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**Tour of Earth’s Atmosphere**

Earth’s atmosphere consists of all the gases that surround the planet. The atmosphere is mainly nitrogen (78%) and oxygen (21%). The remainder of the atmosphere is made up of other gases and particulates, including argon, carbon dioxide, methane, and water vapor. The atmosphere remains in place around our planet due to the force of gravity exerted by Earth. The atmosphere can be divided into five layers. These layers differ in terms of temperature, density, pressure, and composition. The five layers of the atmosphere have unique characteristics that make life on Earth possible.

**Troposphere**

You don’t even have to leave the surface of the Earth to interact with the first atmospheric layer. The troposphere is the layer of the atmosphere closest to the Earth. The troposphere varies in thickness from 6 to 20 km. It extends farther into the atmosphere at the equator than at the poles. The troposphere is the least thick layer but it contains most of the total mass of the atmosphere. The density of gases within the troposphere decreases with increasing altitude. Similarly, the temperature within the troposphere decreases as the altitude increases. Many familiar things occur in the troposphere. Most cloud formation and weather events occur within the troposphere. The troposphere is also the layer that contains birds, insects, and other flying animals. Hot air balloons also fly within the troposphere.

**Stratosphere**

The layer above the troposphere is the stratosphere. The stratosphere stretches from the top of the troposphere to about 50 km above Earth. In the stratosphere, temperature begins to increase with increasing altitude. This is due to a high concentration of ozone within the stratosphere. Sometimes we call this area the “ozone layer.” The ozone layer is a layer within the stratosphere. Ozone is a molecule made up of three oxygen atoms. The oxygen gas (O2) that we breathe is made up of two molecules of oxygen. Ozone (O3) can form in the presence of ultraviolet radiation from the sun. This type of radiation can break the bonds in an O2 gas molecule to form single oxygen atoms. Then, some of these single oxygen atoms can combine with existing oxygen gas molecules to form ozone. Ozone molecules absorb UV radiation from the sun and this leads to temperatures that increase with increasing altitude within the stratosphere. Because the air in the stratosphere is 1000 times thinner than the air at sea level, weather balloons that are used to monitor atmospheric conditions are usually sent up to fly within this layer. Weather balloons can operate at up to 40km above the Earth’s surface. They carry instruments that help scientists predict weather patterns.

**Mesosphere**

The mesosphere reaches from the top of the stratosphere to about 85 km above Earth’s surface. The gas particles in the mesosphere are becoming further and further apart. Since there are not as many gas particles to absorb energy from the sun, the air temperature decreases with altitude. The temperatures drop so low, that the mesosphere is the coldest layer of our atmosphere. Millions of meteoroids, or rocks from space, enter Earth’s atmosphere. The upper layers of the atmosphere do not contain enough gas particles to create the friction that burns the meteors up. However, the gases in the mesosphere (although very thin) are still thick enough to create the friction needed to cause them to burn up. The burning up of meteors creates fiery trails in the night sky, also known as shooting stars.

**Thermosphere**

The atmospheric layer above the mesosphere is the thermosphere. The thermosphere stretches from the top of the mesosphere to around 600km above Earth. Temperature increases with altitude in the thermosphere. There are even pockets within the thermosphere where temperatures can reach over 1,000°C. Below 300km, is a region of the thermosphere called the Ionosphere. A phenomenon called the aurora occurs within this region. The auroras are colored or shimmering lights that appear in the sky at night and are caused by energized particles from the solar wind colliding with atoms within the thermosphere. The thermosphere is also where the waves that are given off by radio towers travel.

**Exosphere**

The atmospheric layer above the thermosphere is the exosphere. The exosphere is the uppermost layer of Earth’s atmosphere. The exosphere runs from the top of the thermosphere to about 10,000km above the Earth. Temperatures in the exosphere increase with increasing altitude. It is possible for gases in the exosphere to escape Earth’s gravitational pull and enter outer space. Satellites and the international space station orbit Earth within the exosphere.