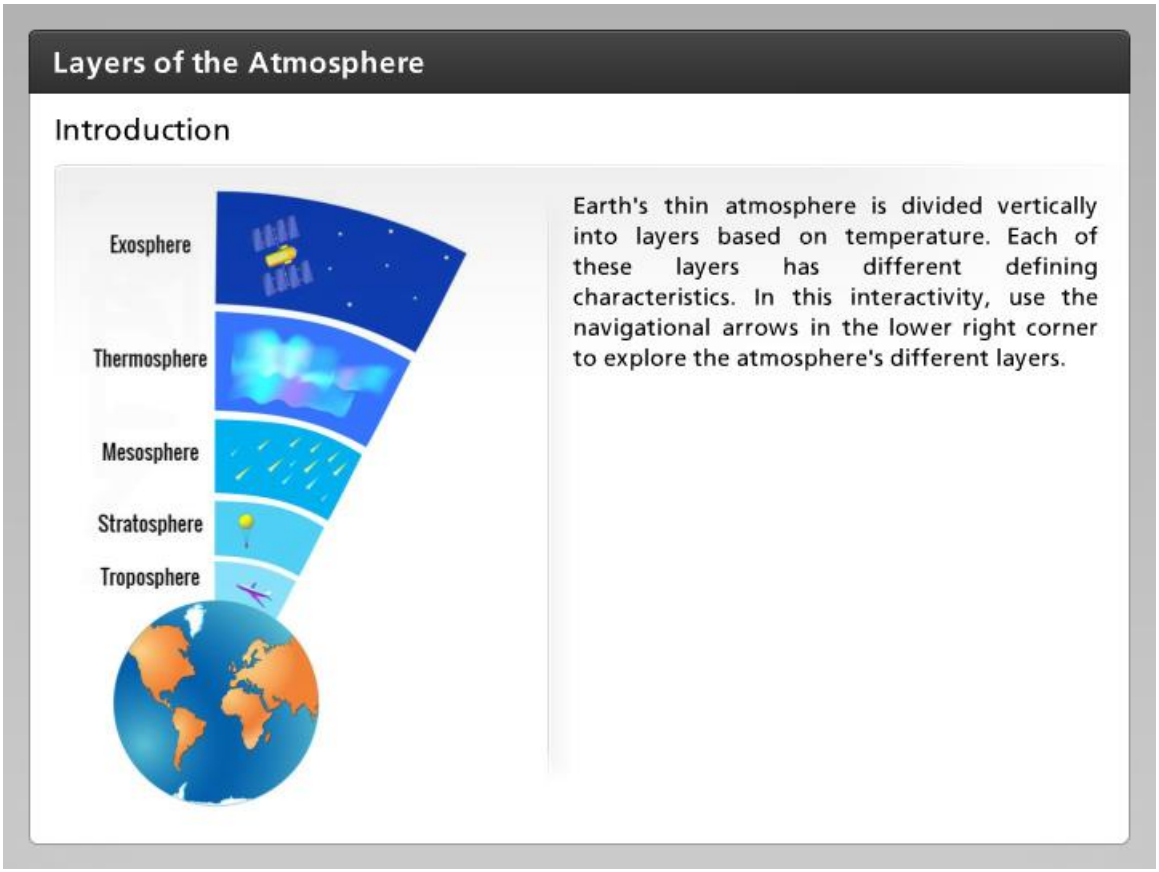
Module 11: Meteorology
Topic 1 Content: Layers of the Atmosphere Notes

Introduction



Earth's thin atmosphere is divided vertically into layers based on temperature. Each of these layers has different defining characteristics. In this interactivity, use the navigational arrows in the lower right corner to explore the atmosphere's different layers.

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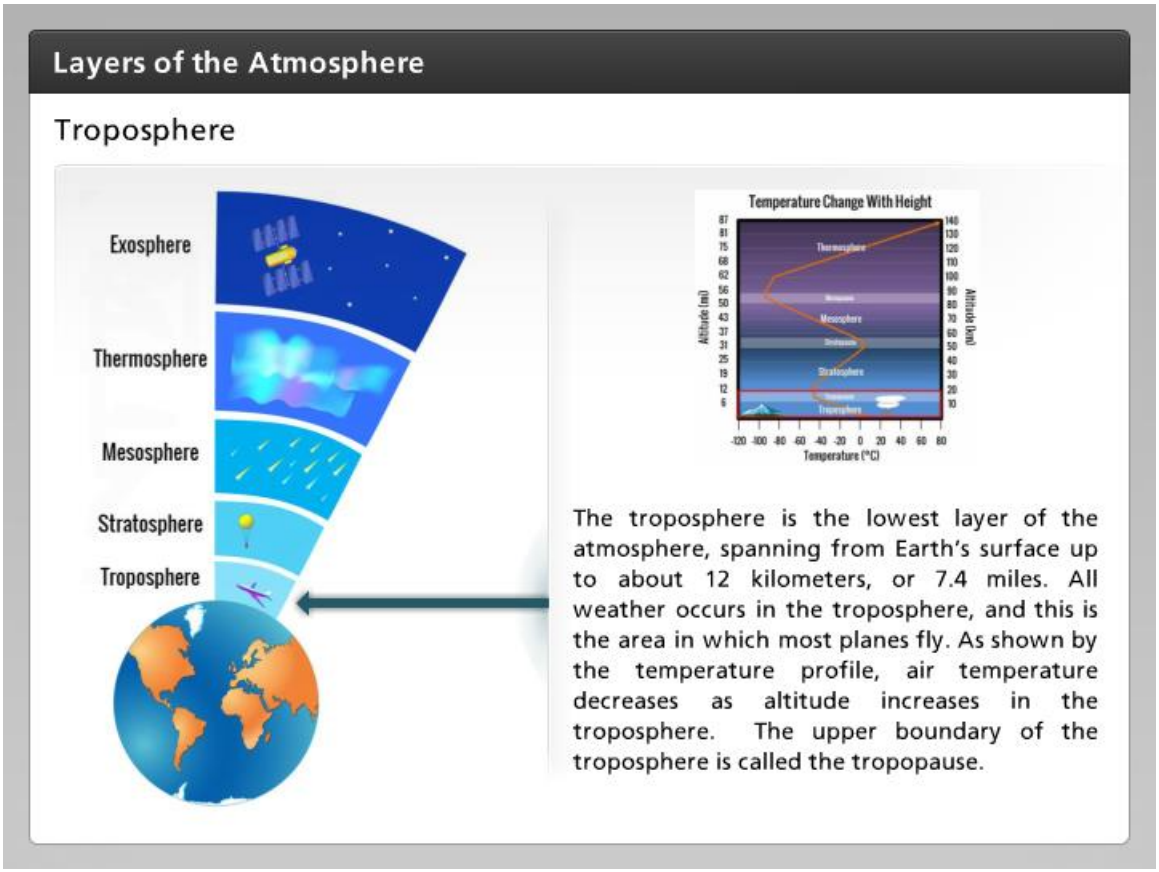
Troposphere



The troposphere is the lowest layer of the atmosphere, spanning from Earth's surface up to about 12 kilometers, or 7.4 miles. All weather occurs in the troposphere, and this is the area in which most planes fly. As shown by the temperature profile, air temperature decreases as altitude increases in the troposphere. The upper boundary of the troposphere is called the tropopause.

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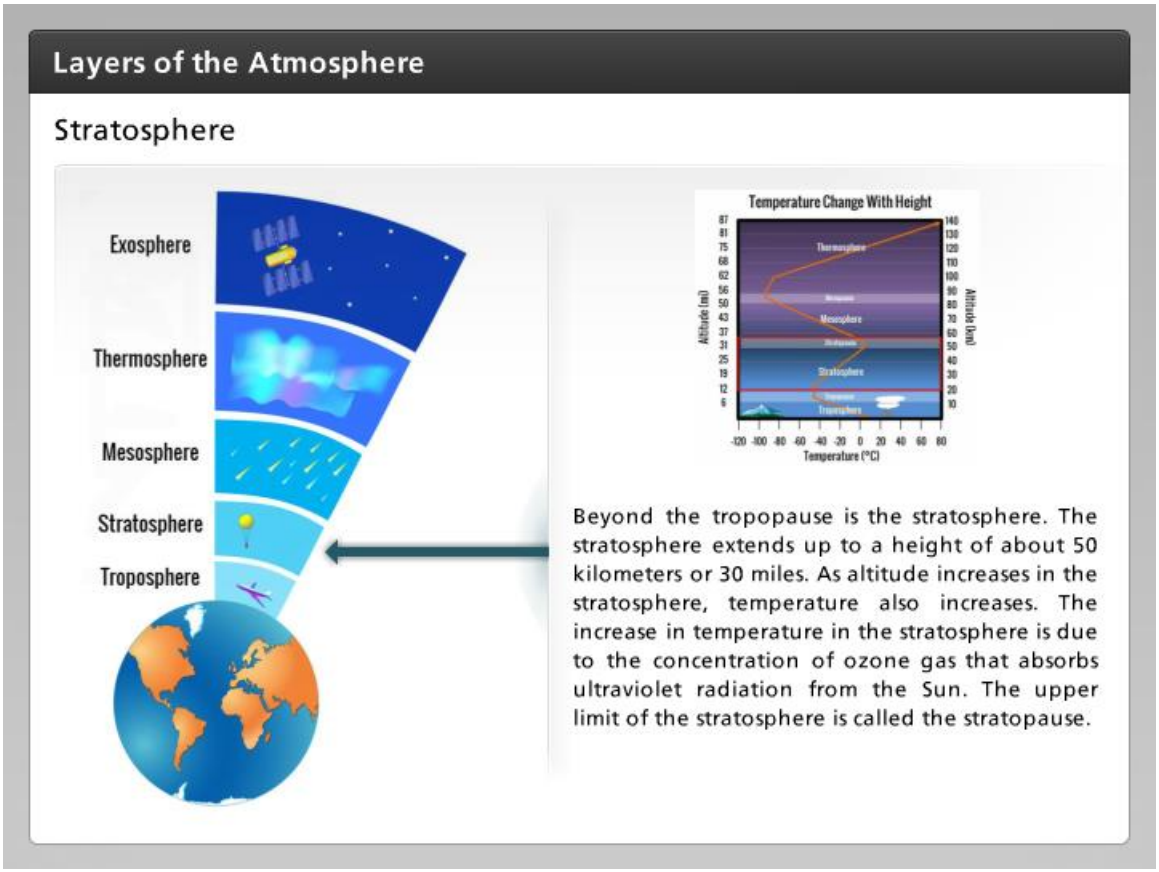
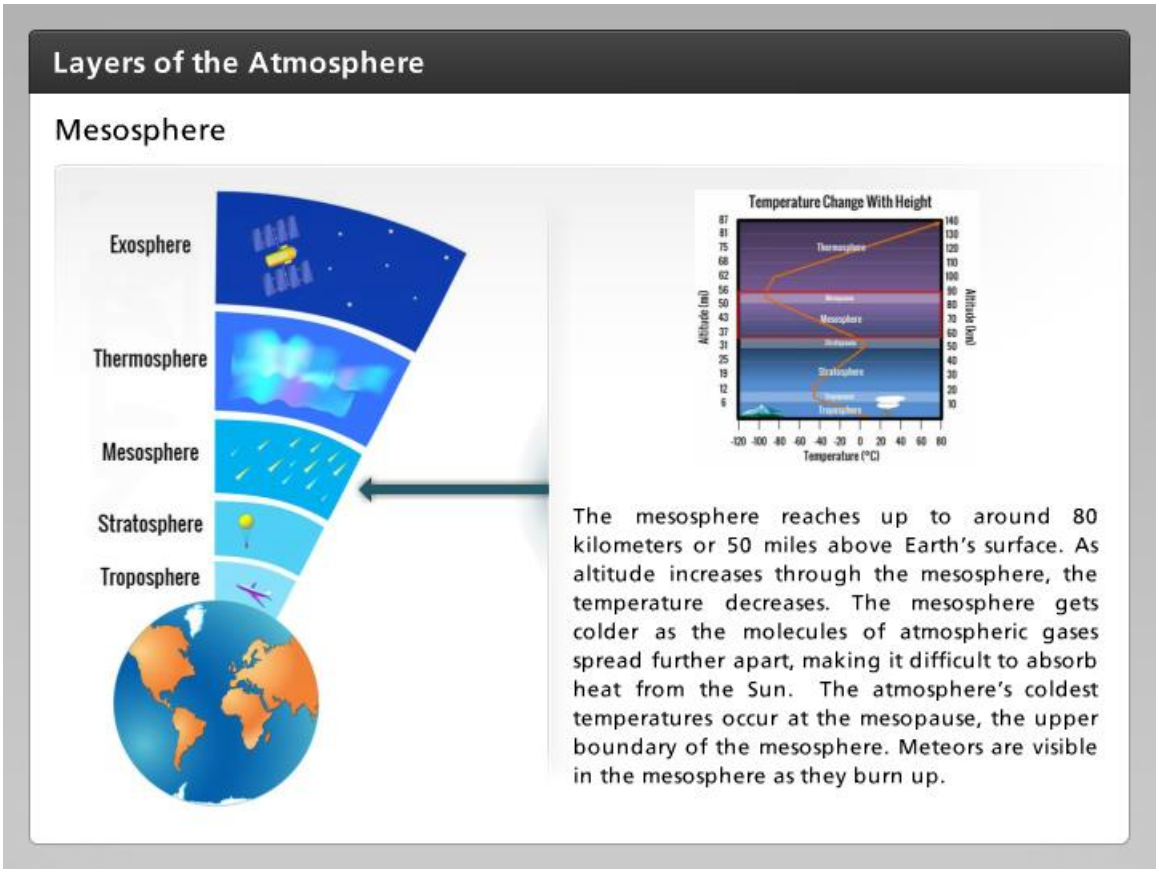
Stratosphere



Beyond the tropopause is the stratosphere. The stratosphere extends up to a height of about 50 kilometers or 30 miles. As altitude increases in the stratosphere, temperature also increases. The increase in temperature in the stratosphere is due to the concentration of ozone gas that absorbs ultraviolet radiation from the Sun. The upper limit of the stratosphere is called the stratopause.

Mesosphere



The mesosphere reaches up to around 80 kilometers or 50 miles above Earth's surface. As altitude increases through the mesosphere, the temperature decreases. The mesosphere gets colder as the molecules of atmospheric gases spread further apart, making it difficult to absorb heat from the Sun. The atmosphere's coldest temperatures occur at the mesopause, the upper boundary of the mesosphere. Meteors are visible in the mesosphere as they burn up.

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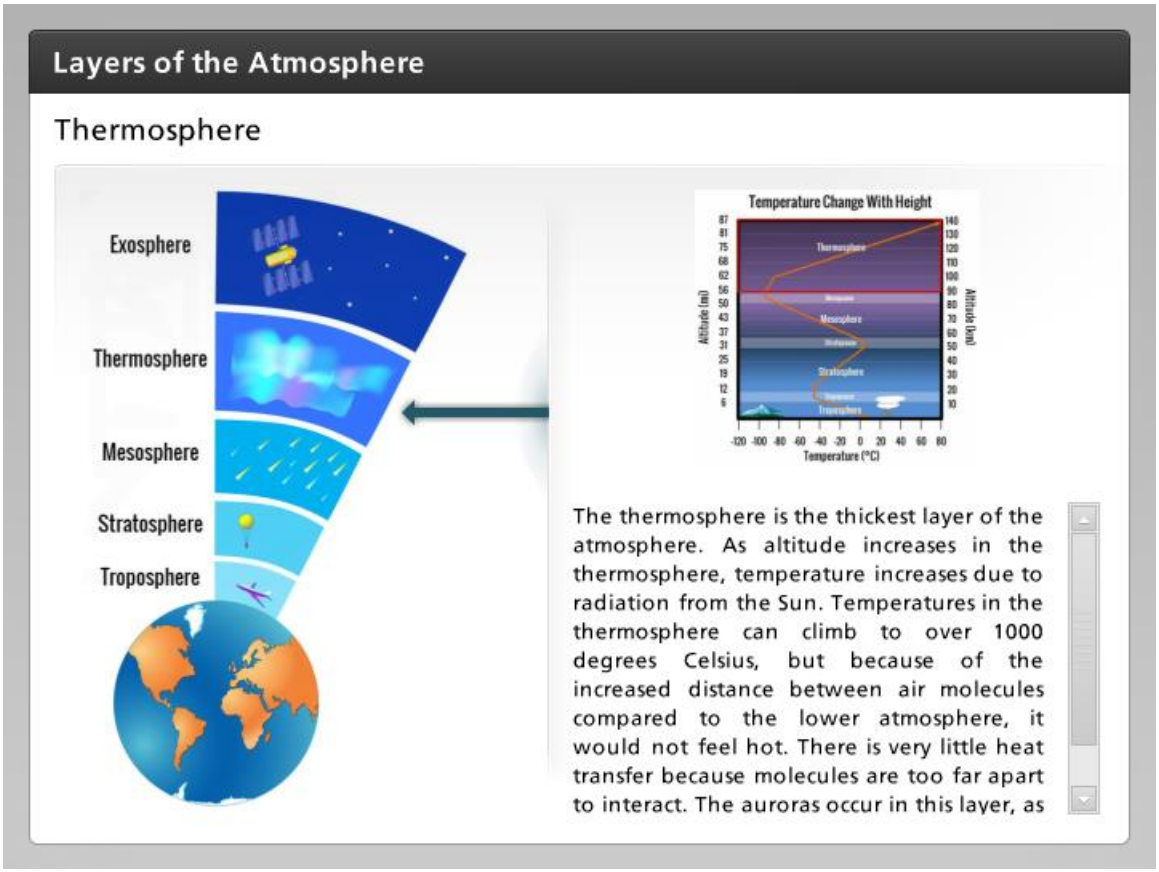
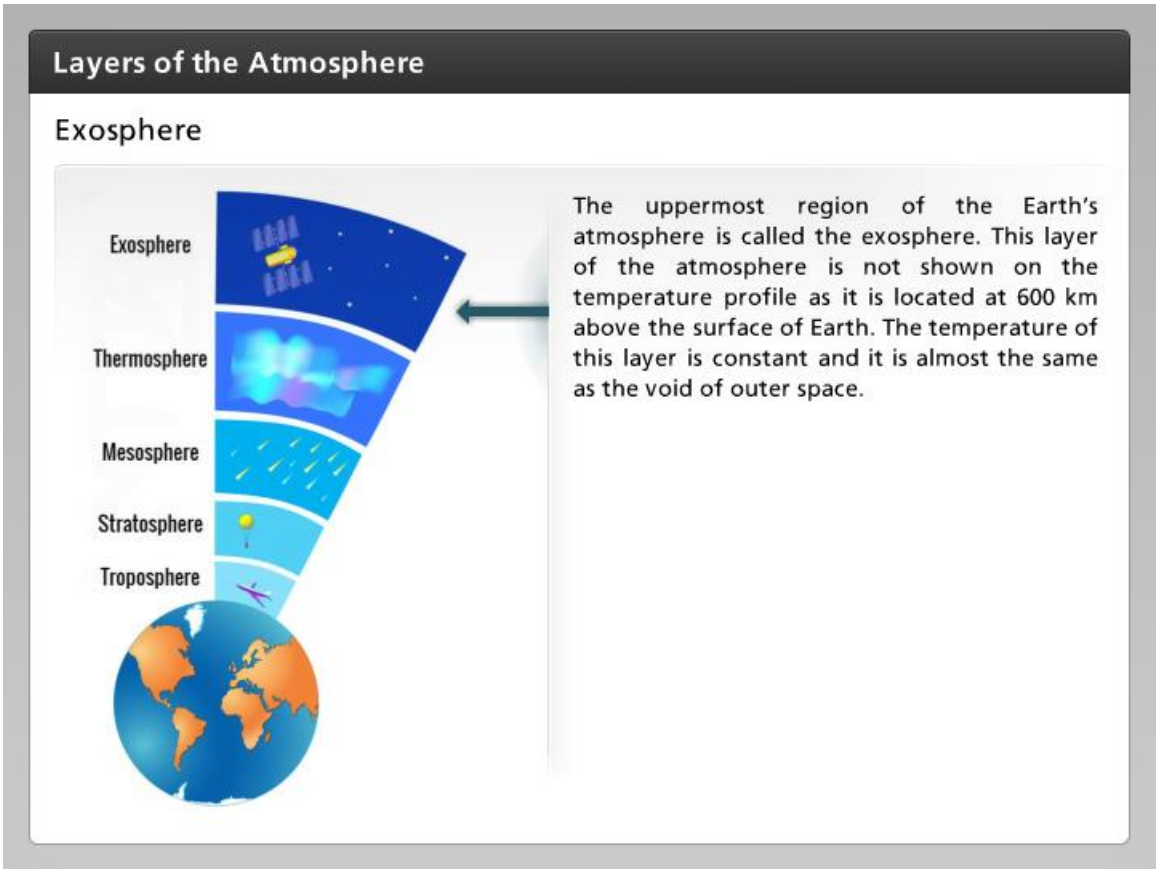
Thermosphere



The thermosphere is the thickest layer of the atmosphere. As altitude increases in the thermosphere, temperature increases due to radiation from the Sun. Temperatures in the thermosphere can climb to over 1000 degrees Celsius, but because of the increased distance between air molecules compared to the lower atmosphere, it would not feel hot. There is very little heat transfer because molecules are too far apart to interact. The auroras occur in this layer, as solar radiations strikes freely floating ions.

Exosphere



The uppermost region of the Earth's atmosphere is called the exosphere. This layer of the atmosphere is not shown on the temperature profile as it is located at 600 km above the surface of Earth. The temperature of this layer is constant and it is almost the same as the void of outer space.