

Study Guide for Test 2

Chapter 6

1. What is refraction?
2. How does refraction allow a lens to bring parallel rays of light to a focus?
3. Can a mirror also be used to bring parallel rays of light to a focus?
4. What is the simplest construction of a refracting telescope? A reflecting telescope? In each case what is the primary objective?
5. Which type of telescope, refractors or reflectors, has most of the advantages (and consequently most often used by astronomers)? What are some of the advantages?
6. What is the primary objective for a refractor? What is meant by the focal length of the objective? For a reflector? What is the focal length?
7. A reflecting telescope has a primary mirror that is 20 cm in diameter. The focal length of the primary is 60 cm and the focal length of the eyepiece is 5 cm. What is the magnification? Compare the light gathering ability of this telescope to a telescope with a primary mirror that is 10 cm in diameter.
8. What is chromatic aberration? In what type of telescope does it occur? Spherical aberration?
9. What is resolution?
10. Name limits to resolution for Earth-based refractors and reflectors? How about orbiting telescopes?
11. What is the limit of resolution due to diffraction? To improve this resolution, how would you change the wavelength at which you are observing? To improve this resolution, how would you choose to build your telescope, that is, would you build a scope with a larger or

- smaller primary objective? Can this limit to resolution be improved by corrective optics?
12. Can radio telescopes be located on the surface of the Earth or **must** this type of astronomy be done by orbiting observatories? Why?
 13. Are radio waves longer or shorter than visible light waves? Why does this cause radio astronomers problems with the resolution of their images?
 14. How do radio astronomers combat the problem of reduced resolution due to the limit of diffraction working at radio wavelengths?
 15. Name the Earth-orbiting observatory famous for work at visible wavelengths. What is the advantage of placing this scope in orbit?
 16. Which types of observatories must be placed in space because the Earth's atmosphere is opaque at these wavelengths?
 17. What wavelengths are transparent to the Earth's atmosphere, and consequently the observatories may be located on Earth?

Chapter 7

18. Describe the Solar System Layout briefly.
19. Name the terrestrial planets. What are their characteristics?
20. Name the Jovian planets. What are their characteristics?
21. Is Pluto a terrestrial planet? Is it a Jovian? Why or why not?
22. What are comets made of?
23. What are asteroids made of? Where is the asteroid belt?
24. What is the definition of average density?
25. What is the average density of the Earth?

26. How does the average density of the Jovians compare to that of the terrestrials? How does this density compare to the density of water? Which Jovian has a density less than that of water?
27. How does the density of Jupiter compare to the density of Earth? How do the masses compare?
28. What tool do astronomers use to determine the composition of celestial bodies from their emitted or reflected light? (We talked in class about using these techniques to determine the composition of the atmosphere of Titan.)
29. By mass, astronomers believe the solar system and most of the universe are composed primarily of what two elements?
30. Briefly, how did the solar system form? Why is it significant that all of the planets orbit in the same direction?
31. What is the most important physical parameter that dictated the characteristics of the planets?
32. Using the answer to the above question, explain why the outer planets form differently than the inner terrestrial planets? In particular why are the outer planets bigger and why is their composition different?
33. Is there any evidence of planets orbiting stars other than our Sun?
34. What two indirect methods give us indications of these planets? We also have at least one direct indication of an extra-solar planet. What is this direct indication?

Chapter 8

35. What is the approximate age of the Earth?
36. Describe the surface of the Earth in two words. (The answer to this question is wet and active.)
37. What powers the atmosphere? The oceans?

38. What is the green house effect? How does it effect the average temperature of the Earth?
39. How do we know information about the structure of the interior of the Earth?
40. Why do we believe that the outer core of the Earth is liquid?
41. What drives or powers plate tectonics? What geological features result form plate tectonics?
42. What was Pangaea? When and why did it break up?
43. In addition to the mantle, large scale convection occurs in what other region about Earth?
44. What is the mantle of the Earth composed of? What is its phase state?
45. What is the inner and outer core of the Earth composed of and what are their phase states?
46. What does it mean to say that a planet is chemically differentiated? What must happen in order for chemical differentiation to occur?
47. What is the structure of Earth's atmosphere?
48. 78% of the molecules in Earth's atmosphere are of what kind of molecule?
49. Where did the oxygen in the Earth's atmosphere come from?
50. Why is there very little carbon dioxide in the Earth's atmosphere today?
51. Why does the temperature rise in the stratosphere?
52. In what layer does weather occur?
53. What part of the Earth is the origin or seat of the magnetic field?

54. What are the Van Allen belts?
55. What causes the aurora borealis and the aurora australis?
56. Why is the Earth's magnetic field important to life on the planet?
How has the polarity of Earth's magnetic field changed over the last 4 million years?
57. Name two ways that the human population is affecting our planet.

Chapter 9

58. Does the Moon spin on its axis?
59. What are Maria?
60. Why are the highlands lighter in color than the maria? Why are they more cratered than the maria?
61. What is the main weathering agent on the Moon?
62. Describe the Moon's atmosphere.
63. Is there liquid water on the Moon? Ice?
64. How was the regolith formed?
65. Which Apollo mission landed a man on the Moon?
66. How is tidal drag affecting the Earth?
67. How did tidal drag lock one face of the Moon toward the Earth?
What is the eventual fate of the Moon-Earth system?
68. Why is the moon moving away from the Earth?
69. What is the most likely theory of the Moon's formation?

Chapter 10

70. When is the best time to view Mercury with your naked eye?
71. What is a solar transit?
72. Describe Mercury's atmosphere. Why are there large temperature swings between noon and night on Mercury? Why did Mercury lose its atmosphere?
73. How long does a day (daylight plus nighttime) last on this planet (give your answer in terms of Mercurian years)? Explain this in terms of the spin-orbital coupling due to the tidal forces from the Sun.
74. What are scarps?
75. What is the Caloris Basin?
76. Does Mercury have a magnetic field? What does this suggest in regard to the chemical differentiation of the interior of the planet.
77. What is the name of the spacecraft that flew by Mercury?
78. Compare the iron core of Mercury to that of Earth. Which planet's iron core occupies a larger fraction of the volume of the planet? How does this fit in with the location that Mercury formed in the solar nebula?