Name \_\_\_\_\_ Day, Time \_\_\_\_\_

Date \_\_\_\_\_

Composition of the **Atmosphere** 🡪 the most abundant elements are n\_\_\_\_\_ and o\_\_\_\_\_.



**W\_\_\_\_\_** – the state of the atmosphere at a given time and place.

C\_\_\_\_\_ – \_\_\_\_\_ term prevalent weather conditions for a given region, or location.



vapor

solid

liquid

E\_\_\_\_\_ is when water is changed to water \_\_\_\_\_\_\_\_. Energy must be \_\_\_\_\_. This process leaves the rest of the liquid a little bit \_\_\_\_\_.

C\_\_\_\_\_ 🡪 water vapor becomes \_\_\_\_\_ & releases energy as in cloud formation.

Label the phase changes to the right

and state if energy is gained or lost

**R\_\_\_\_\_ H\_\_\_\_\_**

* The ratio of \_\_\_\_\_ (water vapor) in the \_\_\_\_ compared to the amount of water vapor that can be \_\_\_\_\_\_ in the air at that temperature.
* A \_\_\_\_\_ measures the humidity of air.

The cooler air temperature holds \_\_\_\_\_ water, therefore, the \_\_\_\_\_ relative humidity.

The \_\_\_\_\_ air temperature holds much \_\_\_\_\_ water, therefore, the \_\_\_\_\_ relative humidity.

Example:

A cubic meter of air at 20º C can hold \_\_\_\_ grams of water vapor (see chart). This is called \_\_\_\_\_ at 20º C, meaning that the cubic meter of air has \_\_\_\_ grams of water vapor. This represents \_\_\_\_\_\_% relative humidity.

Any further cooling will cause condensation (fog, clouds, dew) to form. Thus, \_\_\_º C is the \_\_\_\_\_ for this situation.

If the temperature is \_\_\_\_\_ to 10º C, the air can only hold 9 grams of water vapor.

The other 8 grams of water vapor will \_\_\_\_\_ as water droplets forming clouds, fog or dew. The relative humidity is still \_\_\_\_\_% because the temperature is different.

If the same cubic meter of air \_\_\_\_\_ to 30º C, it can hold up to 30 grams of water vapor.

17 g / 30 g = \_\_\_\_\_ % This will produce a relative humidity of 56% and represents the amount of water vapor air can \_\_\_\_ at that \_\_\_\_\_.

**D\_\_\_ P\_\_\_\_\_**

* The dew point is a water-to-air \_\_\_\_ temperature.
* The \_\_\_\_\_ the dew point, the more \_\_\_\_\_ is in the air.
* The dew point is associated with relative humidity
	+ \_\_\_\_\_ relative humidity indicates that the dew point is \_\_\_\_ to the current air temperature.
	+ \_\_\_\_\_% Relative humidity indicates the dew point is \_\_\_\_\_ to the current temperature and that the air is maximally \_\_\_\_\_ with water.
* At temperatures \_\_\_\_\_ the dew point, water will \_\_\_\_\_ the air.
* Water \_\_\_\_\_ to form \_\_\_\_\_, dew or \_\_\_\_\_.
* Condensed water on a solid surface is called \_\_\_\_\_.
* When frozen, it is called \_\_\_\_\_.

To determine the condition of the atmosphere in a given location, the following can be measured:

Temperature – \_\_\_\_\_ H\_\_\_\_\_ – psychrometer or hygrometer

Wind speed and direction – \_\_\_\_\_ Air pressure – \_\_\_\_\_

* As altitude (height) \_\_\_\_creases, air pressure \_\_\_\_creases.
* Temperature also \_\_\_\_creases.
* Air that is \_\_\_\_\_, holds \_\_\_\_\_\_\_ water vapor and will \_\_\_\_\_ easier.

\_\_\_\_\_ Temperature Change

* When the temperature of air changes due to a change in \_\_\_\_\_ it is referred to as an adiabatic temperature change
* This is what happens to air when it \_\_\_\_\_ in the atmosphere.

\_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ are forms of condensation

Clouds are groups of water droplets that form up in the atmosphere – \_\_\_\_\_ the ground.

Dew is condensation that occurs on objects \_\_\_\_ the ground.

Fog is cloud formation that occurs \_\_\_\_\_ the ground.

**Cloud Formation**

Air needs to be \_\_\_\_\_ to its \_\_\_\_\_ point (the point where it turns from \_\_\_\_\_ to liquid).

Water vapor needs condensation \_\_\_\_\_ to condense on. E.g. \_\_\_\_\_\_, salt in atmosphere, etc.

Air is most often cooled \_\_\_\_\_ in the atmosphere (a change in temperature due to a change in \_\_\_\_\_).

* Air rises due to it’s own \_\_\_\_\_ (heated air is less dense & will rise) 🡪 \_\_\_\_\_.
* Air is forced as it travels over mountains; this is called o\_\_\_\_\_ lifting.
* Air is forced up due to c\_\_\_\_\_ near low pressure zones.
* Air is forced up due to another air mass, this is called f\_\_\_\_\_ w\_\_\_\_\_.

There are 4 main types of Clouds

1. \_\_\_\_\_ 🡪

2. \_\_\_\_\_ 🡪

3. \_\_\_\_\_ 🡪

4. \_\_\_\_\_ 🡪

Cloud Formation Summary

* Air is \_\_\_\_\_ cooled, most often by being lifted in these four ways:
* Air rises due to it’s own \_\_\_\_\_ (heated air is less dense and will rise) this is known also as \_\_\_\_\_.
* Air is forced as it travels over \_\_\_\_\_; this is called \_\_\_\_\_ **lifting.**
* Air is forced up due to another air mass, this is called \_\_\_\_\_ \_\_\_\_\_.
* Air is forced up due to \_\_\_\_\_ near \_\_\_\_\_ pressure zones.

**What Causes Wind**?



1. \_\_\_\_\_ Distribution of Thermal Energy (temperature)
* Warm air \_\_\_\_\_ (\_\_\_\_\_ dense), leaving a deficit of air and thereby lowering the air pressure – “\_\_\_s”
* Cold air \_\_\_\_\_ (\_\_\_\_\_ dense), creating a buildup of air and thereby raising the air pressure – “\_\_\_s”
1. Unequal Distribution of \_\_\_\_\_
* Pressure differences create a pressure \_\_\_\_\_ and causes the \_\_\_\_\_ to blow.
* The direction of wind motion is always from \_\_\_\_\_ pressure towards \_\_\_\_\_ pressure.
* The greater these differences, the greater the wind \_\_\_\_\_.



**I\_\_\_\_\_**

* \_\_\_\_\_ of constant or equal \_\_\_\_\_ on a weather map
* Air pressure is measured in millibars or mercury depending on the \_\_\_\_\_.
* Standard pressure 🡪 1013 millibars 101.3 kPa 760 mm Hg 29.92 in. Hg



**Isobars**

**(The** \_\_\_\_\_ **circles)**

**Factors that affect Wind**

P\_\_\_\_\_ G\_\_\_\_\_ Force

* Pressure \_\_\_\_\_ create a pressure gradient and causes the \_\_\_\_\_ to blow.
* The \_\_\_\_\_ these differences, the greater the wind \_\_\_\_\_
* The direction of wind motion is always from \_\_\_\_\_ pressure towards \_\_\_\_\_ pressure.
* The velocity of wind can be estimated from the spacing of isobars on a weather chart.
	+ The \_\_\_\_\_ the isobars the steeper the pressure gradient, and the \_\_\_\_\_ the wind

F\_\_\_\_\_ Force

* Frictional forces act to \_\_\_\_\_ wind movement and to \_\_\_\_\_ the wind direction.
* Winds in the \_\_\_\_\_ layers of atmosphere (at or \_\_\_\_\_ the earth's surface) are greatly influenced by the frictional force.
	+ The effect of friction is to \_\_\_\_\_ the wind speed.
	+ Friction is relatively \_\_\_\_\_ over the ocean surface.
	+ Different layers of the atmosphere have different wind velocities and these winds can affect each other as they intersect.

**C\_\_\_\_\_ Force** (Effect) 🡪 due to the Earth’s \_\_\_\_\_

* Winds are curved or \_\_\_\_\_ to the \_\_\_\_\_ in the Northern Hemisphere.
* Winds are curved or deflected to the \_\_\_\_\_ in the Southern Hemisphere.
* When the wind swirls \_\_\_\_\_ in the northern hemisphere or clockwise in the southern hemisphere, it is called \_\_\_\_\_ flow.
* When the wind swirls \_\_\_\_\_ in the northern hemisphere or counter-clockwise in the southern hemisphere, it is called \_\_\_\_\_ flow.
* Winds blow \_\_\_\_\_ low pressure systems and swirl counterclockwise (in the Northern Hemisphere) around the \_\_\_\_\_ pressure center.



* Winds within high-pressure areas flow \_\_\_\_\_ and clockwise from the higher pressure areas near their centers towards the lower pressure areas further from their centers. In the Northern Hemisphere, winds blow \_\_\_\_\_.

**Global Wind Belts**

* Air moves from higher pressure to lower pressure. Pressure belts move air in a \_\_\_\_\_
* The Coriolis effect deflects wind, generating the \_\_\_\_\_ wind patterns.

