Precipitation Type Applet

This applet was developed by Tom Whittaker and Steve Ackerman with Weather Wise at the University of Wisconsin. The web page for all of their applets can be found at
http://profhorn.meteor.wisc.edu/wxwise/

The precipitation type applet can be used to teach how snow, sleet, freezing rain, and rain can form.
Benchmarks
SC.6.E.7.2 -Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.

SC.6.E.7.4 -Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.

SC.912.E.7.3 Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.

Prior to using this applet show students pictures of snow, rain, freezing rain (ice storm), and sleet to familiarize them with these forms of precipitation. Ask them how they think all of these forms of precipitation are similar and how they are different. Here is a good resource--
http://www.srh.noaa.gov/jetstream/global/preciptypes.htm

Explain to the students that you will show them a simulation of how these different forms.

Start the Applet—http://profhorn.meteor.wisc.edu/wxwise/precip/precip.html

Snow
Tell the students that the snow is falling, but it is not reaching the ground at first. Why is this? The snow is evaporating when it is falling through the lower layers of the atmosphere. As it evaporates it will cool the atmosphere and you will notice that the temperature of the bottom two layers will start to decrease. Snow will begin to accumulate on the ground when the temperature at ground level goes below freezing. **Summarize** that snow falls when the temperature throughout the whole atmosphere is below freezing.

Rain
As the snow is falling adjust the temperature and dew point of the bottom two levels to above freezing (5°C works for the temperature and 3°C for the dewpoint) What happens? The snow that is falling melts and becomes rain. This is because the temperature of the air is above freezing in the bottom two layers. Point out again that the air temperature will cool to the dew point temperature. This is because some of the rain is evaporating and cooling the air. Summarize that rain often starts out as snow in the high levels of the atmosphere. As the snow falls through a layer of the atmosphere that is above freezing it will melt and fall as rain.

Freezing Rain
Adjust the temperature and dew point at the bottom level so that they are both below freezing (-3°C) while keeping the temperature and dew point at 3°C for the second level. What happens? The snow that is falling melts and becomes rain. When the rain reaches the surface it refreezes on the ground. This is called freezing rain. **Summarize** that freezing rain forms when snow falls through a warm layer of the atmosphere and melts. It refreezes if the temperatures at the Earth's surface are at or below

freezing (0°C/32°F).

Sleet

Adjust the temperature and dewpoints to 4C for the third level, and -8C for the second and first level. What happens? Again the snow falls and melts in the mid level of the atmosphere. This is because the temperature of the air is above freezing. As the rain falls into a layer that is below freezing it freezes and becomes sleet.

Why didn't these rain drops become snow? Snow forms from tiny droplets of supercooled (below freezing air). The reason that the rain drops did not turn into snow is that they are too large and are not supercooled.

Finally adjust all of the temperatures and dew points to above freezing. You will see that you get rain.

In summary

*Snow falls as long as the temperatures are below freezing

*Rain falls as long as the temperature is above freezing. Snow can melt and turn into rain.

*Freezing rain occurs when snow first falls, melts into rain, and refreezes when it comes into contact with below freezing temperatures. You need a very shallow layer of below freezing temperatures for this to occur.

*Sleet occurs when snow first falls, melts into rain, and then refreezes as it falls through a deeper layer of below freezing air. You need a deeper layer of below freezing air in order for the rain to refreeze into sleet.

The National Weather Service has a good resource to show the differences between snow, sleet, and freezing rain. The link for this resource is http://www.srh.noaa.gov/jetstream/synoptic/precip.htm

Answer key

1. below
2. Celsisus, Fahrenheit
3. cool
4. above, melt
5. freezing rain
6. sleet
7. rain
8. sleet
9. freezing rain
10. snow

Name_____

Precipitation Types

1. In order for snow to fall the entire atmosphere has to be (above/below) freezing.

2. The freezing temperature for water is zero degrees (Celsius/Fahrenheit) or 32 degrees (Celsius/Fahrenheit)

3. If snow evaporates into air then the air will (warm/cool).

4. In order for rain to form snow has to fall through a layer of air that is (above/below) freezing. The snow will (melt/freeze) and turn into rain.

5. (Sleet/freezing rain) forms when snow melts, turns into rain, and then refreezes when it comes into contact with the ground.

6. (Sleet/freezing rain) forms when snow melts, turns into rain, and then refreezes as it falls through a layer of the atmosphere that is below freezing.

For each of the following decide what type of precipitation will fall: Freezing rain, rain, sleet, or snow.

7. Snow falls through a layer of air that is 6°C. The air at the surface is 8°C.

8. Snow falls through a layer of air that is 3°C. It then falls through a layer of air that is -4°C. The air at the surface is -6°C.

9. Snow falls through a layer of air that is 5°C. The air at the surface is -2°C.

10. Snow starts falling from a cloud. It goes through a layer of air that is -5°C and the air at surface is -8°C.