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**Activity 3: Defining the Habitable Zone**

The planets in our Solar System orbit the Sun at very different distances. Scientists have developed a system for describing distances in our Solar System based on the average distance between Earth and the Sun. The Astronomical Unit (AU) is approximately 149,570,000 kilometers (the average Sun-Earth distance). The distances between objects in our Solar System are measured using the AU as the common unit of distance. The table below provides the planet's name and average orbital distance to the Sun.

A. Convert the distances from km to AU for each of the planets in our Solar System.

|  |  |  |
| --- | --- | --- |
| **Planet Name** | **Distance to Sun in km** | **Distance to Sun in AU** |
| Mercury | 57,950,000 km |  |
| Venus | 108,110,000 km |  |
| Earth | 149,570,000 km |  |
| Mars | 227,840,000 km |  |
| Jupiter | 778,140,000 km |  |
| Saturn | 1,427,000,000 km |  |
| Uranus | 2,870,300,000 km |  |
| Neptune | 4,499,900,000 km |  |
| Pluto | 5,913,000,000 km |  |

B. Construct a scale model of our Solar System. Mark a large dot to represent the Sun at one end of your scale model. Then place dots at the correctly scaled distances away from the Sun to represent each of the nine planets. Your teacher will have further instructions on how to complete this activity.

The presence of liquid water at the surface of a planet appears to be one of the central characteristics that distinguishes whether or not a planet can harbor life. This requires that the planet be at a distance from the central star where the temperature is not too low to cause all water to freeze nor too high to cause all water to boil. The region around a star where the temperature is "just right" is known as the *zone of habitability*. For a star like our Sun the zone of habitability has been identified as between .84 AU and 1.7 AU.

C. Mark the zone of habitability on your Solar System scale model.

D. Which of the planets in our Solar System may have the potential for liquid water on the surface? Explain how you can tell.

E. Is the Moon in the zone of habitability? Does the Moon have liquid water on the surface? Why, or why not?

F. Describe how the location of the zone of habitability would change if the central star's temperature was to increase.