**Weather Task**

**Weather: Air Patterns**

*From: Read Works*

Weather results from global patterns in the atmosphere interacting with local conditions. You have probably experienced seasonal shifts, such as winter in New England, when it snows; or fall in the Southwest, when temperatures begin to drop. These seasonal changes occur because of the Earth’s tilt on its axis. As the Northern Hemisphere tilts away from the sun temperatures in that area drop, for example, and this temperature change causes weather patterns to shift.

**Wind Patterns**

The difference in temperature across the Earth creates wind circulation patterns. At the equator, the imaginary line circling the Earth midway between the North and South poles, the air is very hot from solar radiation. The heat releases moisture from plants and bodies of water that results in humidity. As the hot, humid air rises, it forms clouds and becomes an air mass. This air then travels either north or south, where it cools as it approaches the poles before heading back to the equator, creating circular systems of weather. As a result of the Earth’s spin, winds in the Northern Hemisphere travel to the right and in the Southern Hemisphere, they travel to the left. This is called the Coriolis effect. These global wind currents have a great deal of influence on weather.

Air masses are pushed against each other as they travel along the currents. They vary in temperature, moisture and density depending on geographic conditions where they form. Where two different air masses meet is called a front. A cold front is where a cold air mass replaces a warm one, and a warm front is where a warm air mass replaces a cold one. You can view this on a local weather map.

Very high in the atmosphere the wind is especially strong and forms jet streams. These carry air masses along very quickly, resulting in faster changes in the weather we experience. A high-pressure system is where dry air sinks to the ground. High-pressure systems usually result in fair days without much precipitation. Low-pressure systems force air to rise at the center, resulting in cloud formation and more moisture in the atmosphere. Low-pressure systems are usually associated with rain or storms.

Wind patterns not only shape our weather, they have also shaped our history. Sailors traveling from Europe to North America were aided by circular wind currents and mirroring ocean currents pushing in the same direction. Similarly, people are believed to have migrated from South America to Polynesia, across the Pacific Ocean, just by following the wind and ocean currents.

**Clouds and Storms**

Clouds are masses containing small droplets of water. How small? According to some scientists, so small that a coffee cup filled with typical cloud would contain 100,000 droplets. If all the water condensed to the sides of the cup it would barely be wet. Because water refracts light, we’re able to see clouds even though the droplets are small and it’s mostly empty air. This also explains why clouds take on the color of the light that illuminates them. Clouds appear white when the light is purest at mid-day. When a cloud is so dense it blocks out the sun, it appears black, such as during a severe thunderstorm.

The droplets in clouds are always falling but they do so very slowly. As they grow heavier, they fall faster, eventually becoming precipitation. Precipitation can be rain, snow, sleet or hail depending on the temperature of the air as it falls. Sometimes the air can be cold so that hail forms, falling so fast that even if it is a warm summer day on the ground the hail is still ice when it hits the ground.

Thunderstorms form when a low-pressure system forms, or because of differences in air temperature at the Earth’s surface that force warm, humid air aloft. These storms often include hail, heavy rain, high winds, thunder and lightning. They most often occur in summer months, but sometimes snowstorms also have thunder and lightning.

You can use thunder and lightning to figure out how far away a storm is. After you see a flash of lightning, count the number of seconds until you hear thunder. For every five seconds, the storm is one-mile away.

**Spinning Thunderstorms**

*This article is provided courtesy of the American Museum of Natural History.*

On a spring night in 2007, disaster struck a small town in Kansas called Greensburg. Shortly before 10 p.m., a siren went off. A mile‐wide tornado was approaching Greensburg. And it wasn’t just any tornado. It was a category EF5, the most powerful kind there is.

Its winds were estimated to be more than 200 miles per hour. In less than ten minutes, the town was destroyed and ten people lost their lives.

When the fury had passed, people clambered through the rubble. Cars and trucks had been thrown about. Homes were crushed, or simply ripped from the ground. “I’m in downtown Greensburg. There’s really nothing left,” said one resident.

**How do tornadoes form?**

A tornado is a swirling, funnel‐shaped column of wind that gets its start from a thunderstorm.Thunderclouds form when warm, wet air collides with cool, dry air. Then, strong winds form into a wide tube of spinning air. When the tube touches the ground, it becomes a tornado.

Kansans are used to tornadoes. The people of Greensburg live smack in the middle of “Tornado Alley” an area that spans eight states in the Central United states. This region is a perfect thunderstorm factory. It has just what storms need to get started: \*cool, dry air from the Arctic mixing with warm, humid air from the Gulf of Mexico. Above the flat Great Plains, far from mountains and coastal weather, thunderstorms can form undisturbed. These conditions spawn more than 600 tornadoes, on average, in “Tornado Alley” every year.

Meteorologists are scientists who study and forecast weather. They use a technology called radar to track storms. Weather radar works by detecting the precipitation (rain, snow, or hail) in approaching storms. The radar unit sends out a radio wave towards the storm. The radio wave bounces off the raindrops, hail or snow that is in the storm, and then returns to the radar unit. The amount of time it takes for the wave to return tells meteorologists how far away the storm is. Most radar units send out about 1,000 radio waves per second. This gives them detailed, up‐to‐the‐minute information about the storm.

Using radar, forecasters can track the formation and path of severe storms like tornadoes. When a tornado takes shape, its winds blow raindrops in a circular pattern. When scientists see that pattern on a radar screen, they know that a tornado is developing. Although tornadoes have fast swirling winds, \*tornadoes themselves move relatively slowly across the land (18‐30 miles per hour). So scientists can make reasonable forecasts about where they are headed. A system of tornado watches and warnings are used to alert the public to danger. A tornado “watch” means thunderstorm conditions exist that could spawn tornadoes. A “warning” means a tornado has touched down and been spotted.

This system saved many lives in Greensburg. After the tornado sirens shrieked, people had 20 minutes to escape to their basements and storm shelters before the tornado destroyed their town.

**Writing Prompt: Severe weather has the potential to cause death and destruction. Based on the details in these texts, explain how severe weather forms and how it is predicted and tracked by meteorologists.**