# Science 9 Unit 5 Worksheet

## Chapter 13, Part 1.

1. Our sun is a _____ that gives off light and other forms of energy. A _____ is an object that travels in a path around the _____ or around any _____. The Earth is one of the planets that _____ around the sun.

2. In addition, a _____ is an object that travels in a _____ around a planet. Our Earth has _____ moon travelling around it. Also, there are smaller space objects like _____, _____, and _____.

3. These objects, the planets and the sun make up something called the _____. Compare the _____ known planets in the solar system in Figure 13.2 on page 266. List the planets names in the space below. Which are the largest and the smallest planets?

4. Everything in the solar system is in _____. This type of motion is called _____ which is the motion of one object around another. The planets revolve around the sun in paths or _____ which are nearly circular with the sun at the centre of each orbit.

5. Each planet in the solar system is _____ from every other planet in its _____, _____, _____, and the _____ which make it up. Each planet also takes a different amount of time to complete one _____ around the sun. The _____ it is from the sun, the _____ it takes to revolve.

6. The amount of time it takes the Earth is one _____. The longest time to complete one revolution is by _____, approximately _____ Earth years! Apart from revolving all the planets also _____. This _____ of an object is about an imaginary _____. IE Our North and South Poles!

7. _____ temperatures also vary depending on the planet's _____ from the sun and the composition of its _____. Density also varies a lot, this measures how _____ the particles of the substance are. The density of water is _____ or _____. How does this compare to the Earth?

8. The planets are made up of different combinations of chemical _____ and no two planets are th same. However, there are _____ more common than others. List them in the space below:

9. Who are the Terrestrial planets and why are they given this name? What is their other name?

10. The first four inner planets are mentioned above. The remaining _____ planets travel the vast areas of outer space and are called the _____. Four of these planets are _____. They are large and their atmosphere is mostly made up of the low density gases _____, and _____. For this reason they are called the _____.

11. The last planet is _____. It is so far away and so _____ that we know little of it. _____ is the science of outer space, even beyond the solar system! An _____ is a person who studies astronomy and its mysteries.

**Part 2.**

12. The terrestrial planets are composed mainly of _____ and _____. This group includes Earth, _____, _____, and _____. They have been studied with electronic spacecraft called _____.

13. _____ is not easy to see from the Earth because it is never far from the _____ _____ of the sun. The only times you can see it is just _____ sunrise and after _____. It is a planet of _____. Being the closest to the sun, Mercury receives about _____ times the sunlight and temperatures can reach over _____!

14. Since Mercury has no atmosphere to trap heat, it can get as cold as _____! It was first photographed by _____ in _____. The pictures showed that it was a barren, _____, with many craters caused by rock collisions in the past.

15. _____ is the easiest to see from Earth because it is our _____ neighbour. It appears to be very bright because sunlight reflects from its thick _____. Venus is the _____ brightest star and is sometimes called the _____. Its atmosphere is mostly _____ which holds heat and causes the greenhouse effect.

16. Why is the planet Venus so difficult to explore with space probes?

17. The only planet in our solar system with an atmosphere is _____. Our atmosphere is mainly _____ (78%) and _____ (21%). The oxygen is mostly produced by living _____. More than _____ of its surface is covered by water. The water in the atmosphere produces the _____ and the Earth's

temperature ranges from _____ to about _____.

18. Mars is called the _____ because of its _____ soil. Mars is bright, although not as bright as _____. Mars has _____ that change with the seasons . It also has _____, and there is evidence of _____, _____, and _____. It is the planet with surface conditions most similar to those of _____.

19. For these reasons, Mars has been studied more closely than other planets, but _____ life forms were found there. Scientists believe that it once had a denser _____ and liquid _____ on its surface, this is why they can see certain features on the surface.

20. The _____ can be found in the outer regions of the solar system. They include _____, _____, _____, and _____. They appear to lack a _____ and are made of _____ and _____. Deeper inside these planets they are _____ and may even become liquids and _____.

21. Jupiter has a diameter of _____ times that of the Earth and has a greater _____ than all the other planets combined. A day on Jupiter is less than _____ long which means that it is _____ very quickly and produces high winds in its atmosphere.

22. Its surface is covered with _____ or belts. The most interesting feature is a huge hurricane called the _____ which is larger than two Earths! It has at least _____ different moons. Using binoculars, you can see the moons _____, _____, _____, and _____. Space probes have discovered _____ of small rocks travelling around Jupiter in paths about the planet.

23. _____ is the second largest planet in the solar system and is about 5/6ths the size of Jupiter, but only _____ of Jupiter's mass. It is the least _____ of all the planets. Its atmosphere is _____, it has high winds, and the day is less than _____ hours long. Being farther from the sun, its temperature is lower at about _____. Saturn is easily identifiable by its _____ which are composed of over _____ separate rings. It has at least _____ moons.

24. Uranus is _____ times as big in diameter as planet earth, but since it is so far away from Earth it appears as if it were a star. Astronomers have a lot of data about Uranus from *Voyager 2* space probe. It is _____ because of its _____ which is nearly the same plane as its orbit. This means that Uranus _____ on its side.

25. It has a _____ like atmosphere and has an average temperature of about _____. The atmosphere is mostly made up of _____, with some _____ and _____. The winds are strong, usually blowing up to _____.

26. Neptune is the _____ planet from the sun. It was discovered by patience and mathematical hypothesis as a result of observing Uranus. Later, in 1989, *Voyager 2* was able to send back more detailed information about Neptune. They discovered that it had _____ clouds with white sections and a storm section called the _____. With an average temperature of _____, its atmosphere is mostly _____. A total of _____ moons are known to orbit Neptune and some dusty thin rings about it.

27. Pluto is unusual because it does not appear to be _____ nor is it a _____. Astronomers hypothesize that _____ and other solids cover its surface. Pluto's moon is called _____ and was discovered in 1979. Some believe that Pluto was a moon of _____ at one time. Take a look at Figure 13.15 on page 278 of your textbook.

**Part 3.**

28. The sun and the planets are just some of the objects in the solar system. Each _____ travels about its "parent" planet in an orbit. The Earth's moon is about _____ of the size of Earth, making it one of the largest moons. There have been _____ visits to the moon by Nasa.

29. Data has been collected on moon rock, soil, _____, and _____. Our moon has no _____ and has been cratered by the impact of objects from outer space. The moons of other planets were not discovered until the invention of the modern _____. In 1610, _____ was the first person to observe the four moons of Jupiter.

30. Space probes have investigated several different moons and what surprised astronomers the most was the difference in their _____ and _____. Discuss some of these below:

31. The closest moon to Jupiter is _____. It is interesting because it appears to have _____. Only the number of moons orbiting the four _____ planets is known for sure. By studying the planetary moons it helps us understand the _____ and _____ of our solar system. Why could knowledge about the planetary moons be useful to us some day?

32. The irregular, rock objects found travelling in orbit between _____ and _____ are called _____. Another name for these fragments is _____. Asteroids may be leftovers from a long time ago when the planets were _____, or the result of _____ between what was a large planet and space debris.

33. Most are found between Mars and Jupiter in the _____, but some follow Jupiter's orbit or can even come closer to the Earth and Sun. An asteroid called _____ came within _____ km of the Earth. They are rich in _____ which means they could be _____ . They have a low gravity making rocket _____ easy.

34. A _____ is a lump of rock or _____ that falls from space to Earth. As it passes through the atmosphere _____ causes the meteor to burn up and produce a Visible streak across the night sky. Most meteors burn up before they reach the Earth's _____. If it does make it to our planet it is then called a _____. The larger meteors probably come from _____ that have orbit which have crossed Earth's path. If it hits the surface, it can create huge craters such as the one at _____.

35. A _____ is a chunk of rocky or _____ material covered in ice and travelling in a very long _____ around the sun. They are believed to be made up of _____,_____, _____, and _____.
Their tails always point _____ from the _____ as their solar energy acts like

wind.

Read some interesting information about Halley's comet found on page 287 of your text book.

**Chapter 14, Part 4**.

36. The sun is the _____ of our solar system. Learning about the sun helps us understand the other stars more easily. Compared with other stars, ours is of _____ size, but huge when compared to the Earth (about 110 times the diameter). I.E More than _____ Earths could fit inside the sun. The sun is the closest star to the Earth at about _____.

37. The sun produces energy through a process called _____. The pressure and temperature inside the sun it causes substances to fuse and form new substances. In this way, enormous amounts of heat, light, and other forms of energy like radiation, travel through space.

38. Scientists calculate that the sun has been producing energy for about _____ years. The sun is made up of _____. It is mostly _____, followed by _____ and other gases. The gases give rise to various layers. The outer layer is called the _____ which is very hot. Beneath this layer is the _____ or inner atmosphere. Bursts of _____ travel out from the chromosphere through the corona. Sheets of glowing gases called _____ burst outwards from the sun and can last for days.

39. Beneath the chromosphere is the _____ which is made up of boiling gases. The photosphere is the _____ of the sun and has an average temperature of _____. This region of the sun has dark areas called _____ which are actually cooler than the rest of the of the photosphere. They are in _____ which proves that the sun _____ on average every _____ days. Away from the equator the rotation is much _____.

40. Under the photosphere is a huge region of _____ gases. Closer to the centre of the sun the _____ and _____ increases. This where the nuclear fusion takes place and produces the sun's energy, about _____ degrees celsius.

**Part 5**.

41. Groups of stars that seem to form patterns are called _____ which appear to move across the sky as the Earth turns on its _____. The easiest constellation to find in the sky is the _____ which contains the _____. Name any 11 constellations:

42. Like the sun, the _____ seem to rise in the east, travel across the sky, and set in the _____. One type of motion of the Earth is called _____ or spinning of an object on it axis. One rotation takes _____ hours. It is this motion that makes objects in the sky appear to move.

43. The Earth's axis is an _____ line joining the _____ and south poles of the planet. If it extended northward it would pass through _____, the North Star. We can see this star _____ in Canada. Refer to Figure 14.8 and consider the questions asked

there.

44. The other motion of the Earth is _____ or the movement of one object travelling around another. The Earth revolves around the _____ once a year or 365 days. This motion, combined with the tilt of the axis, causes the _____ of the Earth. It also causes different _____ and _____ to be visible at different times.

45. Many of the constellations were given the names of _____, and from the Greek word Zodion (for animal) they were called the _____. Refer to Figure 14.9 on page 300 of your text. What stars do we see in the northern hemisphere?

46. Predictions based upon the regular movement of objects in the sky have led humans to tell about the _____ and _____ conditions. Some people believe that events in the sky can influence events in a person's life. This is called _____. This is not to be confused with astronomy which is a _____ study of outer space. The first astronomers recorded many detailed _____ of the sky. Astrology is _____ considered a science because it has not been tested through _____ experiments. Instead, astrological observations are based upon beliefs and folk law.

**Part 6**.

47. In the real world, sometimes there are no direct ways to measure certain calculations. One must find a way to _____ distances using an _____ method. You can calculate such things using a method called _____ to determine the distances to some stars and planets indirectly.

48. Triangulation is a _____ of measuring distances using a scaled diagram and a known length called a _____, along with _____ angles measured from the end of the baseline. Refer to Figure 14.13 & 14.14, draw the triangulation models in the space below:

49. The method above _____ be used to calculated long distances. Read the Activity 14E on page 307 of your textbook. It is a simple process to use the triangulation baseline method. One way to obtain a long baseline is to use the _____ of the Earth. Since the Earth rotates on its axis, it takes _____ hours to rotate the diameter of _____ kilometres.

50. The largest baseline possible to observers on Earth is the diameter of the _____. Angles to the stars are taken 6 months apart. Refer to Figures 14.16 & 14.17 on pages 307/ 308 of your textbook and draw the baseline models in the space below:

51. Since the distances and calculations that astronomers must make are so huge, scientists have developed unit of measurement such as the _____ and _____ notation to write very large or small numbers. A light year is the _____ that light rays travel in _____ year. It is not a way to measure _____, but to measure _____. Light travels at _____ or _____ in one year. Wow!

**Part 7**.

52. Scientists use a special device called a _____ to look closely at light given off by the sun and other stars. It _____ light energy into a series of _____ called a _____. One common example you have seen of this is a _____. The usual colours of the rainbow include: _____.

53. When a chemical element is _____, it gives off light energy in a unique _____ when viewed through a spectroscope. The spectrum of a star can tell us about the _____ elements that make up a star, how _____ of the element is present, and how _____ the star is moving towards or away from the Earth. Review Figure 14.21 on page 310 of the text.

54. The _____ of a hot object lets scientists _____ its temperature with other hot objects. A _____ red colour means the temperature is low compared to _____, _____, and the hottest _____. So hot stars have more blue _____ than red light. Describe the classification of stars by using their spectral types:

55. Stars can also be classified by their _____, _____, _____ from Earth, or

their _____. The brightness of a star is called its _____. The Greek astronomer _____ developed a classification of stars by brightness. It was divided into _____ categories ranging from the brightest as _____ magnitude. The faintest stars were called _____ magnitude. Astronomers now use the term in two ways. _____ magnitude refers to brightness as it appears to us. The term _____ magnitude refers to the actual amount of light energy given off and takes into account their distance from Earth.

**Chapter 15, Part 8.**

56. The _____ consists of all the matter and all the energy, as well as the space in between. Ancient astronomers thought that the Earth was _____ and everything else revolved around it. Explain the ancient concept of the Earth-centred universe:

57. Briefly describe the contributions of the ancient Greeks and Chinese to astronomy:

58. About _____ years ago scientific ideas were changing for _____ reasons. One reason was that scientist were starting to use _____ to learn about nature. The other reason was the _____ of the _____ in the early 1600s. Italian scientist by the name of _____ improved the invention and magnified the sky by ____ times.

59. Eventually the Earth-centred view of the universe was replaced by the _____. Briefly discuss the discoveries and contributions made to astronomy by Galileo Galilei:

60. Now we know that the planet revolve around the sun and that the sun is one of countless stars. Astronomers know that other stars are also _____ and are gather into _____ surrounded by gas and dust. The group of stars that our sun belongs to is called the _____ Way Galaxy. A _____ is a collection of gas, dust, and _____ of stars.

61. Past the Milky Way Galaxy is a vast _____ of space that appears to be empty, but the universe is made up of countless _____. See Figure 15.4 on page 322 of the text. The distances between objects in the universe are given different _____. Distances between the _____ in the solar system are called _____. Distances between the stars are called _____ distances and the distances that separate galaxies are referred to as _____.

**Part 9.**

62. Galileo's telescope worked because it _____ or bent light rays as they pass through a light-gathering _____ called a, _____. This type of telescope is called a _____ telescope. It allows more light to be _____, but lenses can not be made any larger than _____ in diameter. Why is this the largest possible?

63. A _____ telescope uses a curved mirror instead of a lens to gather light. The English scientist _____ was the first to use such an instrument. Both the refracting and reflecting telescopes are called _____ telescopes. They may be portable or set up permanently in _____.

64. The Earth's atmosphere _____ with their views of outer space. To minimize the problem, observatories are usually built on mountain tops. Seven extra moons of Jupiter have just been discovered from such an observatory in Hawaii! The _____ air high up helps to absorb and _____ far less light than the _____ air lower down.

65. Recently, scientists have discovered that putting a telescope in space orbit can overcome the problem of the Earth's atmosphere. The _____ was launched to view further into outer space, but it was _____ and had to be fixed by shuttle astronauts.

66. _____ may be used to gather permanent images of space. Pictures can be taken over a period of many _____ and thus we can see images beyond the naked eye! Another device used to explore space is the _____. It separates light into a spectrum of colours. The spectrum we can see is called the _____, but it is only a small part of the broad band of energy called the _____ spectrum. This includes :

67. A device which receives radio waves from stars and galaxies in outer space is called a _____ _____. They look like satellite dishes and can be very large and are made to work in sets called _____. Together they collect signals and data over time to make up maps.

68. Parts of the electromagnetic spectrum become _____ by the Earth's atmosphere and can not be detected from the surface. Satellite observatories, like the _____,

improve our view of space and these images are enhanced back on Earth by _____.

## Part 10.

69. A _____ is a huge collection of _____, _____, and 100s of millions of stars. Stars are attracted to each other by the force of _____ and are constantly in motion. The Milky Way is _____ shaped with a inner region called a _____. Our sun is on the _____ part of the disk. In between there are _____ of stars which indicate the clockwise direction of the motion of the stars about the nucleus.
70. For this reason, the Milky Way is a called a _____. Look at Figure 15.17 on page 332 of your textbook and notice the special type of spiral galaxy called a _____. The only other galaxy you can see from Canada is the _____ Galaxy.

71. What are four types of types of different shaped galaxies found in outer space?

72. A group of stars which are close and travel together are called a _____. They may have as few as _____ stars or as many as a _____ in them. They are smaller than a galaxy but they come in two types. An _____ is a group of _____ stars found in the main part of the Milky Way. They are _____ and _____ together in space. One example is _____ in the constellation _____.

73. The second type of star cluster is the _____ which is made up of approximately a million stars outside the main part of the Milky Way. See Figure 15.20 & 21 in your textbook. Astronomers have found about _____ globular star clusters around the Milky Way. Much of the pioneer work was done by Canadian astronomer _____. Read her profile.

## Part 11.

74. A _____ is a spread-out cloud of interstellar _____ or _____. It comes from the Latin word for _____! They are both bright and dark nebulas, although they are unique in shape and colour. We can see objects either because it _____ its own light energy, or _____ light. This is the same for Nebulas. Look at the example found in Figure 15.22 on page 336 of your textbook. _____ is found in the summer constellation _____. Dark patches are composed of mostly _____.

75. Other unusual objects in space include: _____, _____, and _____. Massive , high energy objects in outer space are called _____. These are not a star or a galaxy, but have some of the characteristics of both. They are strong _____ of radio waves, appear as a faint star, yet produce huge amounts of _____. Scientists think that they are the _____ and most _____ sources of universal energy.

76. _____ are a pulsing source of radio waves that do not move in the sky, they may also be called _____. What is a pulsar and why does it send out pulses of energy?

77. A _____ is an extremely small, _____ core of a star. It has a _____ force of gravity and pulls everything near towards it. It even pulls _____ toward it so that it can't be seen! Scientists only know of their existence through _____.

**Chapter 16, Part 12.**

78. A _____ is a series of actions repeated in the same order every time. The life cycles of stars may take _____ of years to happen. Stars begin their lives in _____ or huge clouds of dust and gas. This dust and gas forms _____ attracted by gravity and becomes tightly packed. Eventually the clumps give off enough energy and become stars.

79. New stars are usually very _____ at first and are _____ or _____ in colour. The life cycle of a star depends upon its _____. Low mass stars may live for _____ billion years, while medium mass stars like our sun may live for _____ billion years. High mass stars have a much shorter life, perhaps only a _____ million years.

80. When a star source of energy runs out it cools and swells up into what is called a _____. Their outer layers _____ and they shrink into what is called a _____. These are very dense and eventually they just fade away. High mass stars end their life cycle in a different way. They swell into _____ and then they explode in what is called a _____. A supernova leaves behind a _____ of dust and gas. At the centre of this is a small _____ called a _____.

81. Read Figure 16.4 on page 346 of your textbook. Describe the life cycle of high-mas stars:

82. Read Figure 16.5 on page 347 of your textbook. Using a diagram, what possible stages were in the formation of the solar system? Why are the so called "minor bodies" of special interest?

83. The study of the origin and changes of the universe is called _____. Longer light wavelengths indicate that the galaxy is moving _____ from you is called a _____. Scientists use the _____ theory to explain the universe beginning from a very dense, hot mass, under _____ pressure. This mass eventually exploded sending out intense _____. Another theory called the _____ theory suggests that the universe _____ and _____ until another cycle repeats itself. We still know very little about how the universe began, but we do know that _____ are still the building blocks of life which form proteins and all living things.