

## Exam 1 Review

1. Review the Summary at the end of each chapter (pp. 76-77, 100-101, 127-128), the quizzes and your homework.
2. What is the astronomical significance of Stonehenge?
3. What did Eratosthenes do that was significant? Be able to describe how he was able to derive his answer.
4. You should be able to explain and/or describe the following:
  - a. Ptolemy's model of the solar system
  - b. Copernicus' model of the solar system
  - c. Kepler's model of the solar system
  - d. Retrograde motion using Ptolemy's model, and using the Copernican model
5. Be able to describe the contributions of Tycho Brahe and Galileo to our understanding of the solar system.
6. What are Kepler's three laws of planetary motion?
7. What are the "99 Years of Astronomy"? What happened during that time?
8. What did Galileo contribute to our understanding of gravity?
9. What are Newton's three laws of motion?
10. What is "G" in Newton's Law of Gravitation? Is it a very large or very small number?
11. Be able to explain how inverse square laws work.
12. Two objects in space are mutually attracted to each other through their masses. Using Newton's Law of Gravitation, predict what would happen if: A) the distance between the two objects doubled; B) the mass of one object doubled; C) the masses of both objects was reduced to half their original size; D) The distance between the two objects was reduced by half.
13. If the radius of an orbit is reduced, what happens to its circular velocity?
14. Why is Newton's version of Kepler's 3<sup>rd</sup> law of planetary motion so important to astronomers?
15. Very briefly, how do the tides occur?
16. What are spring and neap tides? How do they occur?
17. How does a geosynchronous satellite work (p.88).
18. Describe angular momentum. Why is it important in our understanding of the solar system?
19. In what important ways did Newton's *Principia* change the way we view the world?
20. What are the two postulates of Einstein's Special Theory of Relativity? What relationship between mass and energy is a result of the Theory? Be able to describe some of the scientific proofs of special relativity.
21. How does gravity work according to Einstein's General Theory of Relativity? Be able to describe some of the scientific proofs of general relativity.
22. You should know the general layout of the electromagnetic (EM) spectrum and where each of the following fit: visible light, gamma rays, infrared, microwave, radio, ultraviolet, x-rays (p.106).
23. What is the atmospheric window? Why is it important to astronomers?
24. At what speed does all EM radiation travel?
25. "Light" behaves as both a wave and a particle. As a wave, light has a wavelength and a frequency. What are wavelength and frequency? How are these related to its velocity?
26. For a photon of light, what is the relationship between energy and frequency?
27. Be able to describe the general differences between optical reflecting and refracting telescopes.
28. Be able to define the following for a telescope or its mirrors/lenses: focal length, light gathering power, resolving power, magnification.
29. What is seeing? How does light pollution affect seeing?
30. What is a spectroscopy? Describe how it works.
31. Remember that there are other types of telescopes besides optical telescopes and they can reveal things that we could not "see" otherwise. What do radio telescopes, infrared telescopes, ultraviolet telescopes, X-ray detectors and gamma rays detectors reveal about the Universe?
32. What are adaptive optics and interferometry? How do these techniques help us see the universe better?
33. What particles are used in particle astronomy?
34. What are gravity waves?