Elements of Weather – Precipitation

Now for the last of the six elements of weather…precipitation! **Precipitation** is any form of water that falls from the clouds in the sky. Precipitation waters the earth as well as cleans the air on its way down. Since water can be in the form of a solid, liquid, or a gas, there are several types of precipitation that can occur beyond just rain, such as snow, sleet, freezing rain, and hail. Let's take a closer look at the main types of precipitation and the weather conditions that create them.

RAIN

In our lesson on clouds you learned that they are made up of billions of tiny water droplets or ice crystals. All those tiny water droplets move around and collide with one another, forming bigger and bigger droplets. This process continues until the droplets become heavy enough to overcome any updrafts and let gravity take over to fall down to Earth's surface as rain. Rain can leave a cloud as liquid water or it can leave as ice crystals or snow, and melt into rain on its way down if the temperatures are warm enough. Meteorologists separate rain into different categories (light, moderate, and heavy) according to how much water collects on the ground in one hour. **Drizzle** is made up of very tiny water droplets that fall from clouds that almost touch the ground. A **rain shower** is rain that showers down but doesn't last very long. If a meteorologist forecasts rain showers you can expect rain to occur off and on and not be continuous.

SNOW

Snow is made up of ice crystals in clouds that have joined together to make larger ice crystals, eventually forming snowflakes. When they are heavy enough they start to fall from the cloud, but can keep growing as they make their descent to earth's surface. The crystals can collide with water vapor or other crystals, partially melt and then refreeze to form a different shape. This is why they say that no two snowflakes are alike since the crystals can join together in different patterns. However, all snowflakes have six sides and all are symmetrical. The height and temperature where the snowflake was formed determines its shape, but again, it will always have six sides. In our study of chemistry last year, you learned that a water molecule is made up of 2 hydrogen atoms and 1 oxygen atom. The water molecule will ALWAYS have the same shape in how the atoms bonded, so when these water molecules get together to make an ice crystal they can only fit together in a six-sided pattern called a **hexagon**. In order for the snowflake to make it to earth's surface without melting into rain, the air temperature must be cold enough to keep it frozen as it makes its way down, but there is a range of freezing temperatures that will keep it as snow, but will give you different types of snowfall. Very frigid temperatures makes for a fine, powdery snow. Temperatures within a degree or two of freezing will give you a very slushy snow. The best snow to play in and build a snowman is between these two, not too cold and not too mild!

SLEET

Sleet is basically frozen raindrops or a mixture of rain and snow. Sleet occurs when the temperature of the air that is closer to the ground is at or below freezing. Rain falls from the sky through warmer temperatures and freezes into tiny ice pellets when it hits an area of freezing temperatures mid-air.

With sleet, rain freezes into ice pellets before reaching earth's surface. You can hear these tiny pellets as they hit and bounce off of solid surfaces.

FREEZING RAIN

Freezing rain can be both beautiful and destructive. Unlike sleet, rain falls as liquid but doesn't freeze into ice until making contact with an object or surface. When you think of freezing rain, think of Elsa from the movie Frozen. Like Elsa, freezing rain leaves everything it touches covered in a layer of ice called a **glaze**. This can make it look as if you are in Elsa's beautiful ice palace, but believe me, the beauty is not worth the risk! The layers of ice it brings makes driving very hazardous, especially with hard-to-spot black ice patches that cause cars to skid off the road. If the ice gets thick enough it can snap large tree branches or pile up on power lines causing power outages. Freezing rain is what causes ice storms. An ice storm can cause power outages that last for weeks!

HAIL

Hail is frozen precipitation forming balls of ice that fall from the sky. The ice balls are called hailstones. They can be the size of a pea or as big as a softball. The largest recorded hailstone was the size of a soccer ball! Ouch! Despite hail being made of ice, it can fall at any time of the year because it is made in cumulonimbus clouds, also called thunderheads. Cumulonimbus clouds are the TALL king of clouds that produce thunderstorms. To understand how hail is formed, think of a balloon that you hit back up every time it floats down so that it won't touch the ground. We've all played that game. Now think of that balloon as a water droplet in a stormy cumulonimbus cloud. The strong updrafts push that water droplet high up into the freezing parts of the cloud where it freezes into a piece of ice. Then it falls back down in the cloud and gets pushed up again gaining another layer of ice. This happens over and over again. The strong updrafts and downdrafts of the storm causes the hailstone to grow bigger each time it is pushed up into the top part of the cloud. If you were to cut a hailstone in half you can actually see the layers and count how many times it made this journey up and down in the cloud. Eventually the hailstones are heavy enough to escape the air currents of the cloud and they fall down to earth's surface. Depending on how big they are, they can cause a LOT of damage. Pea-size to marble-size are pretty fascinating to see, but anything bigger can be scary. They can break windows, make dents in cars, or even destroy a farmer's entire crop! Hail was one of the ten plagues God sent to the Egyptians to convince them to let His people go. Exodus 9:18 says, "Behold, about this time tomorrow, I will send a very heavy hail, such as has not been seen in Egypt from the day it was founded until now." The result? "The hail struck all that was in the field through all the land of Egypt, both man and beast; the hail also struck every plant of the field and shattered every tree of the field." Exodus 9:25. Have you ever wondered just how big those hailstones were? That is some scary precipitation!

RAINBOWS

After the gloomy grey of a rainy day, you often see a beautiful rainbow appear with the peek of sunshine as the weather starts to clear. Rainbows occur when sunbeams shine through water droplets in the air. Water bends light so the raindrops bend the sunbeam's light, breaking it into seven colors (red, orange, yellow, green, blue, indigo, and violet). The colors of the rainbow will always be in the same order when you see them because each color bends in a different amount, separating them from each other and making them visible. We know that God sent a rainbow after the Flood as a promise that He would never destroy the earth with water again, but I also see rainbows as a way to brighten our spirits after the gloominess that comes with a day of precipitation.