

Video II Notes:

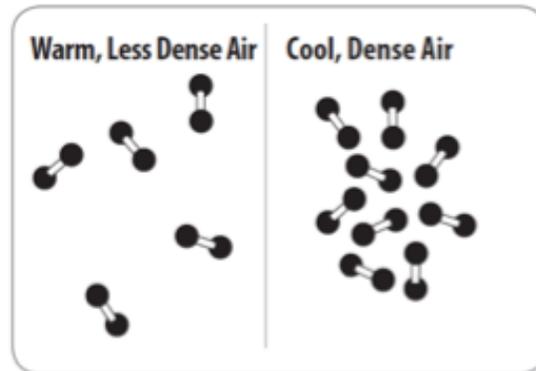
1. How does wind happen:

2. Fill in this quote from the clip: “Air near the _____ is heated by energy of the Sun, so it becomes less _____ and _____.
3. Fill in this quote from the clip: “Near the _____, there’s not as much heating by the Sun, and that cold, dense air _____ down toward the Earth.”
4. The turning of wind belts because of Earth’s rotation is known as the _____. (Note: We will learn more about this later!)

What is Wind?

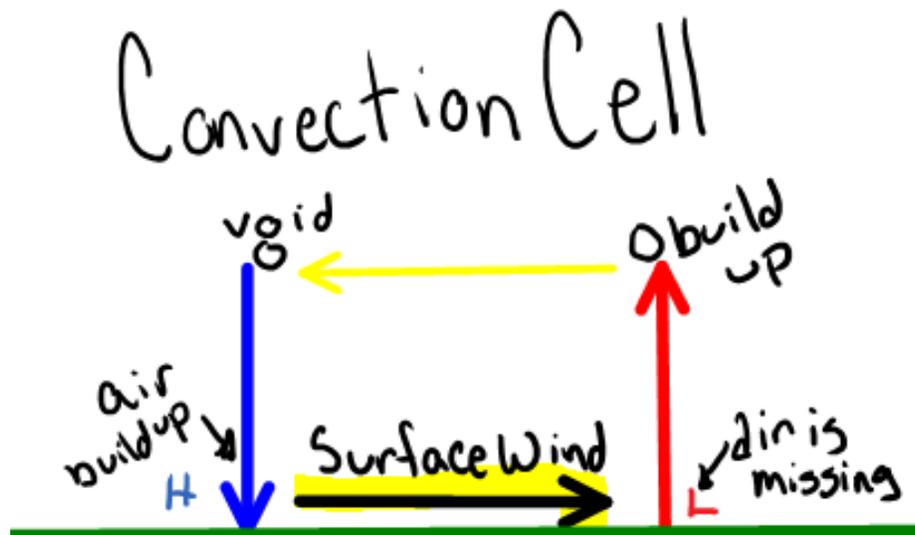
Wind is simply air in motion. It is produced by uneven heating of the Earth’s surface by energy from the Sun. Since the Earth’s surface is made of very different types of land and water, and the tilt of the Earth causes insolation to heat locations on the Earth at different rates, the Earth heats at different rates. When insolation strikes different surfaces, some of that energy is converted into heat, which also heats the surrounding air.

The energy of wind comes from the Sun. When the Sun shines, more of the radiant energy (insolation) reaches the tropics/equatorial region than the poles. Even despite this, some types of land absorb more sunlight than others (for example, the sands of the desert reflect a lot of sunlight, which reduces the amount of heat absorbed). When this insolation is absorbed, the land turns this into heat (think of a blacktop on a hot summer day, or how hot a sandy beach is in August). As this air warms, it expands. The molecules get farther apart. The warm air is then less dense than the air around it and rises in the atmosphere. Cooler, denser air nearby flows in to take its place. This movement of air is what we call **wind**. It’s caused by the uneven heating of Earth’s surface.



How is wind formed?

At Earth's surface, winds blow in response to differences in air pressure. Winds *always* move from places of higher pressure to places of lower pressure (i.e. along a pressure gradient). When you exhale, you do so by squeezing the air in your lungs, increasing the pressure. Air escapes from your body to equalize the pressure inside and outside your lungs. You learned earlier that atmospheric pressure is caused by the weight of the atmosphere. Differences in the density of air cause changes in the weight of the air. Primarily, temperature and humidity determine the density of air. (As temperature and humidity increase, air becomes less dense.) When air density increases, so does air pressure at Earth's surface, forcing the air to move to places with a lower surface pressure. This often creates a localized **convection cell**, where regions of high pressure and low pressure circulate as density changes as a result of temperature.



Using the words **density** and **air pressure**, briefly describe how the above convection cell might be created:

Questions:

1.)

Surface winds on Earth are primarily caused by differences in

- A) air density due to unequal heating of Earth's surface
- B) rotational speeds of Earth's surface at various latitudes
- C) ocean wave heights during the tidal cycle
- D) distances from the Sun during the year

2.)

Winds always blow

- (1) from high-temperature locations to low-temperature locations.
- (2) from low-temperature locations to high-temperature locations.
- (3) from high pressure to low pressure.
- (4) from low pressure to high pressure.

3.)

As air on the surface of Earth warms, the density of the air

- (1) decreases.
- (2) increases.
- (3) remains the same.

4.)

During which process does heat transfer occur because of density differences in a fluid?

- (1) reflection
- (2) radiation
- (3) conduction
- (4) convection

5.)

The planetary wind belts in the troposphere are primarily caused by the

- A) Earth's rotation and unequal heating of Earth's surface
- B) Earth's revolution and unequal heating of Earth's surface
- C) Earth's rotation and Sun's gravitational attraction on Earth's atmosphere
- D) Earth's revolution and Sun's gravitational attraction on Earth's atmosphere

6.)

Surface winds on Earth are primarily caused by differences in

- A) air density due to unequal heating of Earth's surface
- B) ocean wave heights during the tidal cycle
- C) rotational speeds of Earth's surface at various latitudes
- D) distances from the Sun during the year