

Lecture 1:

What is Astronomy?

An exclusive scientific study of things in the universe and how they fit together on a large scale. The history of astronomy can be traced back more than 2000 years to early astrology. Astronomy is a **science**; in contrast, astrology is an art of prediction.

The Nature of Science

Based on rational thought and objective reality.

Scientific Theories:

- Must be testable / falsifiable
- Must be continually tested
- Should be simple and, if at all possible, elegant

Scientific theories can be proven wrong, but they can never be proven right with 100% certainty. Scientific theories are almost always based on mathematics, and they must be very specific, never vague.

Scientific Method

Scientists make observations and measurements (collect data) and then develop theories to explain the data.

The best scientific theories not only explain what has already been observed, they predict what can be observed next.

The theory must be tested by experiments; if new observations agree with its predictions, the theory is supported. If not, then the theory is disproven and must be abandoned in favour of a new and better theory.

The Scientific Method

The cycle of

1. observation (data)
2. analysis (explanation/*theory*)
3. prediction (and experimentation)
4. new observation (or conclusion)

is called the **scientific method**.

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THE SUN AND ITS PLANETS

Object	Diameter (Earth=1)	Mass (Earth=1)	Density (water=1)	Distance from Sun (Earth's distance=1)	Rotation period†
SUN	109.1	332,946	1.41	—	25 to 35 days
MERCURY	0.382	0.055	5.43	0.387	176 days
VENUS	0.949	0.815	5.24	0.723	117 days
EARTH	1.000	1.000	5.52	1.000	24 hours
MARS	0.532	0.107	3.94	1.524	24h 39m
JUPITER	11.19	317.8	1.33	5.20	9h 50m
SATURN	9.41	95.2	0.77	9.54	10h 39m
URANUS	4.01	14.5	1.27	19.18	17h 14m
NEPTUNE	3.88	17.2	1.64	30.06	16h 06m
PLUTO*	0.19	0.0028	1.8	29.6 to 49.3	6d 9.3h

*Pluto, now classified as a dwarf planet, is included here for comparison

Scales