

Chapter Five Science: The Tools of Astronomers Study Guide

Lesson One

Astronomy-The study of the universe

Universe-everything that exists (Earth and all things in space)

Astronomer-someone who observes the universe and tries to explain what is observed
-Some are professionals; some are amateurs

Methods used by astronomers

- eyes-used to observe day and night, position of the sun and moon
- telescope-a device that collects light and makes distant objects appear closer and larger
- robots-can be sent to places to gather samples and do a more close observation

Models, Theories, Hypotheses

- Models-are a way of simplifying the world so that we can understand it better
- Theory-a well-tested scientific explanation supported by evidence
- Hypothesis-a scientific explanation that has not yet been fully tested.

Light -also known as electromagnetic radiation or electromagnetic waves

- Includes not only what we see but radio waves, X rays, and gamma rays
- Speed light travels is 300,000 kilometers per second
- It takes 8 minutes for light from the sun to reach Earth

Opaque-materials that do not allow any light to pass through them; example-desk

Translucent-object can be seen but is not clear

Transparent-an object can be seen through and it is clear

Refraction-the bending of waves as they go from one substance to another

- Refraction of light through a prism creates the different colors of the spectrum
- Refraction is the basis of eyeglasses and telescopes

Reflection-the bouncing of waves off a surface; examples-mirrors and some telescopes

Wavelength-the distance from one peak to the next on the wave

Frequency-the number of waves that pass through any point in a second

Electromagnetic Spectrum-diagram showing the waves of light in order of their wavelength
(Largest to smallest)-radio, infrared, visible, ultraviolet, X-rays, gamma

Space Probe-a vehicle sent beyond Earth to study planets and other objects within our solar system

Reflecting Telescope-uses a mirror and a lens to form and magnify an image of a faraway object

Refracting Telescope-uses lenses to form and magnify an image of a faraway objects

Objects that provide information from space

- Satellites-orbit high above Earth's atmosphere and send data back to Earth
- Space Probes-travel away from Earth taking photographs and perform experiments
- Space Shuttle-a reusable craft that carries astronauts
- Hubble Space Telescope-orbits above most of Earth's atmosphere taking pictures

Surviving in Space

- You have to have oxygen (2lbs), water (7lbs), and food (3lbs) per day
- To provide oxygen for astronauts they use canisters that remove carbon dioxide and purify in the spacecraft
- Water is recycled by gathering water in the air and condensed into a liquid and then purified
- Food is usually freeze-dried cubes or powders

Lesson Two

Rotation-one complete spin on the axis which takes about 24 hours

Standard Time Zones-a belt that is 15 degrees wide in longitude in which all places in that belt have the same time. There is one hour difference between joined time zones. There are 24 time zones

International Date Line-location where a new day begins and is located at 180 degree line of longitude (if you go west of this line you add a day)

Revolution-one complete trip around the Sun

Seasons are caused by the tilted Earth as it moves around the Sun

Sun as an energy source

- Sun is the energy source for life on Earth
- Sun is needed for the growth of most organisms
- Sun's energy was used in the creation of fossil fuels
- Sun is the source of energy for the water cycle

Lesson Three

Moon

- the Moon revolves around Earth
- Moon changes appearance in monthly cycles
- Phase of the Moon-the shape of the lights part of the Moon that we see at any given time
 - New Moon-none visible
 - Waxing Crescent
 - 1st Quarter
 - Waxing Gibbous
 - Full Moon
 - Waning Gibbous
 - 3rd Quarter
 - Waning Crescent

Lunar Eclipse-When the Moon crosses the path of Earth's orbit during the full Moon the Moon might pass through Earth's shadow. When this happens very little sunlight falls on the Moon. The Moon becomes dark for a time until it moves back out of Earth's shadow.

Solar Eclipse-when Earth passes through the Moon's shadow. For a solar eclipse to occur, the Moon must be in a straight line between the Sun and Earth. Happens at the Moon phase. A solar eclipse can occur when the Moon crosses the plane of Earth's orbit at new Moon phase.

Tides-the regular rise and fall of the water level along a shore. Tides are mainly caused by the pull between Earth and the Moon. The pull is stronger on the side of Earth facing the Moon.

Moon Features

- Craters-formed by the impact of objects from space

- Maria-large, dark, flat areas; were formed by huge lava flows that covered low-lying areas
- Highlands-light-colored, heavily cratered regions at higher elevations than maria
- Mountains-scattered throughout the highlands
- Valleys-cigar-shaped depressions