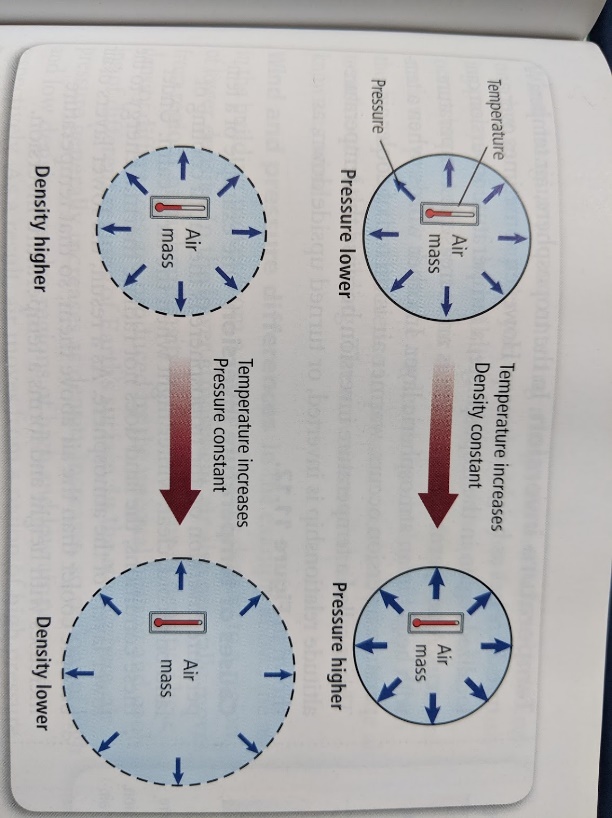
**Earth Science 11** Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Block:\_\_\_\_\_\_\_\_\_\_\_

**The Atmosphere**

The Earth’s atmosphere is composed of two main gases, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. In fact, 99% of the atmosphere is made from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The remaining 1% is made from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and some trace gases. Earth’s atmosphere also contains tiny particles, such as \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_.

Note: In the last \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years, carbon dioxide has increased from 0.028% to 0.040% concentration in the atmosphere from fossil fuel burning.

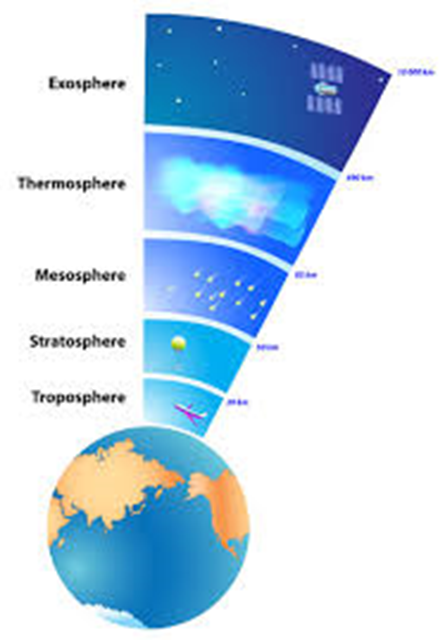
**Making Connections:** Can you brainstorm some reasons why atmospheric composition might be changing?

|  |
| --- |
|  |

**Atmosphere has Properties:**

If density stay the same; **Low temperature = Low pressure** and **High temperature = high pressure**. This is because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

If Pressure stays the same; **Low temperature = High density** and **High temperature = Low density.** This is because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Atmospheric Layers:**

Troposphere: The troposphere is the layer of the atmosphere that is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the earth’s surface. It is in this layer is where the Earth’s weather occurs and the majority of the Earth’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form. Note that as you move higher in the troposphere, the temperature quickly gets much colder, and can get as cold as \_\_\_\_\_\_\_\_\_\_\_\_\_

Stratosphere: The layer above the tropopause is the stratosphere. The stratosphere is very \_ and mostly contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Ozone is a molecule that absorbs the sun’s energy (preventing harmful rays from reaching the Earth’s surface). Since ozone absorbs the sun’s energy, the stratosphere gets \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the troposphere.

Mesosphere: This layer is very cold (can get to \_\_\_\_\_\_\_\_), because very little of the sun’s energy is absorbed.

Thermosphere: The thermosphere is a very hot layer. This layer can get hotter than \_\_\_\_\_\_\_\_\_\_\_, because of the low air density and it absorbs a lot of the sun’s energy.

Exosphere: This is the layer between the Earth’s atmosphere and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It is between 500 to 10,000 km above the Earth’s surface.

**Weather vs. Climate**

* **\_\_\_\_\_\_\_\_\_\_\_\_:** is the day-to-day state of the atmosphere, and its short-term variations.
  + A combination of temperature, humidity, precipitation, cloudiness, visibility, and wind.
* \_\_\_\_\_\_\_\_\_\_\_\_: is the weather of a place averaged over a period of time (often 30 years)
  + Includes information about normal weather, as well as the range of weather extremes for a location

**What are clouds?**

* \_\_\_\_\_\_\_\_\_\_\_\_\_ are \_\_\_\_\_\_\_\_\_\_\_\_ particles that come together around a “condensation nucleus”
* These \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are particles (such as \_\_\_\_\_\_\_\_) that were blown up into the atmosphere. If there is enough water in the atmosphere, then the water particles will attach to it, and a cloud will start to form.
* This process is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The droplets that form can be liquid water or ice, depending on the surrounding \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* When the number of these droplets is large enough, a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is visible.

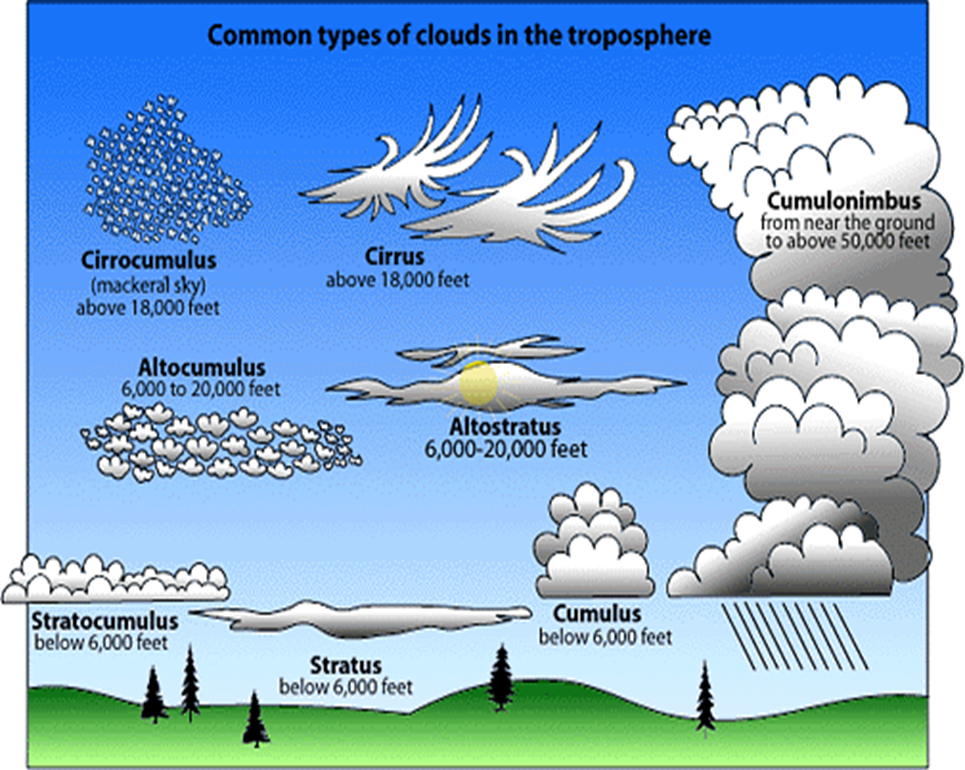
Note: There is constantly water in the Earth’s atmosphere. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is how scientists measure the amount of water in the atmosphere.

**Different Types of Clouds**

* Different types of clouds form depending on the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and where in the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** the cloud forms.
* There are three main types of clouds: low clouds, medium clouds, and high clouds.

**Low Clouds:** These clouds form from **\_\_\_\_\_\_\_\_\_\_\_\_\_,** moist air. These types of clouds break down into two main categories: cumulus and stratus. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** clouds are puffy and lumpy looking clouds. **\_\_\_\_\_\_\_\_\_\_\_\_\_** clouds look like layers and will cover large parts of the sky. Usually fog is a stratus cloud that drops to the Earth’s surface.

**Middle Clouds:** These clouds from in the middle of the troposphere, around the point where some of the water particles turn to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ clouds are white/grey, large, round masses or wavy rows. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ clouds are gray and form thin sheets. Both types of clouds can bring light rain.

**High Clouds:** These clouds are made from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because they form so far above the Earth’s surface. They break down into two main types: cirrus and cirrostratus. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ clouds are thin and wispy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ clouds act almost like a blanket. They can be very transparent or very dense.

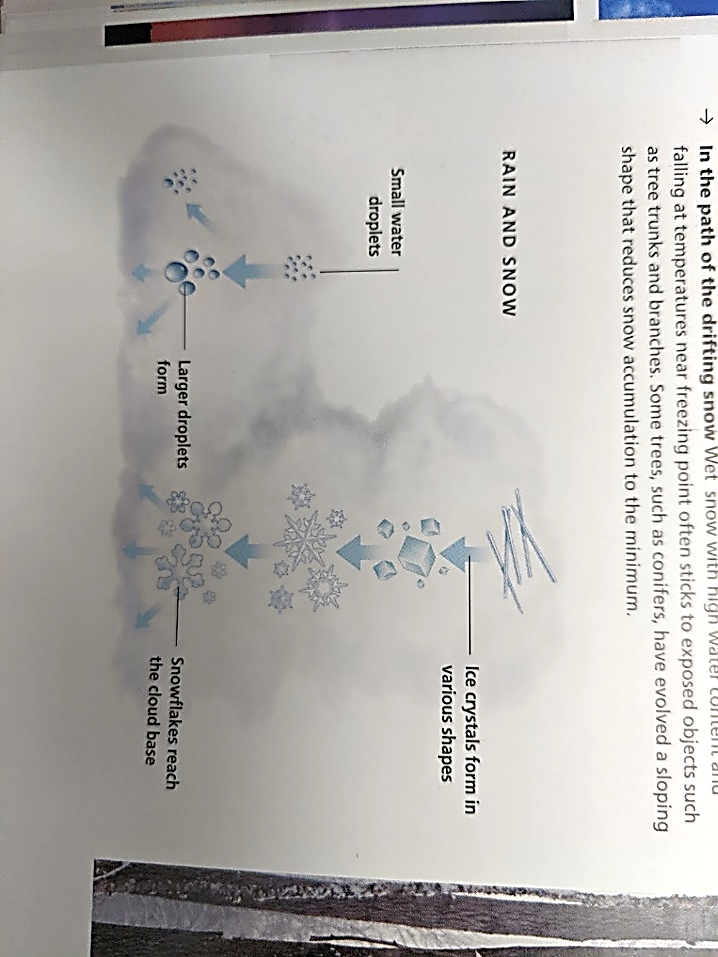
**Vertical Cloud Growth**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ clouds can grow upwards if the cloud is warmer than the surrounding air. The cloud can grow through middle altitudes as a towering \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If it reaches high enough, the top will be made of ice crystals. Strong winds can spread the top of the cloud into an anvil shape.

These clouds produce torrential rains, strong winds, and hail characteristic of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

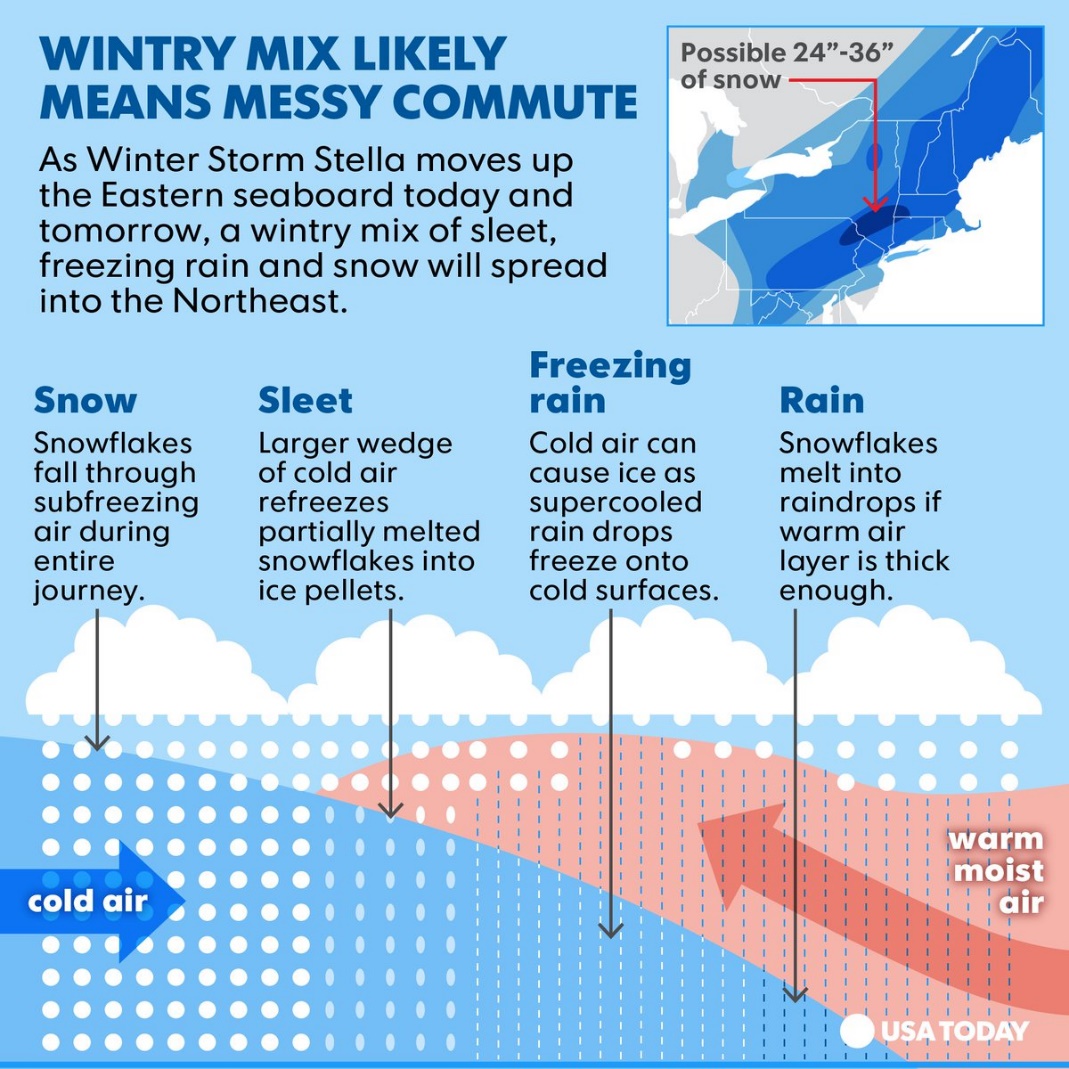
**Precipitation**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** any liquid water or ice that falls freely from the atmosphere to Earth’s surface.

* There are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of precipitation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(rain and drizzle), \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (snow, ice, and hail), and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (freezing rain).

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** liquid precipitation that falls to the ground from clouds. Rain-producing clouds must be very **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** to develop large enough raindrops to fall from the cloud.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** fall when a thick layer of air near Earth’s surface is at or below freezing temperature.

* Snow can fall from **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** or **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** clouds
* Hail is a product of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Ice pellets form when rain falling through a **\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_** turns the drops solid

**Air Masses**

An air mass is a large volume of air that has the \_\_\_\_\_\_\_\_ characteristics as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Such as; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_). Though each air mass forms at a specific \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, they are constantly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. There are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that determine the characteristics of a mass.

* Developed over land: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Developed over water: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Developed over cold area: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Developed over warm area: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

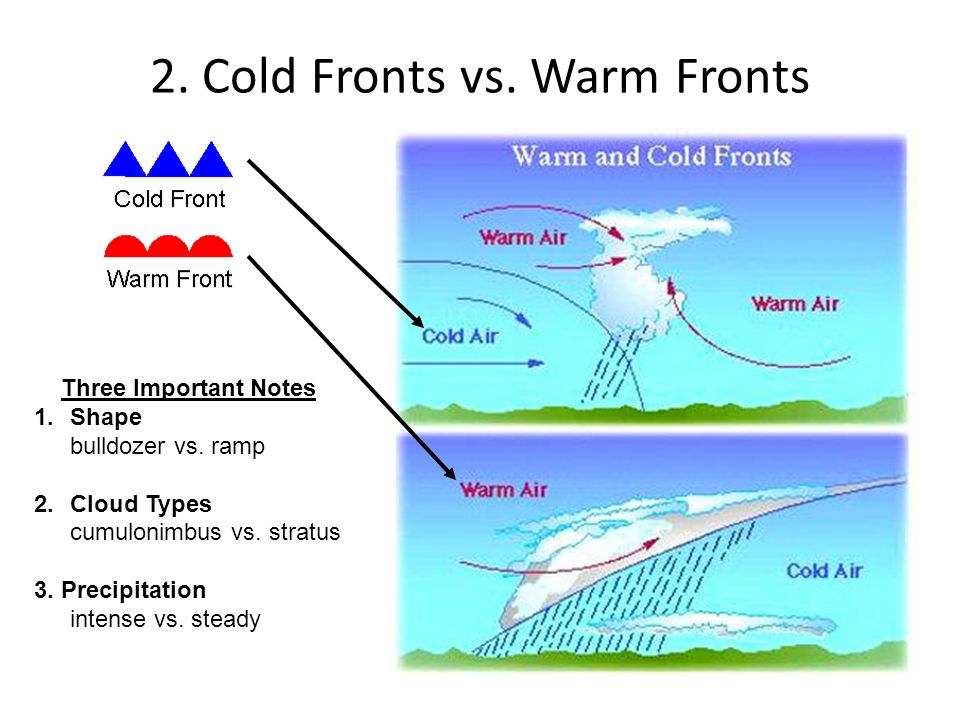
Combine \_\_\_\_\_\_\_\_\_\_ of the categories to determine the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. There are \_\_\_\_\_\_\_\_\_\_\_ types of air masses that affect North America. Each brings it’s own characteristic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

*Use the map projected to complete the table below.*

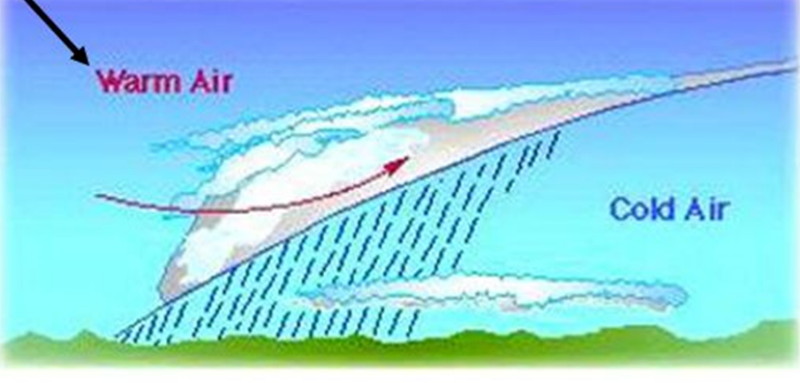
|  |  |  |
| --- | --- | --- |
| **Air Mass** | **Winter Characteristics** | **Summer Characteristics** |
| **Arctic** |  | Cold, and dry |
| **Continental Polar** | Very cold, and dry | Cool, and dry |
| **Continental Tropical** | Warm, and dry |  |
| **Maritime Polar** | Cold to mild, and humid |  |
| **Maritime Tropical** |  | Hot, and humid |

**Weather Fronts**

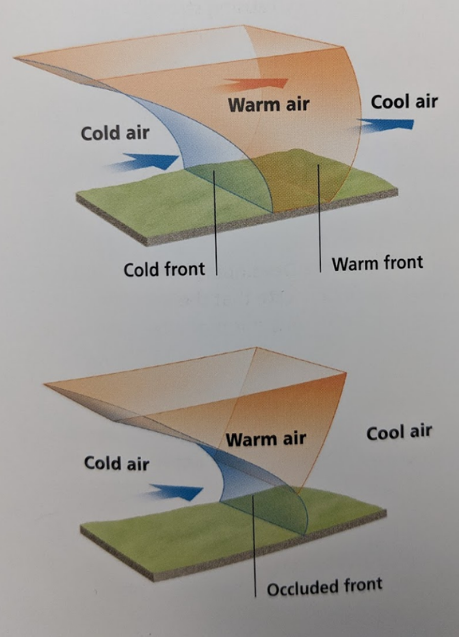
A front forms when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with different characteristics \_\_\_\_\_\_\_\_\_\_\_\_\_\_. The area at the collision is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Their names are determined by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ air mass. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurs along *all* fronts. There are \_\_\_\_\_\_\_\_\_\_\_\_ different types of fronts: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Cold Fronts**

When \_\_\_\_\_\_\_\_\_\_\_\_ air moves into and area of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ air. Weather caused: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It’s symbol on a weather map looks like this:

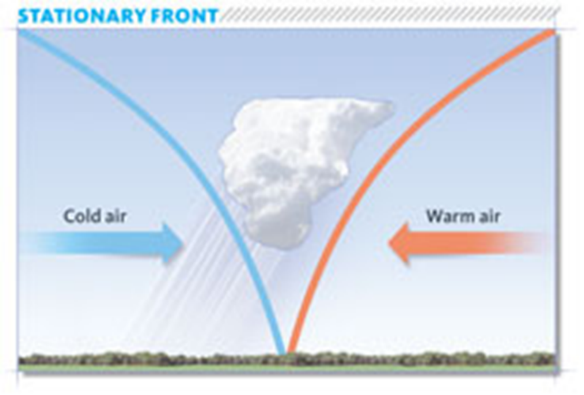


**Warm Fronts:**

When \_\_\_\_\_\_\_\_\_\_\_\_ air moves into an area of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ air. Weather caused: \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It’s symbol on a weather map looks like this:

**Occluded Fronts:**

When \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ air mass moves so quickly that it forces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ air mass upwards. After one or two days the cold front overtakes the warm front. Weather caused: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_. It’s symbol on a weather map looks like this:

**Stationary Fronts:**

When two air masses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Weather cause: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (all nice or all bad). It’s symbol on a weather map looks like this:

**Pressure Systems**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: zones of high pressure generally occur in \_\_\_\_\_\_\_\_\_\_ air masses, where the air is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. High pressure air masses \_\_\_\_\_\_\_\_\_\_\_. Resulting in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ weather.

As the sun heats an air mass, it becomes warmer and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Since the air mass is now less dense it starts \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This creates a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ centre. As the air rises, it cools and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into clouds. Therefore, low pressure centres are associated with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ weather.

*Draw arrows on the diagram below showing how air masses are moving*

