Lecture 2

Learning Goals:
By the end of class today you should be able to …
•Explain what science is and what it is not.
•List the typical steps of the scientific method and how it is used.
•Understand the scale of the Solar System

Reading for Today: Units 1, 2, 4.1
Reading for Next Time: Unit 3, 5

Looking for Answers …

•Scientific Method
–observation
–logic
–skepticism
–repeatability

•Hypothesis
•Propose a solution
–Must be testable
–Must be ***dis***provable

Scientific Process
- Iterative – new ideas can be developed and questions asked throughout

Definitions
(science meaning ≠ everyday language)
•Hypothesis: proposed explanation for some property of the universe.
•Must fit current observations/evidence
•Not well tested or supported

•Theory: hypothesis that has been thoroughly tested and verified.
•Never absolute – always subject to continual refinement and sharpening → reduce uncertainty

Is a theory still subject to testing? _____

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•Law: Well established theories, widely accepted
    - •Have been around a long time and repeatedly successfully tested
    - •i.e. Newton's laws of motion
    - •Does *not* mean the idea is tentative
    - **Is a law still subject to testing? _____**

•Model: express relationships between different quantities
    - •Typically mathematical or geometric
    - •Competing models may be developed to test and compare against observations.

•In science, nothing is ever proven, only confirmed or disproven
•'*No amount of experimentation can ever prove me right; a single experiment can prove me wrong*'
    -Albert Einstein

Scientific ideas are those that can be tested and potentially disproven.

•Limitations of scientific inquiry

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Astronomical Scales
Scale Model of the Solar System

Let's shrink the size of the sun down to 6 cm.

How far away would Mercury be from a 6 cm diameter Sun?

How big and how far away would the Earth be in this scale model?

How big and Far away is Jupiter in the model?

How Far away is Neptune in the model?

At this scale could you walk to the nearest star?