Chapter 11 Changes in the Weather

A. How Weather Begins

1. Atmosphere is the layers of air surrounding our planet.
2. Weather begins with energy from the sun called solar energy.
3. Solar energy enters the atmosphere where some is reflected and some is absorbed.
4. 10% is reflected by surface, 30% is reflected by clouds,dust,air, 20% is abosorbed by the atmosphere, 40%is absorbed by the surface.
5. Some solar energy directly hits the surface where it is converted into heat energy.
6. Heat from the surface warms air above - atmosphere heated **indirectly.**
7. Weather is caused by the uneven heating of the atmosphere.
8. The surface heats unevenly, so the air above it is heated unevenly
9. Surface heated unevenly due to:
   - Round shape of Earth
   - Coloring of the Earth's surface (dark colors absorb, light colors reflect.
   - Land and water heat and cool at different rates. (three fourths of the planet covered by water.)
10. Land heats and cools a lot quicker than water.

B. Air Pressure and Winds

1. Air is made of particles of matter.
2. All matter (Air) has mass.
3. Mass of atmosphere pushes down on Earth causing air pressure.
4. Air pressure changes from day to day, place to place.
5. Temperature of air affects its pressure
6. When air is heated, it expands - particles move farther apart.
7. When the air particles move apart, it makes the air less dense which lessens its pressure (as the temp increases pressure decreases, as the temp. decreases the pressure increases.)
8. The amount of water vapor in the air also effects the pressure.
9. Water vapor is less dense than air, so the more vapor the lower the pressure.
10. Differences in air pressure cause air to move (called wind)
11. Gentle winds - little difference in air pressures. Strong wind - big difference in air pressures.
12. Winds always move/blow from areas of high pressure to areas of lower pressure.
13. Local winds form from local differences in air pressure
14. Two local winds:
    - Sea breeze (day) - movement of air from water to land.
    - Land breeze (night) - movement of air from land to water.
15. Global winds (wind belts) - large areas of winds that move in particular pattern. They are named for the direction from which they blow
16. We are in the Westerlies wind belt, which is why our storms tend to move from west to east across our state.

C. Air Masses and Weather

1. Air Mass- a large body of air that has about the same temperature and moisture throughout.
2. Four kinds of air masses:
   - Cold/wet
   - Cold/dry
   - Warm/wet
   - Warm/dry
3. Air masses are named for where they form over. Cold/wet form over cold oceans. Warm/dry form over warm land.
4. How long any kind of weather remains in an area depends on how fast the air masses are moving over the area.

D. When Air Masses Meet

1. When an air mass moves, another moves into its place.
2. The place where two air masses meet is called a front.
3. Changes in weather take place at a front.
4. Fronts are named for the type of air mass moving into a region (cold front/warm front)
5. Thunderstorms are common along cold fronts (tornadoes)
6. Cold Front - The place where a moving cold air mass meets a warmer air mass. More severe weather occurs along cold fronts.
7. The greater the differences in temperatures at the front, the more violent the reaction
8. Warm front - the place where a moving warm air mass meets a cooler air mass. Warm air moves over colder air. Water vapor condenses forming high feathery clouds. Light steady rain.

E. Clouds

1. Different types of clouds form along cold and warm fronts.
2. Clouds are named for their shape
3. Cloud type depends on weather.
4. Cumulus - large puffy clouds often seen during clear weather.
5. Cumulus means heap.
6. Cumulus clouds are flat on bottom with rounded tops.
7. Cirrus - high, thin, wispy clouds that look like feathers or curls of hair.
8. Cirrus means curls.
9. Cirrus clouds are the highest clouds made of tiny ice crystals.
10. Stratus - thick, low clouds that cover the sky.
11. Stratus means layer.
12. Stratus clouds are a sign of rainy weather.
13. Fog is a stratus cloud near the ground.
14. Sometimes clouds have two names because they have the features of two types of clouds.
15. Nimbo/nimbus - means rain.
16. Alto - means high.

F. Water Cycle

1. Water cycle- the changing of the states of water in continual cycle of evaporation, condensation, and precipitation.
2. Evaporation - changing of water to water vapor (gas).
3. Condensation - The process of water vapor changing back into water (tiny droplets that form clouds.
4. Precipitation - water returning to surface in one of four forms.
5. 4 types of precipitation - rain, snow, sleet, and hail.