

# The Layers of the Atmosphere

The first layer of the atmosphere, called the troposphere, is made out of the gases that we breath everyday. It is the layer that we live in and the layer of where most of our weather forms. Airplanes usually fly int eh troposphere. The next layer of our atmosphere is called the stratosphere. Above the stratosphere lies the mesosphere, followed by the thermosphere. The lower part of the thermosphere, from 80 to 550 km above the Earth's surface, contains the ionosphere. (Not technically a layer of the atmosphere, but a division inside a layer) Beyond the ionosphere extending out to perhaps 10,000 km is the exosphere or outer thermosphere, which gradually merges into space. (So, the exosphere is technically still considered part of the thermosphere.)

In order to help scientists identify the border between each of these layers, scientists have given special names to the boundaries between a number of them. The boundary between the troposphere and the stratosphere is referred to as the tropopause. The border between the stratosphere and the mesosphere is called the stratopause. And the line separating the mesosphere from the thermosphere is called the mesopause. These boundaries are not a visible border. If you were traveling by rocket ship you would not see any sudden changes like in our cake model we will be making. Instead, the change is gradual. Also, unlike our cake model, the layers of the atmosphere are spheres that circle the earth as shown the clay model in Lesson 2.

Sources:

Lesson 1 Layer Cake & Jello Model – Original idea of DDB

Lesson 2 – Clay Layers – Original idea of DDB

Lesson 3 - Layer Bracelet - Original idea of DDB

text : <http://www.kidsgeo.com>

[http://www.ace.mmu.ac.uk/eae/atmosphere/Older/Atmosphere\\_Introduction.html](http://www.ace.mmu.ac.uk/eae/atmosphere/Older/Atmosphere_Introduction.html)

# Lesson 1 - Atmosphere Layer Cake



**Amount**

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- 2 boxes
- 5 cake pans
- 1 bowl
- blue coloring
- yellow coloring
- white icing
- chocolate icing
- star sprinkles

**Ingredient -- Preparation Method**

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- White Cake mix
- smaller pans for thicker layers work best (I used round)
- medium size
- paste coloring works best
- paste coloring works best
- enough for between the layers
- enough for the outside of the cake
- if you what to add

Mix the first cake according to the directions. Add blue paste coloring to make a light blue. Add about a ¾ a cup of the batter to the medium bowl. Pour the remainder into 2 pans. Cook the first 2 cake layers. Mix the second cake mix. Pour about ¾ a cup in the bowl with the first batter you set aside. Add blue paste to the remaining batter making the blue a little darker than before. Pour this dark blue batter into 2 cake pans. Add a little yellow paste coloring to the batter in the bowl. Pour the green batter into a cake pan.

After the layers have cooled assemble them according to the diagram.

## Jello Version

Amount	Measure	Ingredient -- Preparation Method
5	3oz pkgs	Jello – 4 blue, 1 green
7	envelopes	Knox gelatin
7	cups	hot water
1	can	condensed milk, sweetened

You need 2 molds. I suggest recycling 2 liter, clear bottles. Cut the top off and clean well before using. You might do one mold and pour the extra in a baking dish. That way you have control over your layer sizes. Coat the inside of both molds with a thin layer of mayonnaise to help removing the jello layers from the mold later.

Mix condensed milk with 1 cup hot water. Next mix 2 packages Knox gelatin with 1 cup hot water. Then combine the two mixtures.

Mix each jello package with 1 Knox gelatin package and 1 cup hot water in it's own separate bowl. (It's much easier to pour each layer from a separate bowl) Keep at room temperature and cover with plastic wrap. (It's best to wait on the last 2 blue layers until you are closer to pouring them)

Pour first layer of jello in molds. (Green - ½ of mixture in each) Refrigerate 15 mins. (or more if needed) The mixture should not be fully set or the next layer will not stick but should be solid enough so they don't mix together. To help keep the partially set jello unharmed pour the following layers into a spoon and let the mixture gently overflow onto the jello layers. The next layer is a blue jello layer. Allow this to set in the refrigerator for approximately 15 mins. Follow with 1 cup of the condensed milk mixture (about ½ cup in each or less if desired. Judge according to how your layers are looking. You want this to be a thin layer) Refrigerate approx. 15 mins. (You might find that later layers need less refrigeration to set and be ready for the next layer.) Continue alternating blue jello and milk mixture following the list below:

Jello - blue
Condensed milk mixture
Jello- blue
Condensed milk mixture
Jello - blue
Condensed milk mixture
Jello - blue
Jello – Green

Once you have completed all layers let it set for at least 3 hours. Then have the students label the outside of the mold with stickers that name the layers and divisions. When you are ready remove it from the mold into a baking dish and enjoy! (Dip mold in warm water up close to the top edge for a minute if the jello doesn't slide right out of the mold. Repeat if necessary.)

# Lesson 2 – Clay Model of the Atmosphere

Sculpty Brand Modeling Clay in the colors of: Blue, white and green

**Step 1:** Make a pea to marble sized model of the earth. (Small is good. As you add layers it can get big and take a lot of clay if you don't start out small.)

**Step 2:** Mix a marble sized amount of white Sculpty with a pea sized amount of blue Sculpty

**Step 3:** Roll out the blue mixture about  $\frac{1}{4}$  thick and gently wrap a layer around the earth marble. This is the troposphere.

**Step 4:** Roll out a thin layer of white and gently wrap around the earth marble (Which is light blue at this point, soon to be white) This is the Tropopause.

**Step 5:** Mix a darker blue than the first time and roll out and add to the earth marble. This is the Stratosphere.

**Step 6:** Roll out a thin layer of white and gently wrap around the earth marble. This is the Stratopause.

**Step 7:** Mix a darker blue than the first 2 blue layers. Roll out and add to the earth marble. This is the Mesosphere.

**Step 8:** Roll out a thin layer of white and gently wrap around the earth marble. This is the Mesopause.

**Step 9:** Mix the darkest blue yet. Roll out a layer and add to the earth marble. This is the Thermosphere.

According to your curriculum adjust or add layers as needed.

**Step 10:** Carefully cut in two sections. If you have a sharp knife you can cut at an angle and leave the earth rounded.

Note: you will find the layers are not perfectly defined. The purpose of the project is to understand the layers are spherical. Therefore, the process is the most important part. Make sure you discuss the names of each layer as you add them to your marble.

Cook according to the directions on the back of the Sculpty package. (Or mix a nice light blue and put it away for use in another project!)

# Lesson 3- Atmosphere Layers Bracelet

Materials:

White, Green, black and blue pony or 8mm faceted beads.

Elastic cord

Follow the pattern below. (Add or subtract black beads as needed to fit student)



Use this exercise to reinforce the layer order.

	The earth
	troposphere
	tropopause
	stratosphere
	stratopause
	mesosphere
	mesopause
	thermosphere
	outer space

Adjust as needed to match the curriculum you are teaching. Some sources include the ionosphere and exosphere as layers. Others teach them as part of the thermosphere.