**Little Things  
Mean a Lot**

The information about Earth’s solar system is very detailed and perhaps confusing at times. Why does all this matter?—is it really important that Earth is 149.6 million kilometers from the Sun? Or that Earth’s surface gravity is much less than that of Jupiter? Or that the Moon is 382,400 kilometers from Earth?

These details do matter. They matter because it is the balance of many factors—mass, distance, from the Sun, rotation rate, and other factors—that make life as we know it possible on Earth. These factors also make Earth, the other planets, and the Sun work together as a system.

Two scientists in the 1960’s, Stephen Dole and Isaac Asimov, described the importance of “little things” in a book called, *Habitable Planets for Man.* In it they talk about how life on Earth would be different if some things were changed. Let’s look at a few of their predictions:

**Example #1: What if Earth was twice as massive?**

Greater mass would mean a greater surface gravity. This would have a significant effect on planet and animal life. Trees would be shorter and have thicker trunks. Animals would have heavier legs bones and muscles. Mountains would not be as high because they would not have the strength to support their weight. Waves in the ocean would be lower, and erosion would be faster.

**Example #2: What if Earth was closer to the Sun?**

If Earth’s average distance from the Sun were 10% less than it is now, less than 20% of Earth’s surface would be habitable. The habitable areas would lie in two bands between latitudes 45° and 64° North and South of the equator. A broad area of extremely high (intolerable) heat would separate these two bands. There would be no polar ice, and the levels of the oceans would be higher.

**Example #3: What if Earth rotated once every 100 minutes, rather than every 24 hours?**

Temperature differences between day and night would be extreme. The Sun would seem to crawl across the sky. Few forms of life would be able to tolerate the intense heat of the long days and the bitter cold of the long nights.

**Example #4: What if the Moon was much closer—for example, about 152,000 kilometers away from the Earth, instead of 384,400 kilometers away?**

If the Moon were much closer to Earth, tidal forces might be strong enough to halt the rotation of Earth with respect to the Moon. A day on Earth would last a month, and Earth would be uninhabitable.

On the other hand, if the Moon were 713,600 kilometers away, Earth could not hold it in orbit. Organisms dependent on the rhythm of the tides would die out, and nights would always be dark.

As we can see from these predictions, life on Earth is possible only because of a delicate balance that exists in the solar system.

**Questions:**

1. Which of Earth’s characteristics allow life to exist on the planet?

2. How might Earth change if any of its conditions were even slightly different?

3. Examine the planet you studied for your planet travel brochure. What conditions would you have to change on the planet for life to exist on it?