

Chapter 1

1. Our sun is the most massive and luminous star in the Milky Way. **False**
2. The word astronomy: **means “patterns among the stars.”**
3. If there are about 6000 stars in the entire sky that can be seen by the unaided human eye, about how many stars would be seen at a particular instant on a given dark night from a single location with an uninterrupted distant horizon? **3000**
4. If an event were to take place on the sun, how long would it take for the light to reach us? **8 minutes**
5. The distance to the nearest large spiral galaxy, Andromeda, is 2.5 million light-years. How long does it take light to travel from us to Andromeda? **2.5 million years**
6. The early universe was composed mainly of which two elements? **Hydrogen and Helium**
7. A light-year is measured in units of: **distance**
8. The cosmological principle states that: **the universe looks the same everywhere as long as you look on large enough spatial scales**
9. Classify the following descriptions as either true or false: **True: A hypothesis is a statement constructed explain observations or experimental results; False: A scientific theory which has been proven to be true is no longer subject to testing is a fact; False: The general definition of the word “theory” is a fact.**
10. The number 9.66×10^7 is equal to: **96600000**
11. Suppose you were writing to a pen pal in another universe. What address would you put on the envelope that included all the major structures in which we reside? Select the order from the list below in which you would put on your address, starting with your local location. **1: Earth; 2: The Solar System; 3: The Milky Way; 4: The Local Group 5: Virgo Supercluster; 6: The Universe**
12. The nightly motion of objects across our sky is caused by the: **rotation of Earth on its axis**
13. Which of the following statements best represents the overall rationale for scientific investigation? **Reality is comprehensible, and a limited number of fundamental principles governs the nature and behavior of the universe.**

Lecture Notes

- Astronomy is the study of the universe
- Galaxies tend to cluster together to form groups. The groups form superclusters
- light year= 10^{13} km distance light travels in a year
- 1km=1000 m
- 1kg=2.2 pounds
- 1 AU= distance between the earth and the sun = 1.5×10^8 km
- distance (d) = speed of light (c) x time (t)

- Scientific theories must be testable, must be continually tested, should be simple, should be elegant; can be proven wrong, but can not be proven 100% right
- **Observation**-leads to a hypothesis explaining it
- **Hypothesis**- an idea that can explain a phenomenon
- **Theory**- leads to predictions consistent with previous observations
- **A theory does not become a law over time**
- Cosmological principle: there is nothing special about our place in the universe- matter and energy obey the same laws everywhere

Chapter 2

1. If you go out at exactly 9 P.M. each evening over the course of one month, the position of a given star will move westward by tens of degrees. What causes this motion? **The revolution of the earth around the sun**
2. Assume that the observer is in the continental United States. Match each statement with one of the terms at the top. (Some letters may be used more than once and some may not be used at all.) **D (Autumnal Equinox). The beginning of fall occurs on what date; B (Summer Solstice). The altitude of the sun at noon is greatest on what date; B (Summer Solstice). The sun sets farthest north of west on what date? A (Winter Solstice). The shortest period of daylight occurs near which solstice or equinox?**
3. For the following figure, label each box with its appropriate descriptor. **A: South celestial pole; B: Ecliptic; C: Celestial equator; D: North celestial pole.**
4. Assume that the observer is in the continental United States. Match each statement with one of the terms at the top. **D (Autumnal Equinox): The beginning of fall occurs on what date? B (Summer Solstice): The altitude of the sun at noon is greatest on what date? B (Summer Solstice): The sun sets farthest north of west on what date? A (Winter Solstice): The shortest period of daylight occurs near which solstice or equinox?**
5. When is the Earth closest to the sun? **In the winter in the northern hemisphere.**
6. The picture below shows the position of the Earth at four times of the year. For each position, identify the transition to the correct season. **When the earth is in position B, it is at the winter solstice (far right); when the earth is in position D, it is at the autumnal equinox (bottom); when the earth is in position C, it is at the summer solstice (far left); when the earth is in position A, it is at the vernal equinox (top).**
7. Earth experiences seasons due to the tilt of its axis. What are the consequences of this tilt that contribute to the seasons? **Variation in length of day & Variation in the directness of the Sun's rays**
8. If you were going to send a spacecraft to circle the Moon and photograph the entire far side (the side not visible from earth), during which lunar phase (as seen from earth) would you do the photography? **New Moon**
9. A total lunar eclipse is visible in principle (assuming clear skies everywhere) **to everyone in one hemisphere of earth.**

10. Approximately what time would each of the phase rise above your horizon?
9pm: Waning gibbous; Noon: First quarter; 9am: Waxing crescent; 3am: Waning crescent; 3pm: Waxing gibbous
11. Why don't we have solar and lunar eclipses every month? **Because the Moon's orbit around Earth is tilted by about 5 degrees out of the ecliptic**

Lecture Notes

- earth's orbit is nearly circular
- 1 AU=150,000km
- the celestial sphere is a projection of earth's axes and equator in space; points on the sphere do not correspond to actual distances
- celestial equator-midway between
- ecliptic-path of the sun, inclined 23.5 degrees to equator
- celestial sphere-imaginary sphere on which all celestial objects seem to lie
- earth's north pole is always tilted toward the north star
- the tilt gives 4 special days a year
- vernal equinox-spring in NH, autumn in SH; sun is on the celestial equator (march 21) equal hours of day and night
- winter solstice- winter in the NH, summer n the SH; sun is south of the celestial equator - highest point on the ecliptic (june 21)- longest day in north hemisphere
- autumnal equinox- autumn in the NH, spring in the SH; sun is again on the celestial equator- lowest point of the ecliptic (December 22)- shortest day in NH
- summer solstice- summer in the NH, winter in the SH; sun is north of the celestial equator
- moon does not produce its own light
- the moon has synchronous rotation-makes one orbit around earth and spins one time on its axis in the same amount of time
- synodic month-29.5 days for the moon to go through the whole cycle of phases
- sidereal month-27.3 days-time to make the full 360 around earth
- solar eclipses happen at new moon-passes b/n earth and the sun
- 3 types of solar eclipses: total-the moon completely blocks the sun's light; partial-only part is blocked; annular- the sun appears as a bright ring surrounding the moon; total and annular solar eclipses are due to the elliptical path of the moon
- lunar eclipses happen at full moon- earth is b/n sun and moon; last longer than solar eclipses

Chapter 3 and 4

1. Match each statement with the law. **C (Kepler's first law of planetary motion): This law describes the shape of planetary orbits as ellipses; A (Kepler's third law): According to this law if the semimajor axis of the orbit is 1 Au then the orbit period is 1 year; D (Kepler's second law of**