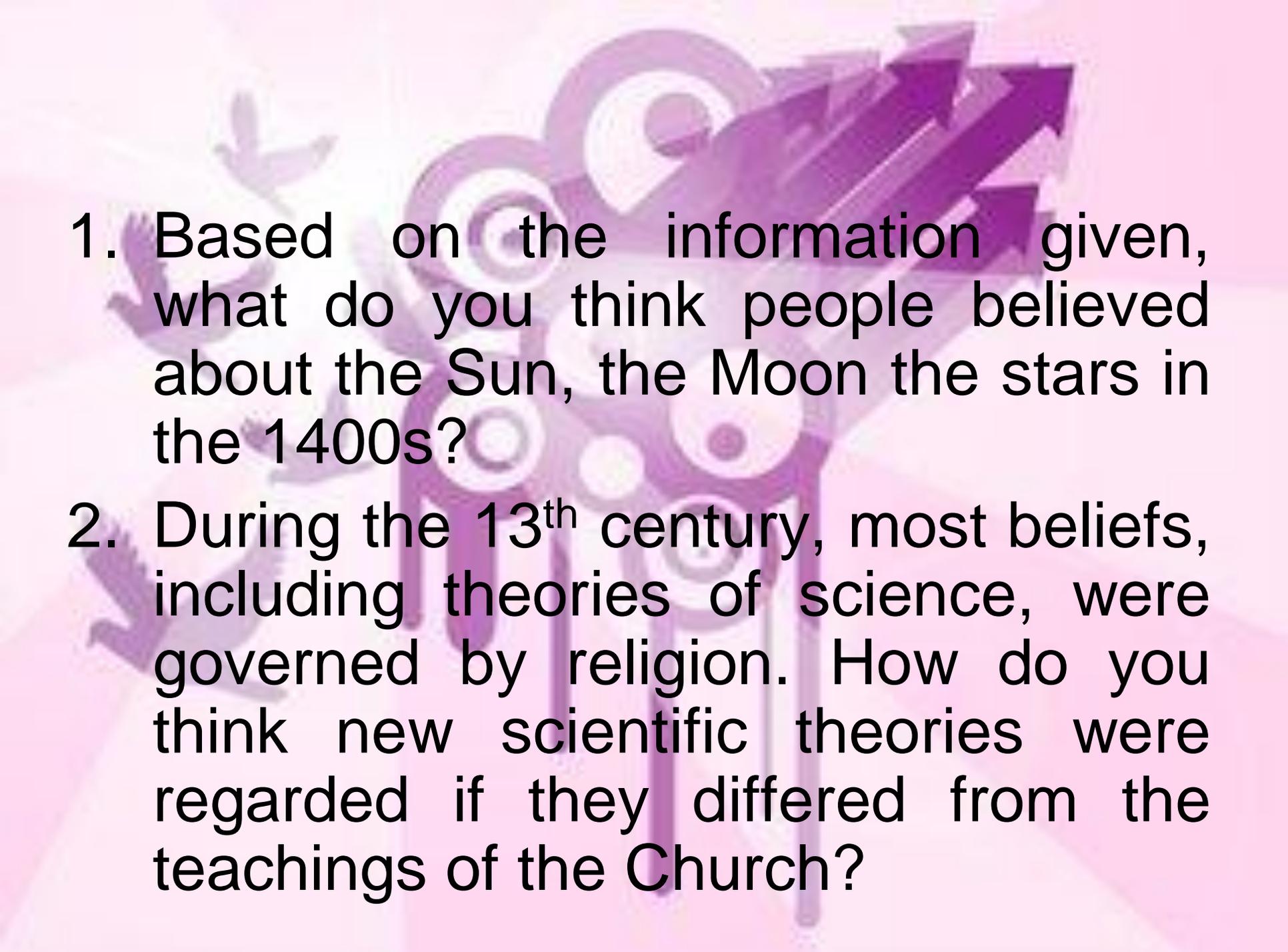
Political Map





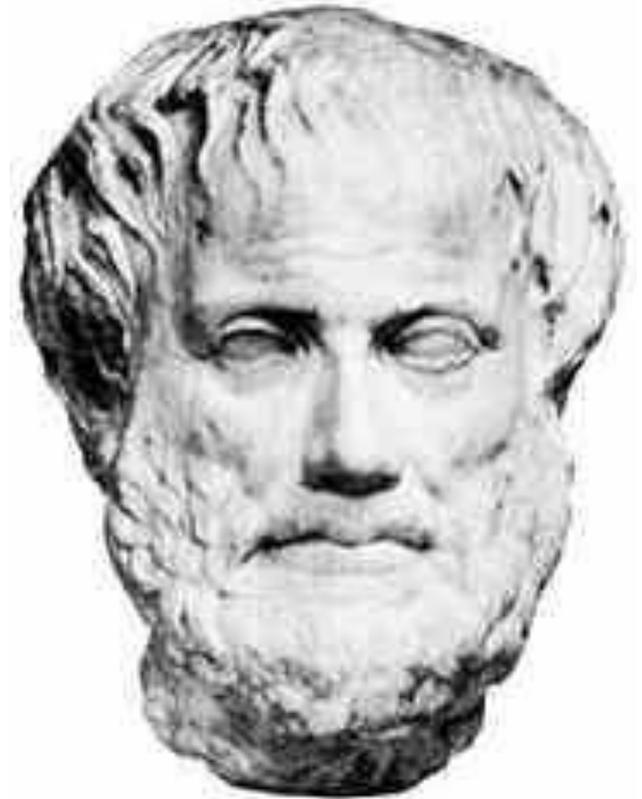
Lesson Proper...

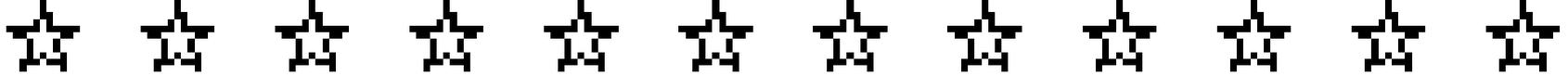
- Imagine life on Earth in the 1400s, when there were no telescopes and no pictures from space. The average person's knowledge of the universe was based only on the science that was supported by the Church and on what they were able to observe with their own eyes.

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1. Based on the information given, what do you think people believed about the Sun, the Moon the stars in the 1400s?
 2. During the 13th century, most beliefs, including theories of science, were governed by religion. How do you think new scientific theories were regarded if they differed from the teachings of the Church?

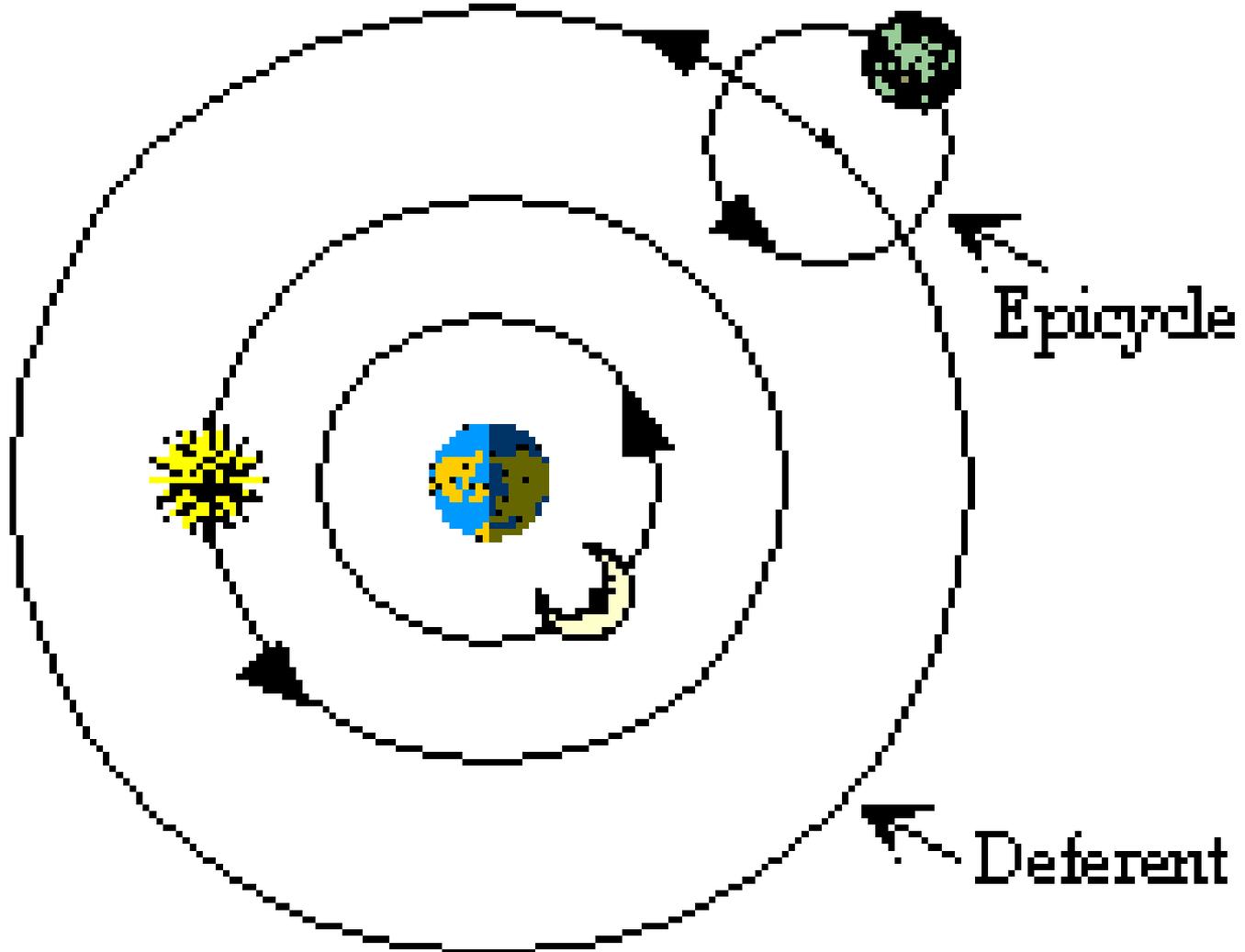
Aristotle

- A Greek philosopher, taught that the **Earth** was the **center** of the Universe. Thus the Sun, the Moon, and the planets orbited the Earth.
- This is the "**geocentric theory**."





Background Stars



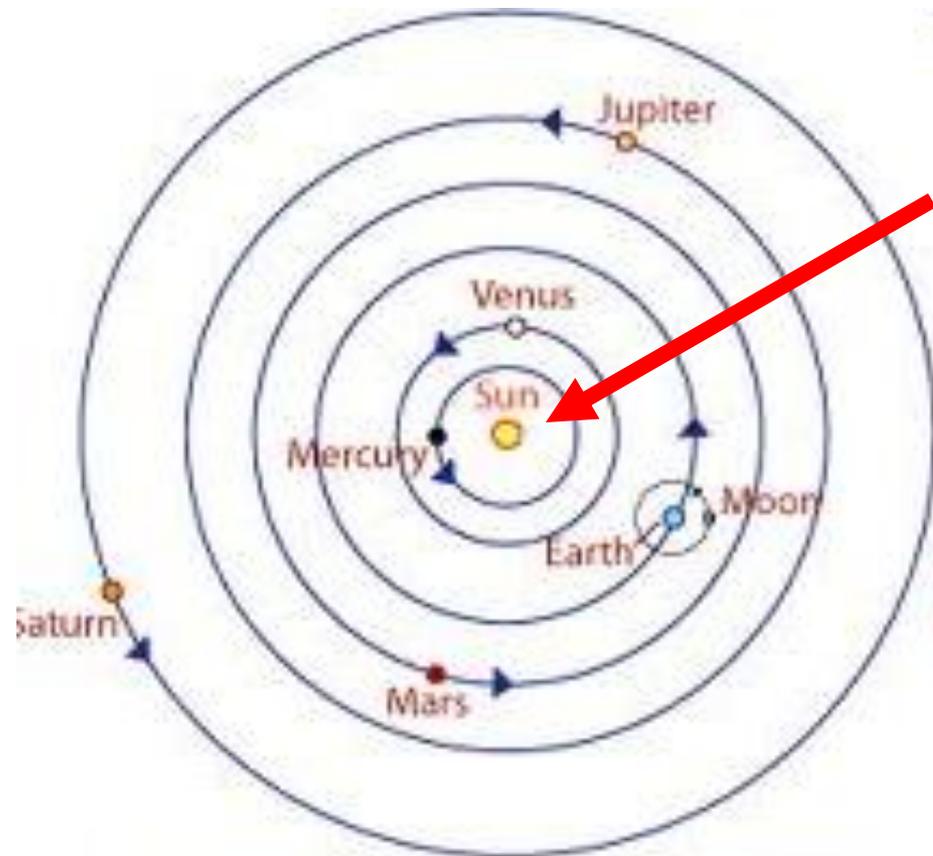
Epicycle

Deferent

- **Aristarchus** placed the **Earth** and other planets in motion **around the central Sun**.



- The idea was rejected by the people in favor of Aristotle's geocentric theory.



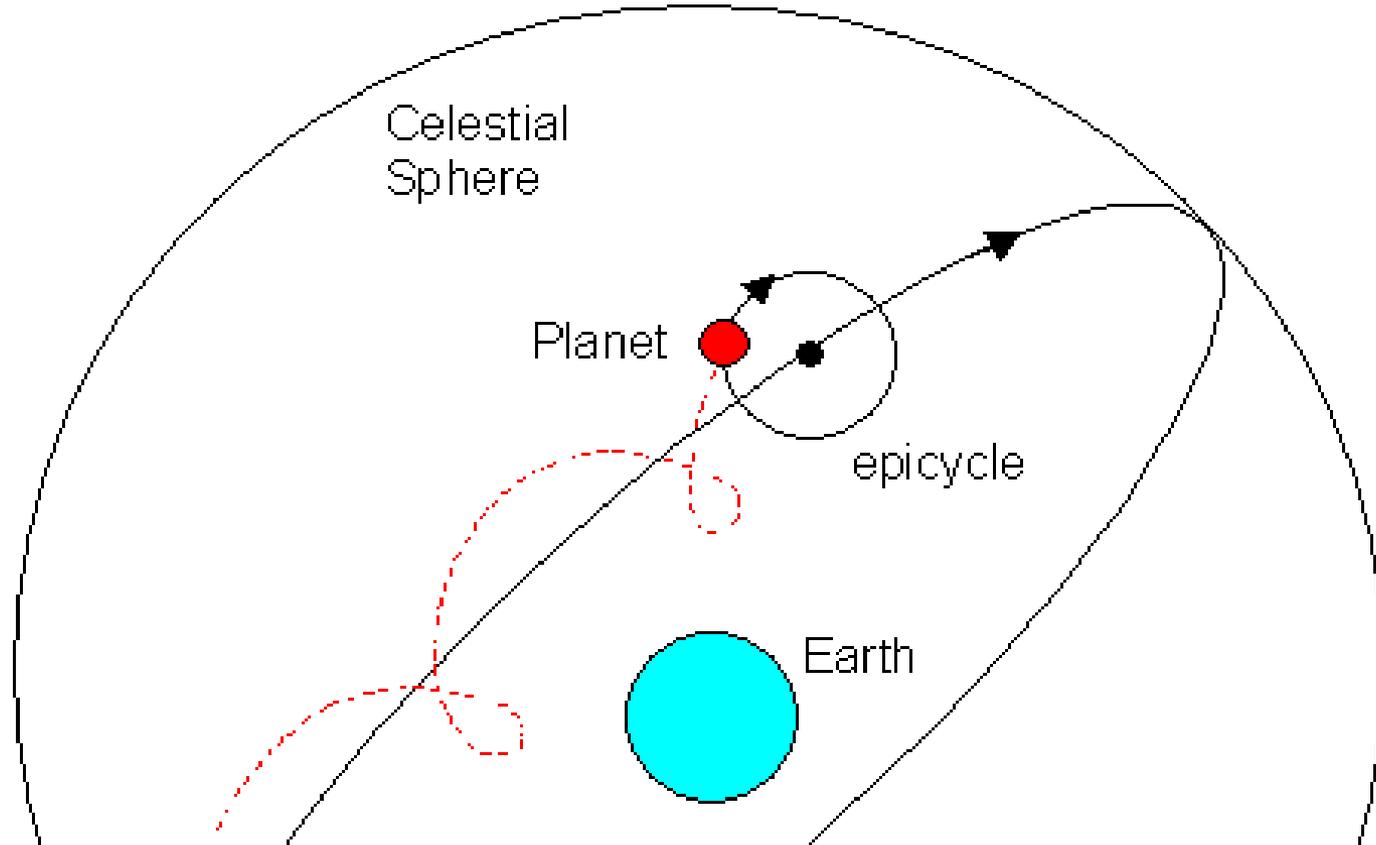
Aristarchus' Heliocentric Model

Ptolemy

- Wrote that the **Earth was motionless**.
- He devised a complex system of "**epicycles**" to account for the apparent retrograde (**backwards**) motion of the planets.



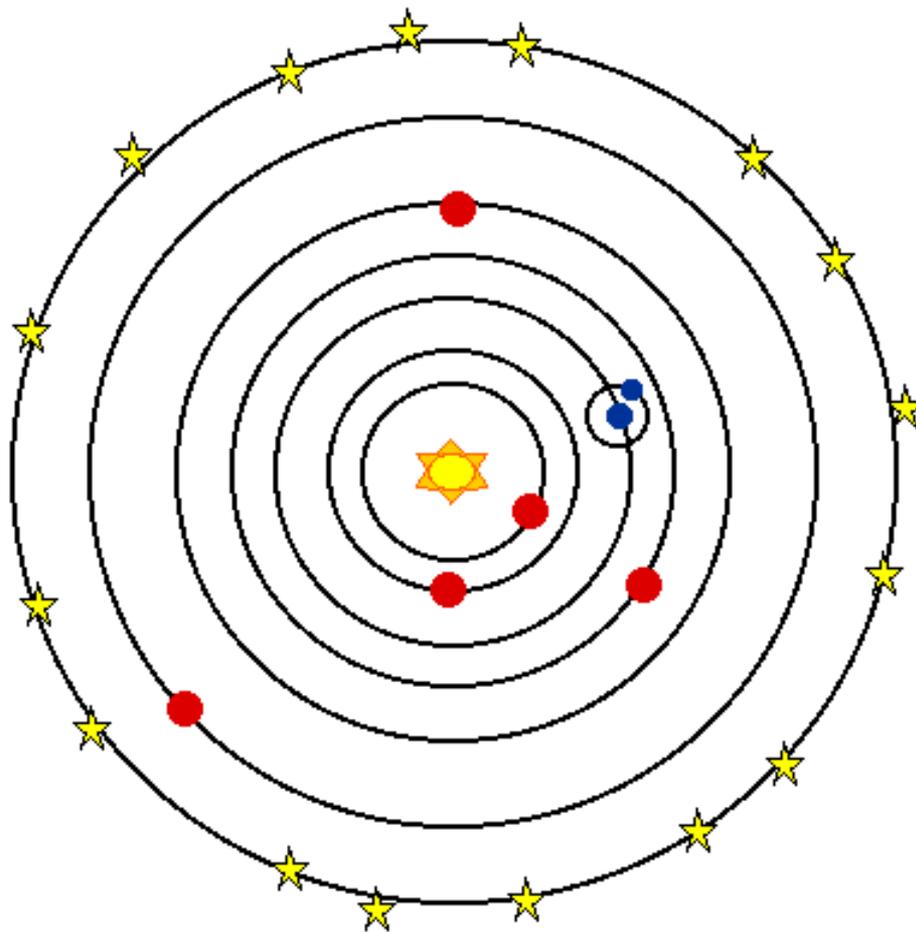
- In an **epicycle system**, each planet revolved around the earth in a large circle by making a series of smaller circles, to account for this effect.



Nicholas Copernicus

- Realized that the rising and setting of the **Sun**, Moon, and





- Copernicus' **heliocentric theory** is an idea that the **Earth and planets orbited about the Sun.**

Try This!

- Complete the table below.

	Geocentric Model	Heliocentric Model
Who is the proponent?		
What do they believe?		
Is it presently accepted today? Why?		
Illustrate		

Synthesis:

What questions are still unanswered for you?

Homework:

Even though astronomers use powerful Earth-based telescopes, images are not always as clear and defined as they could possibly be.

What are some conditions that exist on Earth that make viewing the night sky difficult?

A long-exposure photograph of a night sky showing star trails. The trails are curved, indicating the Earth's rotation. The foreground shows a dark, rocky landscape with a winding road and a mountain range in the distance under a clear sky.

Observing the Universe

Think about this...

- Have you seen a telescope before?
- Have you seen a microscope?
- What are the similarities between the two?
- What are its differences?
- What do you think is the benefit of telescope to mankind?

Objective...

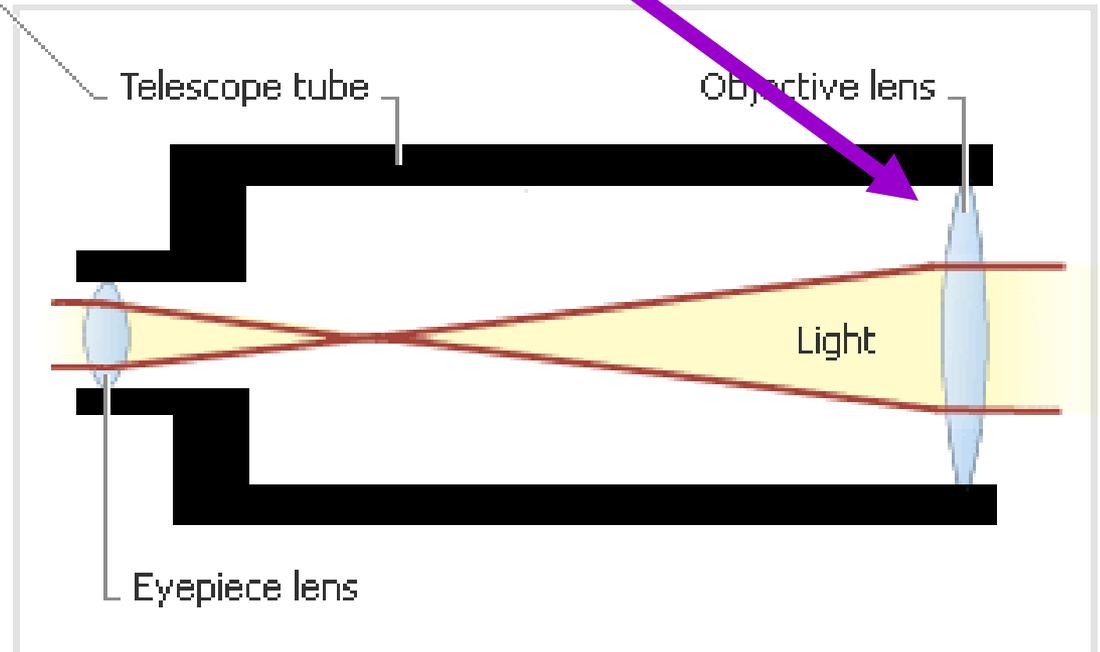
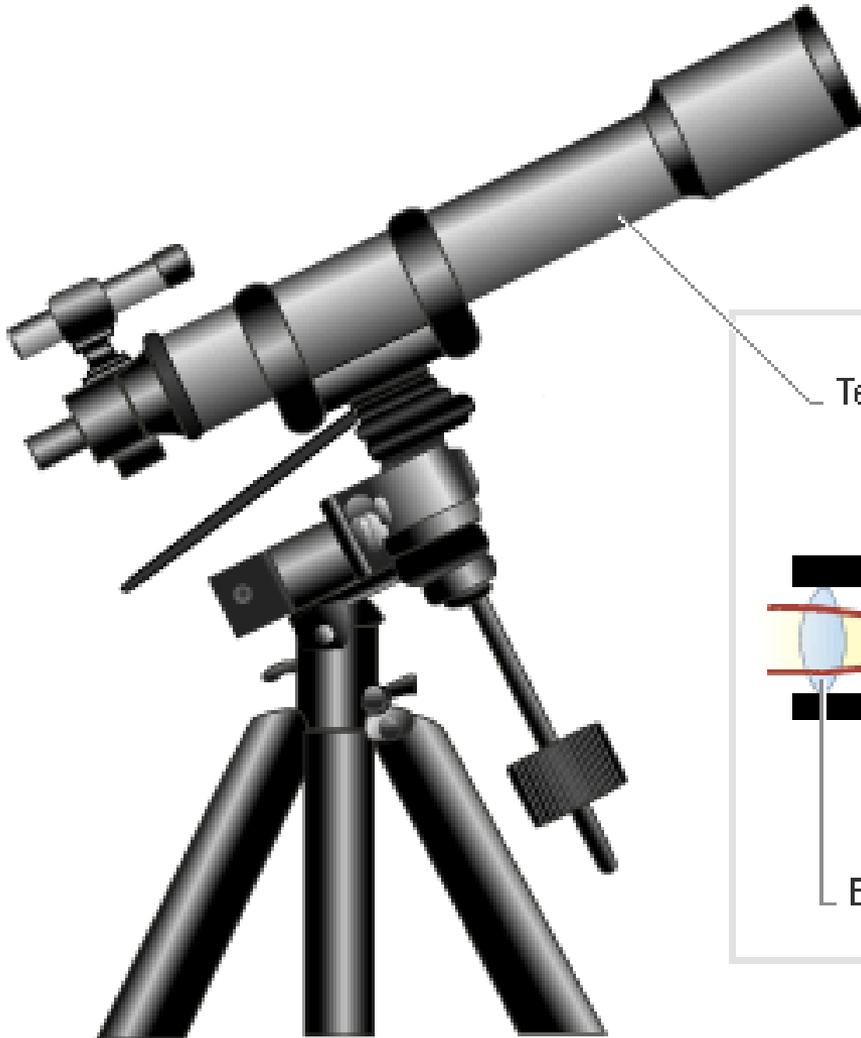
Identify some tools used by earth scientists;

Optical Telescope

There are 2 kinds of optical telescopes: **Reflecting** and **Refracting**

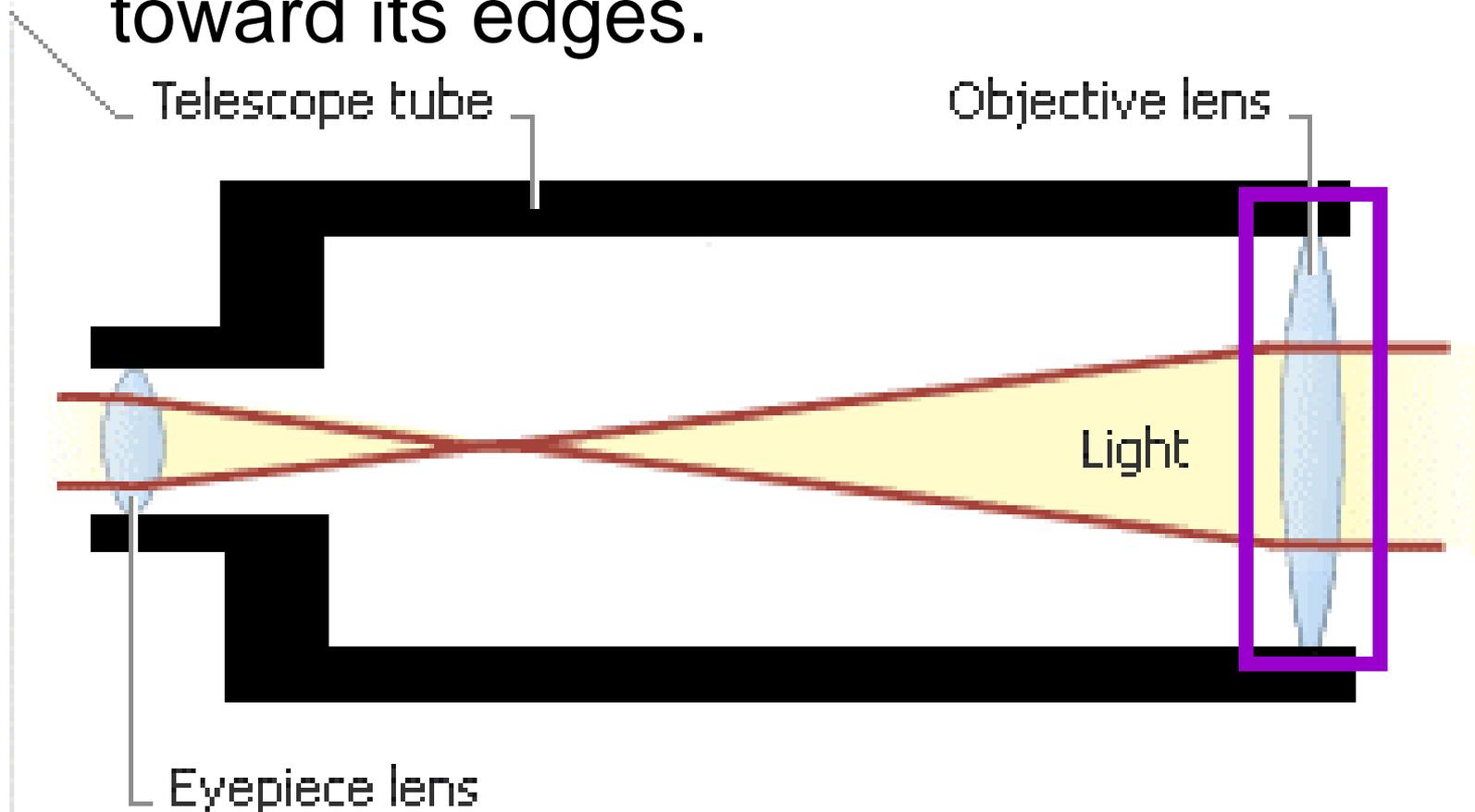
Refracting Telescopes

- Refractors, use a glass lens to bend, or refract, light and bring it to a focus.



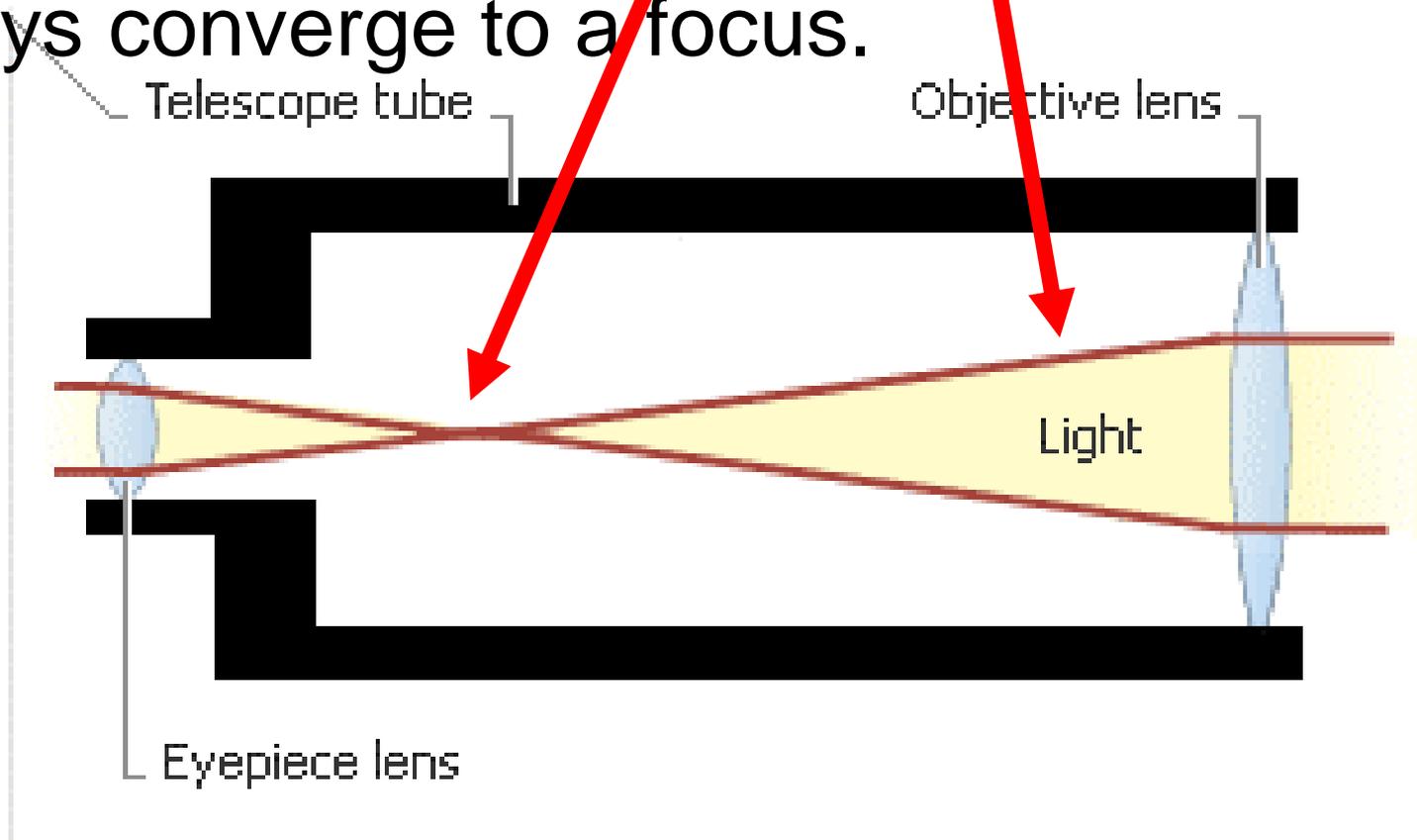
Refracting Telescopes

- The lens is **convex** becoming thinner toward its edges.



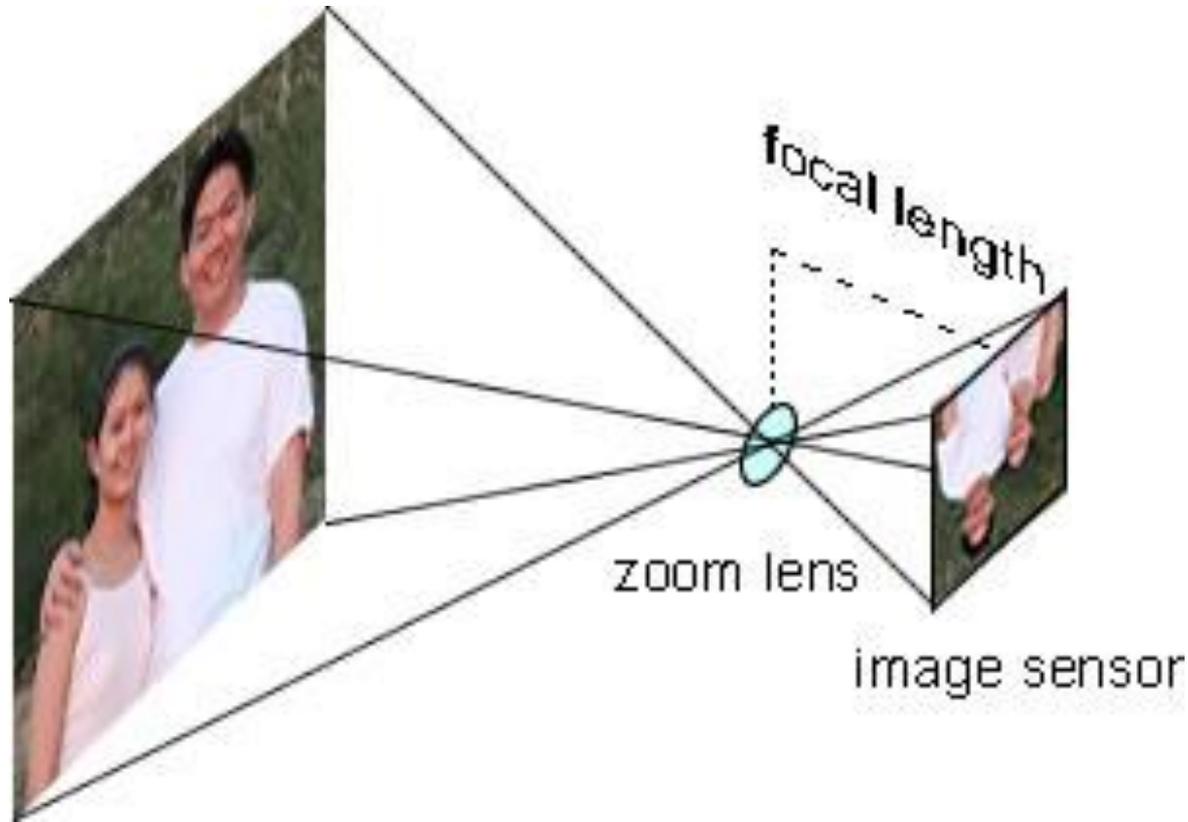
Refracting Telescopes

- A convex lens **bends light** at the edge of the lens to a **greater angle** than light coming through the center, so all of the rays converge to a focus.



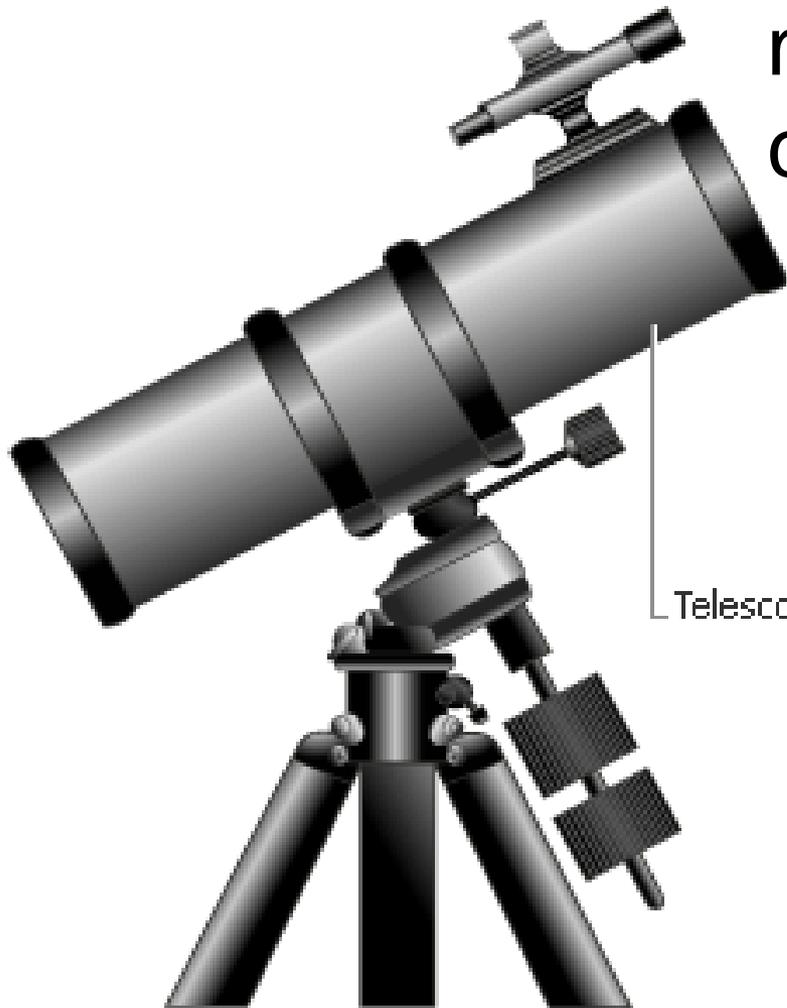
Refracting Telescopes

- The distance between the lens and the place where the rays converge is called the **focal length** of the lens.

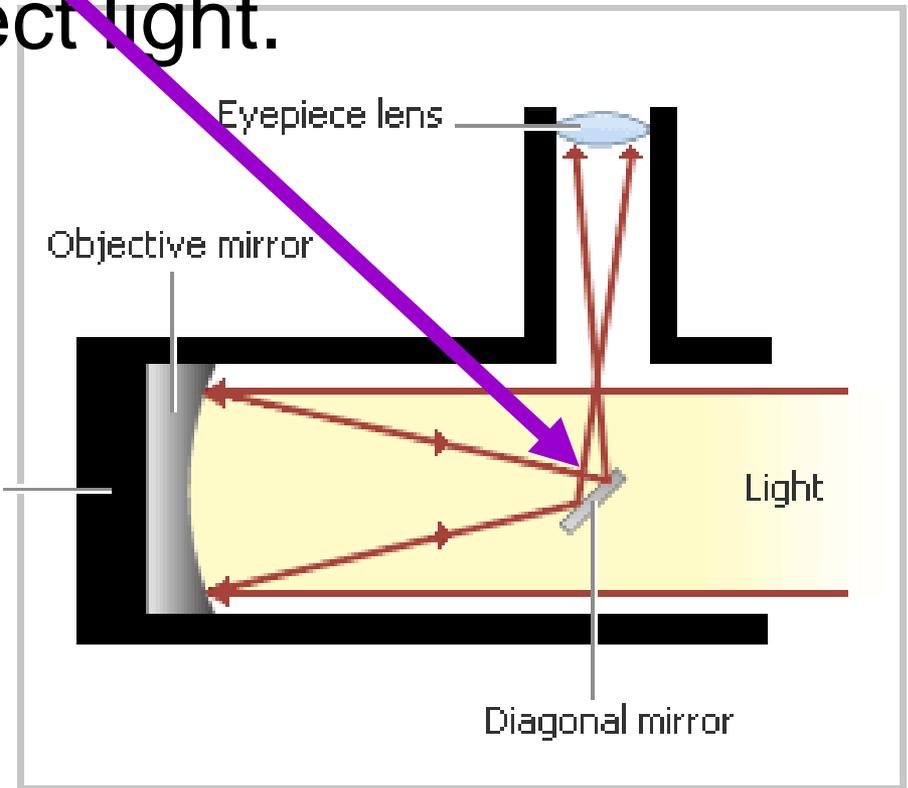


Reflecting Telescopes

- Uses a precisely curved mirror instead of a lens to collect light.

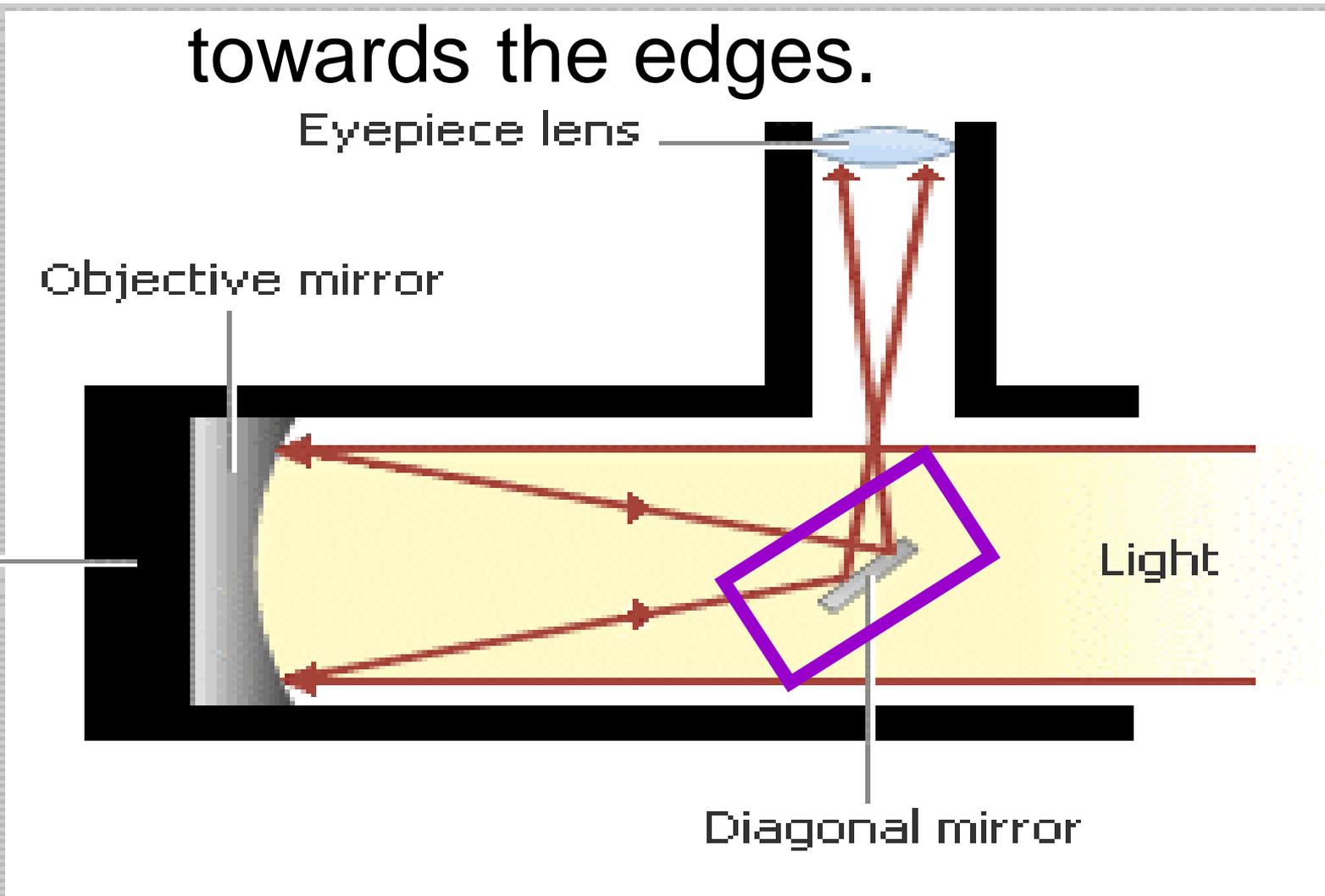


Telescope tube



Reflecting Telescopes

- The mirror is concave, thicker towards the edges.



Reflecting Telescopes

- This parabolic mirror increases the telescope's light sensitivity, so dimmer objects can be seen.



Radio Telescope

- “Sees” radio waves emitted by radio sources, typically by means of a large parabolic (“dish”) antenna, or arrays of them. The first of these was the 9m telescope constructed by Grote Reber in 1937.

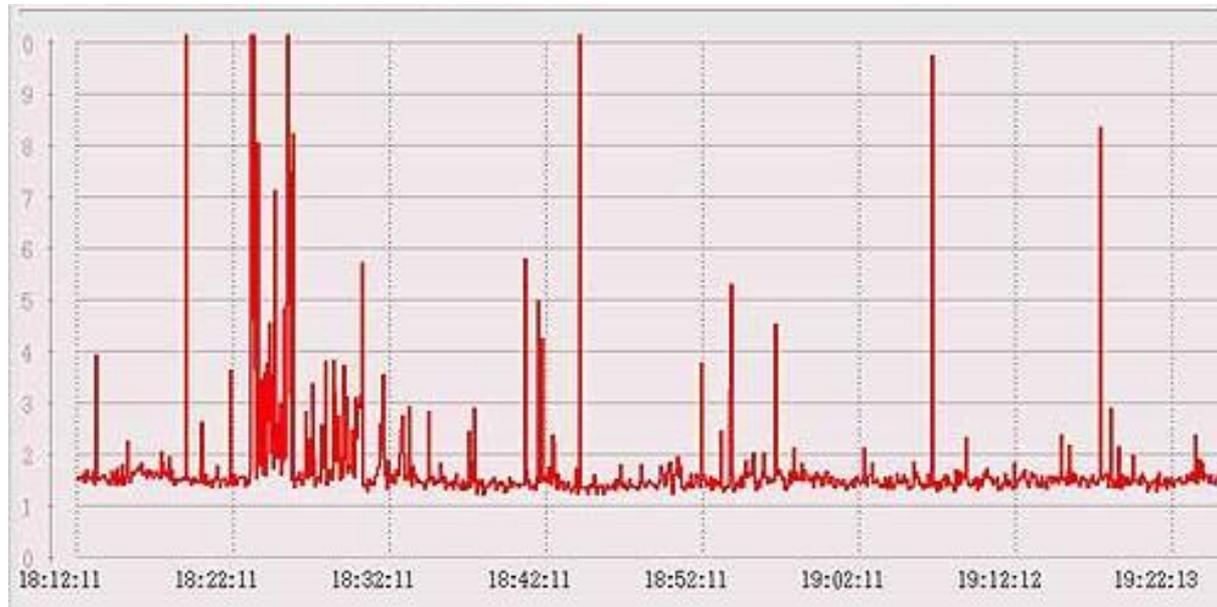
Radio Telescope

- The sub-field of astronomy related to observations made through radio telescopes is known as **radio astronomy**.



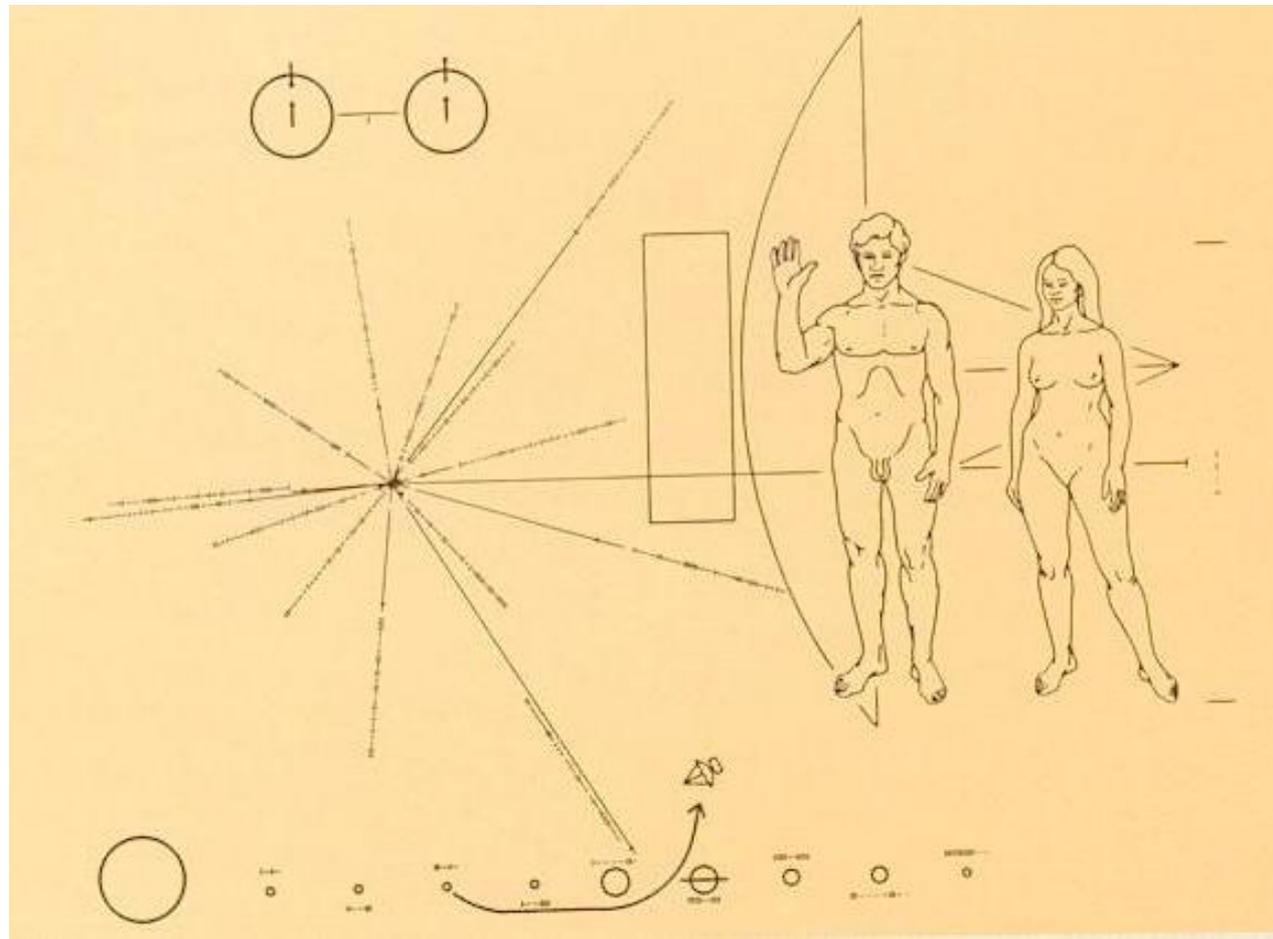
Radio Telescope

- Many celestial objects, such as active galaxies, produce radio-frequency radiation and so are best "visible" or even *only* visible in the radio region of electromagnetic spectrum.



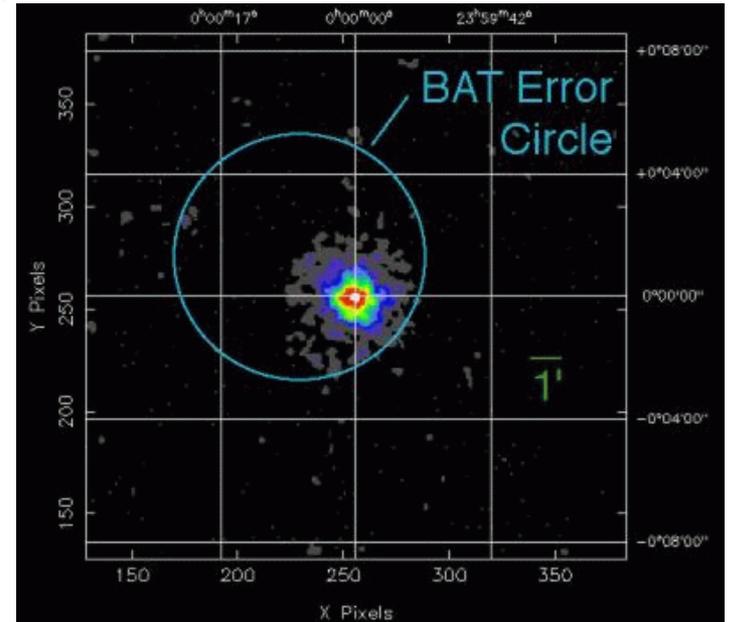
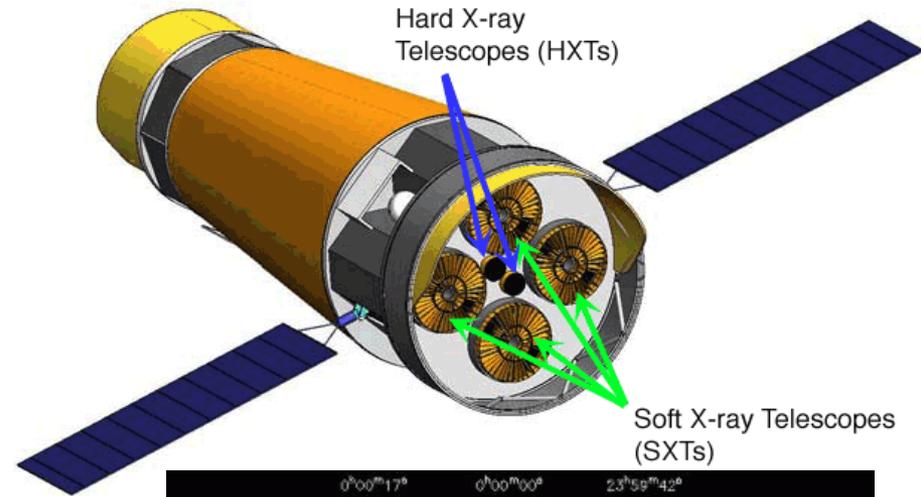
Radio Telescope

- It is the primary means to track space probes and are used in the [SETI](#) project.



X-Ray Telescope

- The XRT is a sensitive, flexible, autonomous X-ray imaging spectrometer designed to measure the position, spectrum, and brightness of gamma-ray bursts (GRBs) and afterglows over a wide dynamic range.



Synthesis:

What else do you want to know?

Homework:

Create a Venn diagram to compare and contrast optical and radio telescope

