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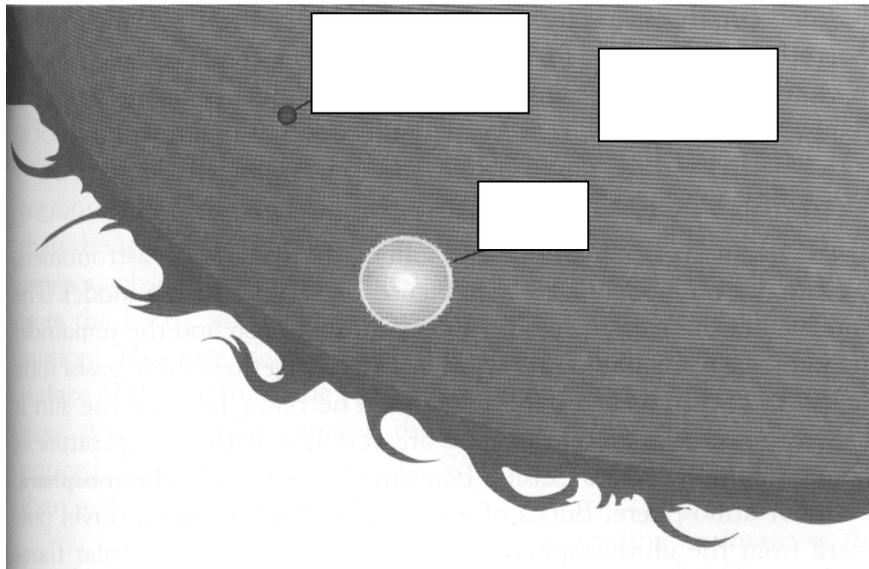
Due Date _____

Science 9

Worksheet 13-2—Stars, Galaxies and the Universe

Read Section 14-1 on pages 292-295 of SP to help you answer the following questions:

1. On the following diagram, label our sun, the smallest stars and giant stars



2. Our sun is (*large, medium, small*) _____ compared to other stars.
3. How long would it take us to get to the sun traveling in a space shuttle at 28 000 km/h?
 _____ . Would it be advisable to travel to the sun in the space shuttle? _____ Explain.
4. How long would it take to travel to the nearest star (other than our sun) in a space shuttle?
 _____ .
5. The process by which the sun produces energy is called _____ . Describe what happens in this process.

6. In B.C., a lot of electrical energy is produced. How long would B.C. have to produce energy in order to equal that produced in one second on the sun? (See margin p. 292)

_____. Why doesn't all this energy reach the earth?

7. How long will our sun continue to produce energy according to scientist's predictions?

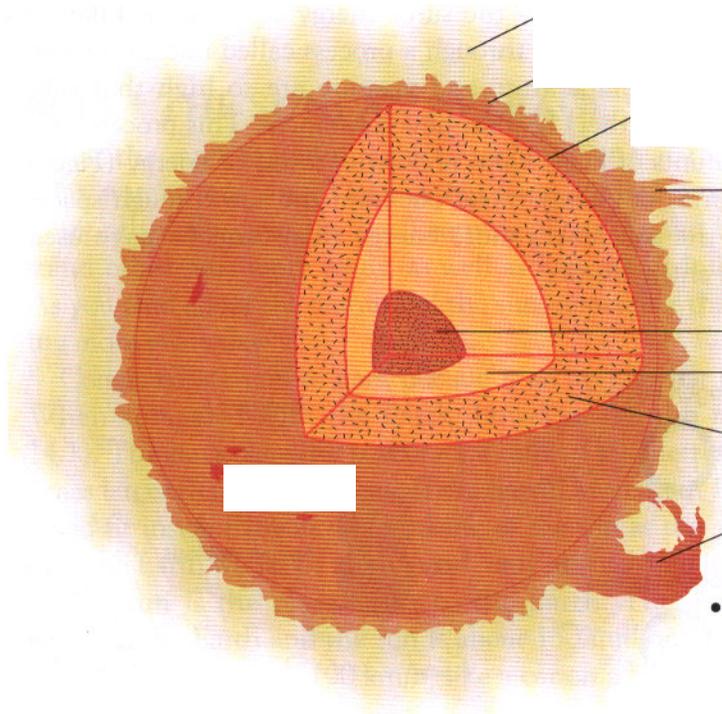
_____. Do you think humans in their present form will be around that long? _____ Explain.

8. 75% of our sun is made up of the element _____ and the rest is mainly _____.

Where did the second element come from? _____

3 billion years from now, which gas will decrease in amount? _____ Which gas will increase? _____

9. Label sunspots, a solar prominence, a solar flare, and the various layers of the sun on the following diagram:



10. What is the approximate temperature in the corona? _____
11. Are solar prominences smaller or larger than the earth? _____
12. Solar prominences throw out charged particles into the solar system. These particles interact with the earth's magnetic field. What do we observe when this happens?

13. Is the photosphere hotter or cooler than the corona? _____
14. What evidence do scientists have that the sun rotates on its axis?
15. The number of sunspots reaches its maximum every ____ years. When is the next time that we will see a maximum number of sunspots? _____ (You can't use the answer in the book!)
16. What is happening at the sun's core? _____ What is the approximate temperature there? _____
17. Why should you never look at the sun directly or through an instrument?

Read Section on Distances to the Stars on page 308 of SP to help you answer the following questions:

18. How fast does light travel in km/s? _____
19. What is meant by a **light year**?
- Is a light year a measure of time or of distance? _____

20. Alpha Centauri is the nearest star to our solar system. It is _____ light years away. Radio waves travel at the same speed as light. If you phoned someone in the Alpha Centauri system on your (very powerful) cell phone and said “Hello, I’m from Earth, how are you?”, assuming the beings there can understand English, how long would it take before you get an answer back? _____ How old will you be then? _____. If you phoned someone on Betelgeuse, how long would it take to get an answer back? _____
21. If we observe the most distant object in the universe, we are seeing what it looked like _____ years ago.

Read Section 16-1 on pages 344-348 of SP to help you answer the following questions:

22. The life cycle of stars are generally measured in _____ of years.
23. What is meant by a **nebula**?
- Particles in a nebula join together and form clumps. These clumps attract each other with the force of _____. When the clumps “fall” together they give off energy. When the clumps get big enough, the energy given off is enough to start nuclear fusion (several million degrees Celsius). When this happens a _____ is born!
24. The five stages in the life of a medium sized star are shown on the right margin of page 345. At which stage is our sun? _____
25. Low mass stars can live up to _____ years. Medium mass stars can live up to _____ years while high mass stars usually only live up to _____ years.
26. When our sun reaches the “red giant” stage, what do you think will happen to the earth?
27. What is a “white dwarf”?
28. What happens to high mass stars after they reach the “red supergiant” stage?
- Is it possible that you could go through life without every seeing a supernova? _____.

29. The supernova that was recorded in China in 1054 was so bright that it was visible in daylight. It was visible for about _____ months. The spreading gases from the explosion form what is now called the _____.
30. In 1987 a supernova called _____ was discovered.
31. When the largest of stars explode (supernova) the dense core that is left becomes not a pulsar, but a _____.
32. The first evidence of solid matter around a star other than our sun was discovered on the star called _____. This solid material is expected to some day form _____.
33. Our sun and planets were believed to have started forming about _____ years ago.
34. When our sun suddenly “flared up” some hydrogen and helium were pushed out to the outer regions of the solar system. These gases eventually formed the _____ giant planets. The solid matter was left closer to the sun and eventually clumped together to form the inner planets which are _____, _____, _____ & _____.
35. Do you think they will find planets circling other stars? _____ Could any of these planets be like earth and support life? _____.

Read Section 15-3 on pages 330-334 of SP to help you answer the following questions:

36. A galaxy is a huge collection of _____, _____ and hundreds of millions of _____. Our solar system is in a galaxy called the _____ galaxy. How do you suppose this name was derived?

Draw a simple face on view sketch of the Milky Way galaxy showing the nucleus and the approximate position of our solar system in this galaxy.



37. There are about _____ stars in the Milky Way galaxy.
38. Galaxies can have several different shapes including _____, _____, and _____.
39. The nearest galaxy to the Milky Way is called _____ and its picture is on page _____ of the text. See other galaxies on page 332.
40. Why were galaxies not known to ancient astronomers?
41. Groups of stars (10 stars to 1 million stars) that are too small to be called galaxies are called _____.
42. What is meant by a **globular cluster**?

Read Section 15-2 on pages 325-329 of SP to help you answer the following questions:

43. Galileo used a type of telescope called a _____ telescope. Why can't refracting telescopes have lenses any larger than about 1.2 meters?
44. Draw a simple diagram of a **reflecting telescope** showing the mirrors and the rays of light as they pass through it. (See Figure 15.8 on page 326)
45. Reflecting telescopes can be made larger, so therefore they can produce (*greater/less*) _____ magnification than a refracting telescope.
46. A telescope which looks at visible light from objects is called an _____ telescope.

47. Why are astronomical telescopes built on high mountains?
48. Where is the Hubble telescope? _____.
Why does it produce better images than telescopes on the earth's surface?

If you are interested you can look at some of the fantastic views from the Hubble telescope by going to an internet search engine (like Google) and typing in: Hubble images.

49. The electromagnetic spectrum of energy consists of: radio waves, _____,
_____, _____, _____,
_____ and _____

The only one of these we can see is _____, but astronomical objects emit them all.

50. Radio waves are able to pass through clouds which enables scientists to gain more information. Where is the nearest Radio Observatory?
51. The initials IRAS stands for the
52. How have we obtained detailed views of many of the planets and moons in the solar system which are much better than anything that could be achieved by telescopes?

Read Section 15-5 on pages 339-340 of SP to help you answer the following questions:

53. What makes **quasars** such unusual objects?
54. What do pulsars do? _____
Where are they found? _____
About how big are they? _____ They have about the same
mass as a _____

55. Describe a **black hole**.

We can't see black holes but we can detect _____ coming off of them.

Read Section 16-3 on pages 349-353 of SP to help you answer the following questions:

56. The study of the origin and changes in the universe is called _____
57. Scientists believe that the universe is not a constant size but is _____
58. When light coming from an object has longer wavelengths than expected (called a red shift), it means that object is moving _____ from us. The greater the red shift, the _____ it is moving.
59. Since the universe is expanding, there must have been a time when all matter was together. This is called "time zero" and according to theory is anywhere from _____ to _____ billion years ago. This theory that the universe started with a very small volume and is continuing to "explode" is called the _____ theory. What evidence did scientists obtain for this theory in 1965?
60. Explain the **Oscillating Theory**.
61. Do we know everything about the origin of the universe?