

MAKE A 4-LAYER MODEL OF OUR ATMOSPHERE

This is a modified activity from UCAR <https://scied.ucar.edu> and NOAA www.nesdis.noaa.gov

MATERIALS:



- 1 yard (3 feet or 36 inches) of string or yarn
- Ruler, yard or meter stick, or tape measure with millimeter and centimeter markings
- Marker
- Tape
- Scrap paper or cut out descriptions

Directions:

1. Review the “Atmospheric Layer Thicknesses” chart below.
2. Stretch out your string flat—tape it down if you have to.
3. Measure 10 mm from the end of the string, and draw a dot on the string. This represents our Troposphere.
4. From the 10 mm dot, measure 40 mm more, and make another dot on the string. That’s the Stratosphere.
5. From the top mark (50 mm), measure another 30 mm and mark the string. That’s the Mesosphere.
6. Finally, from the top mark (80 mm) measure another 700 mm. and mark the string. This is the Thermosphere.
7. Cut the string a little bit after the last mark, which should be at 78 centimeters (about 30 inches).
8. Use your own, or cut up the descriptions below for each layer, and tape it in between marks on the string.

Atmospheric Layer	Model Thickness	Top of layer	About the Real Thickness
Troposphere	10 mm (1 cm)	10 mm (1 ½ cm)	10 km or 6 miles
Stratosphere	40 mm (4 cm)	50 mm (6 ½ cm)	40 km or 25 miles
Mesosphere	30 mm (3 cm)	80 mm (8 cm)	30 km or 19 miles
Thermosphere	700 mm (70 cm)	780 mm (78 cm)	700 km or 435 miles
Total thickness of all layers from Earth’s Surface			789 km or 485 miles

KEY to Measurement Units

NOTE: in the model 1 millimeter (mm) = about 1 kilometer (km) of actual atmosphere

Real measurements:

- 1 km = about 2/3 a mile or 3,280 feet
- 10 mm = 1 centimeter (cm) = a little more than 1/3 inch
- 100 cm = 1 meter (m) = about 39 inches
- 1000 m = 1 km
- 6,378 km = distance from the center of Earth to its surface (3,963 miles)



The **troposphere** is where we live, and has the air we need to breathe. The air is made of nitrogen, **oxygen**, and **carbon dioxide**. Most our weather happens here. This is where you’ll find airplanes.

The **stratosphere** is the layer above where we live. It is very dry, with very few clouds, and no storms to mix up the air. Weather and scientific balloons can be found floating here.

The **mesosphere** has “thin” air, which means we wouldn’t be able to breathe there. This is also the coldest layer of the atmosphere. Meteors (shooting stars) burn up here.

The **thermosphere’s** temperature can range 200° to 2,000°F because it absorbs lots of heat energy from the Sun. Luckily, the International Space Station and satellites orbit Earth from the lower, cooler parts. Space travelers experience weightlessness here.

from [Peeling Back the Layers of the Atmosphere](#) | NOAA National Environmental Satellite, Data, and Information Service (NESDIS)

