**How Big is Our Universe? (Measuring Distance in Space)** Name:

Date:

Block:

After completion of the scale models of the planets, answer the following questions:

1. Solar system objects are typically described as inner and outer. Based on your scale models, describe what you notice about the:

(a) size of the inner planets compared with the outer planets inner planets much smaller than outer planets

(b) distances to the outer planets compared with the inner planets distances between outer planets much greater than distances between inner planets.

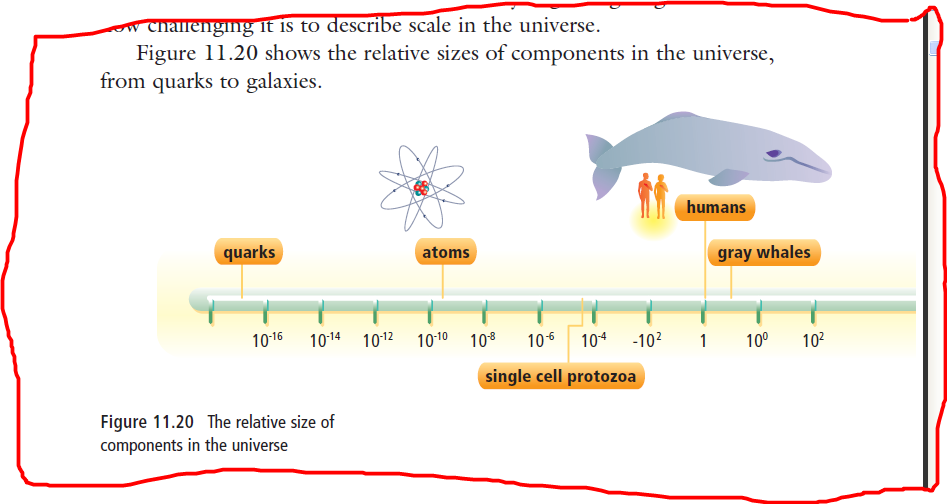
1. How do the distances between the inner planets compare with the distances between the outer planets?\_distance between outer planets way bigger than distance between inner planets.

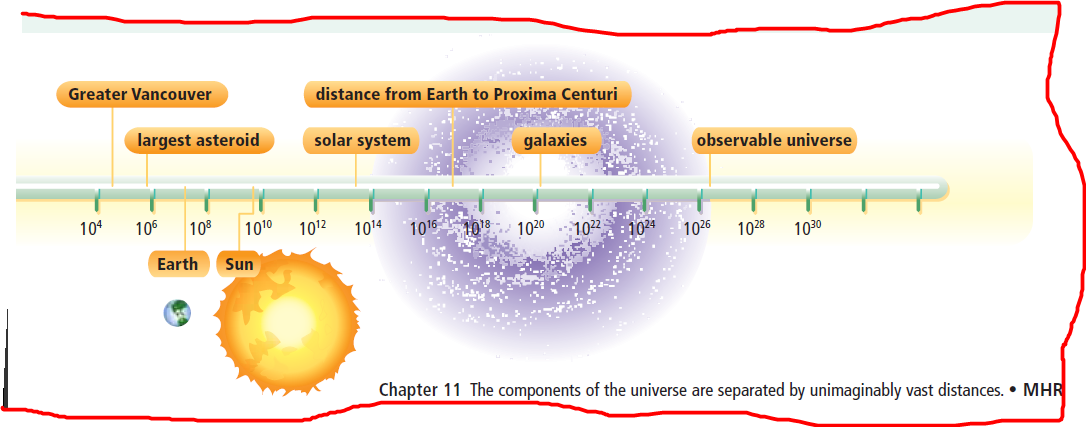
***(Refer to pp. 396- 404 in BC Science 9).***

* It is difficult to understand the immense size and scale of the universe. Watch this video to give yourself a better understanding of just how immense the universe is.

<https://www.youtube.com/watch?v=1Eh5BpSnBBw>

* Check out the scale below: ex. If the size of a human is 1, then the observable universe is about 1026. This video and simulation gives you an idea of how this works. <https://www.youtube.com/watch?v=bhofN1xX6u0>
* Check out some of the very large and very small object in our universe shown in the simulation! <http://htwins.net/scale2/>





***(Refer to pp. 396- 404 in BC Science 9).***

Just as you wouldn’t use millimeters to measure the distance from Vancouver to New York, measuring distances in space in kilometers can be meaningless. We therefore need to use other units of measurement: **Astronomical Units (AU’s)** and **Light Years**

Check out this video on how distances are measured in space – the questions below are based on this video <https://www.youtube.com/watch?v=Op3AYaJc0Xw>

1. About how far can light travel in one year? about 6 trillion miles
2. The moon is only 1 light second from earth. What does that mean? It takes light one second to get from the moon to earth.
3. Trigonometric Parallax is used to measure the distance of objects no more than a thousand light years away. What is the method called for measuring objects even farther away? Standard Candles
4. How long will light from the sun take to reach us? \_8 minutes
5. “The further we can look back, the younger the universe we are probing.”

**UNITS FOR MEASURING DISTANCE:**

* + - * Within our solar system: Astronomical Units (AU’s)
      * Outside our solar system: Light Years

**ASTRONOMICAL UNIT**

* 1 AU = the mean distance between the Earth and the Sun (approx. 150 million km)
* Ex. Jupiter is 5.27 AU’s from the Earth so therefore is 790.5 million kilometers (5.27 AU x 150 million km/AU)

**LIGHT-YEARS**

* It is the distance that light, which moves at 300 000 km/s, travels in a year. It is equal to about
  + - * 1 ly =9.5 trillion km (or 6 trillion miles as mentioned in the video)
      * Ex. The Andromeda galaxy is 2.5 million light-years from Earth!

***Answer the following questions.***

1. An astronomical unit (AU) is the average distance between Earth and the Sun. Explain why the distances between bodies in the solar system are measured using AUs.

Because it is a reasonable unit based on the distance of objects within our solar system. It is a unit larger than kilometres and smaller than light years.

1. The moon is at an average of 384,400 km from Earth. How many AU’s is this?

I AU = 150 000 000 km so 384, 400/150 000 000 = 0.0026 AU

The moon is 0.0026 AU from Earth

1. Andromeda (the nearest galaxy to the Milky Way) is said to be 2.5 million light years away. How many kilometers is that?

1 Light Year = 9.5 trillion km so 9.5 trillion km x 2.5 = 23.75 trillion km away

Andromeda is 23,750,000,000,000 km.