Question 10

For each of the following scenarios, refer to Figure 1.4 and Table 1.2 to determine which metric prefix on the meter is most appropriate for each of the following scenarios. (a) You want to tabulate the mean distance from the Sun for each planet in the solar system. (b) You want to compare the sizes of some common viruses to design a mechanical filter capable of blocking the pathogenic ones. (c) You want to list the diameters of all the elements on the periodic table. (d) You want to list the distances to all the stars that have now received any radio broadcasts sent from Earth 10 years ago.

Solution

Part (a)

According to Figure 1.4, the diameter of the solar system is 10^{13} m. The appropriate prefix is tera-.

Part (b)

According to Figure 1.4, the diameter of a typical virus is 10^{-7} m. The appropriate prefix is nano-.

Part (c)

According to Figure 1.4, the diameter of a hydrogen atom is 10^{-10} m. The appropriate prefix is pico-.

Part (d)

Note that radio waves are a form of electromagnetic radiation, which travels at the speed of light. According to Figure 1.4, the distance light travels in one year is 10^{16} m; in ten years the distance light travels is 10×10^{16} m $= 10^{17}$ m. The appropriate prefix is peta-.