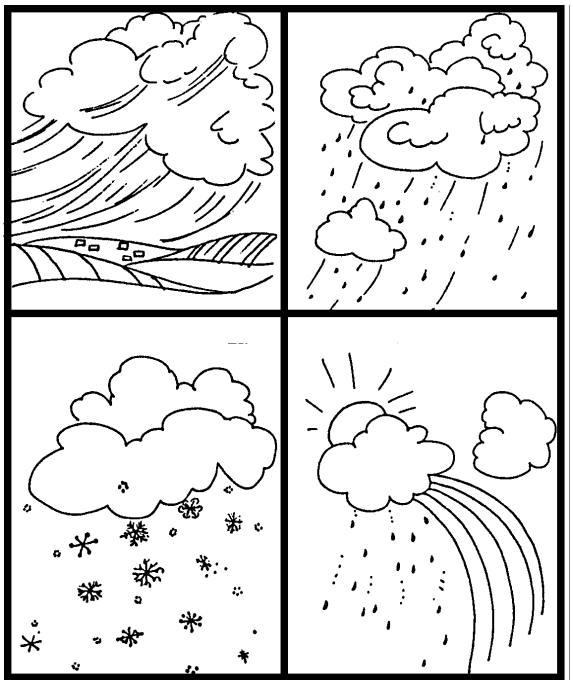
Water Cycle

The Earth's Gift

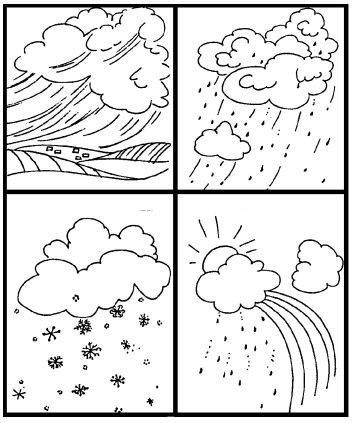
THIRD GRADE

WEATHER



1 WEEK
LESSON PLANS AND
ACTIVITIES

WATER CYCLE
OVERVIEW OF THIRD GRADE



WATER

WEEK 1.
PRE: *Comparing the different components of the water cycle.*
LAB: *Contrasting water with hydrogen peroxide.*
POST: *Investigating a water molecule.*

OCEANS

WEEK 2.
PRE: *Discovering an ion.*
LAB: *Exploring why salts dissolve in water.*
POST: *Comparing bodies of salt and fresh water.*

ATMOSPHERE

WEEK 3.
PRE: *Comparing the atmosphere, hydrosphere, and lithosphere.*
LAB: *Exploring atmospheric pressure.*
POST: *Contrasting the atmospheric gases.*

WEATHER

WEEK 4.
PRE: *Discovering how water condenses from air.*
LAB: *Experimenting with precipitation, and evaporation.*
POST: *Investigating the dew point.*

WATER CYCLE - WEATHER (3)

PRE LAB

Students research questions on the weather.

OBJECTIVES:

1. Exploring how weather is formed in the atmosphere.
2. Discovering how water condenses from air.

VOCABULARY:

condensation
hail
sleet
water vapor

MATERIALS:

Internet
Weather Placemats

BACKGROUND:

Weather is a phenomenon that we experience each day, but yet it is scientifically complex. Many children think that we can predict the weather exactly. They see weather personalities on the television with assurances that it will be a sunny or a rainy day. Children often forget those times when the weather person's prediction was wrong.

The atmosphere is forever on the move. Movement is not only because the Earth is rotating on its axis, but temperature and moisture differences causes shifts in the movements. The lowest part of the atmosphere is constantly swirling and stirring which is an area called the troposphere. It is here that everything we call weather occurs.

PROCEDURE:

1. Give students the weather placemats and/or Internet access.

We recommend Dan's Wild Weather Page, An Interactive weather page for kids by Dan Satterfield. Chief Meteorologist for Newschannel 19 in Huntsville, Alabama. This site easily directs students to other sites where they can find answers.

http://www.whnt19.com/kidwx

2. Use the placemats to show students a weather map. Review the 4 elements of weather: moisture, air pressure, wind, and temperature. A meteorologist someone who

studies the weather would also include humidity (the amount of uncondensed water vapor in the air), visibility (the maximum horizontal distance at which you can see an object), and radiation (the number of hours of bright sunshine per day).

3. Ask students the following questions which they can answer on their worksheet. Make sure they reference where they found the answers.

a. What is weather?

Weather is a condition of the air outside.

b. How does the sun affect the weather?

The Sun provides heat. Some parts of the world heat up differently. The differences cause instabilities in the air, which will provide weather.

c. What makes the wind?

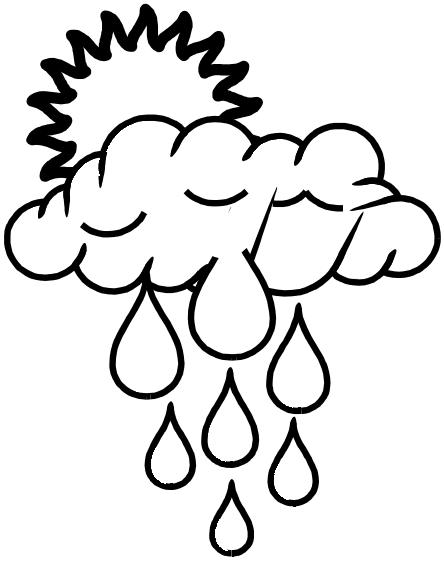
The Sun gives us heat. The Sun and the air together give us wind.

d. How does moisture precipitate in the atmosphere?

In lab students will be concentrating on looking at condensation products and precipitation. Water vapor may condense into a liquid or solid particles which when formed on the ground is termed dew and when formed in the air is termed cloud. When cloud particles become large enough to precipitate, they can fall in the forms of rain, snow, sleet (frozen raindrops), and hail (a complex of clear ice).

WATER CYCLE - WEATHER (3)

Answer the questions below by using the Weather Placemat and/or the Internet. State where you got your answer. Color the pictures.



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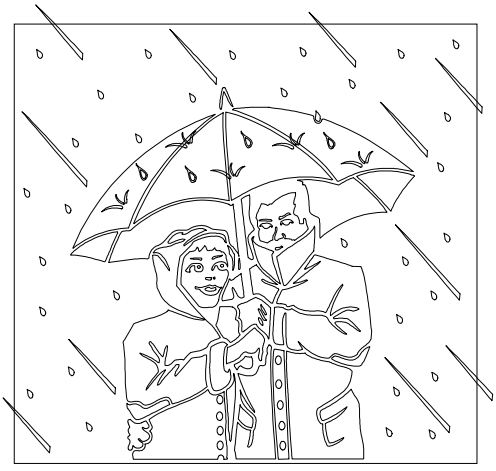


WATER CYCLE - WEATHER (3)

LAB

Students create evaporation and condensation.

OBJECTIVES:

1. Discovering that water can be derived from air.
2. Experimenting with condensation, precipitation, and evaporation.

VOCABULARY:

condensation
dew
evaporation
freeze
frost
precipitation

MATERIALS:

glass beakers or jars
thermometers
clear dish or watchglass
ice
salt

BACKGROUND:

Water is a very versatile substance; it can be a solid, liquid, or gas. It has the ability to change into all these states of matter that make water ideal for making different types of weather. Children do not understand that water is a common component of air and can be “pulled” out.

Condensation which is what this sweat on a glass is called, produces dew. Dew does not fall like rain. It is just water vapor that becomes liquid on a solid surface that has been cooled below a certain temperature. This cooling usually happens during a clear, cool night, but disappears once the morning Sun evaporates the dew. Frost is formed like dew, but at temperatures below freezing. The water vapor changes directly to small, fine frost crystals without condensing into water drop first.

The dew point is the temperature at which the atmosphere is saturated with water vapor. A given volume of air containing higher amount of water vapor has a higher dew point than the same volume of drier air. The dew point gives an indication of the humidity. In meteorology the dew point is applied in the prediction of where and when clouds will form.

In this lab the students will take a close look at what evaporation, condensation, and precipitation mean, by actually creating the different phases. These words are best defined by watching the phenomena. Otherwise, the terms mean very little. Although students live through weather system after system, they rarely observe what is actually occurring.

PROCEDURE:

If you do these examples slowly, students will be able to see these phenomena occurring all around them, just by observing!

Experiment 1. Place some ice in a small clear dish or watchglass. Pour very hot water (almost boiling) into a beaker. Place the crucible on top of the beaker. In a little while the water will condense on the upper side of the crucible and a few drops will fall as "rain." This is an example of condensation.

Experiment 2. Fill a beaker about 1/3 full of water. Add 1 piece of ice and place the thermometer in the beaker. Wait a few minutes. If there is no condensation on the outside of the beaker, add another piece of ice. Continue until "dew" forms on the outside of the glass. Record the temperature at this point, this is called the "dew point."

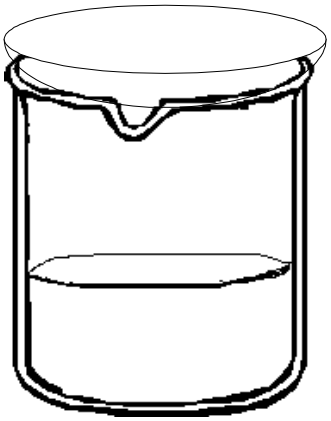
Experiment 3. Put two scoops of ice into a beaker and one scoop of salt. When you start to see ice form on the outside of the beaker, measure the temperature of the ice and salt mixture. This is the temperature it would have to be on this day for frost to form. The salt is added to quickly melt the ice into water vapor, frost is nothing more than frozen water vapor. When you make ice cream, the salt is used in a similar manner.

WATER CYCLE - WEATHER (3) LAB

PROBLEM: How does air form water?

PREDICTION:_____

PROCEDURE: After you complete the experiments, draw what happens. Label the diagrams with the following words: evaporation, condensation, precipitation



EXPERIMENT I.

What happens when you put very hot water in a beaker, and then put a watchglass over the beaker?

_____
_____
_____
_____
_____
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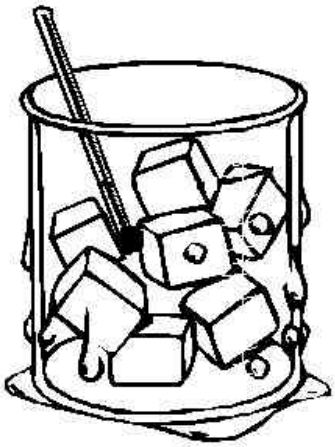
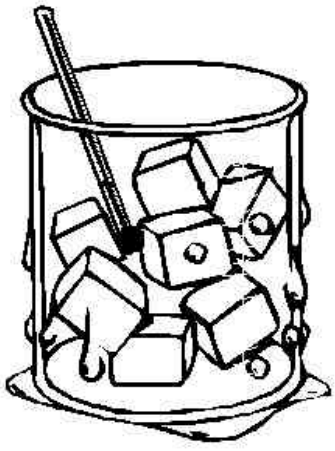


EXPERIMENT II.

At what temperature did dew form (when sweat formed on the outside of the glass)? Describe what happens?

_____
_____
_____
_____



EXPERIMENT III.

Put in two small scoops of ice and one scoop of salt. Describe what happens. Read the temperature when something happens.

_____
_____
_____

CONCLUSIONS: How can you get water from air?

_____
_____

WATER CYCLE - WEATHER

POST LAB

Students create a tornado.

OBJECTIVES:

1. Comparing different types of weather.
2. Discovering how tornadoes form.

VOCABULARY:

tornado
troposphere

MATERIALS:

Tornado Alert by F. Branley
tornado in a bottle

BACKGROUND:

The troposphere creates conditions that produce severe storms in different areas. Some areas are more prone to certain conditions than others. For instance hurricanes commonly occur on the east coast of the United States originating in the warm waters south or southeast of Florida. Moisture and wind direction in the troposphere must be correct for such weather phenomena to happen.

Thunderstorms, generated by temperature imbalances in the atmosphere, are a violent example of convection. The warming of the air near the Earth's surface and/or the cooling of the air above the surface causes instabilities and convective overturning of various layers of hot and cold air.

A severe thunderstorm may spawn a tornado, a violently rotating column of air which descends from a thunderstorm cloud system. On the average, tornadoes move about 30 miles an hour, however, some move very slowly while others speed along at 60 miles an hour or more.

Floods are a natural and inevitable part of life along the rivers of our country. Some floods occur seasonally when winter or spring rains, coupled with melting snows, or torrential rains associated with tropical storms. Drains, small tributaries, and river basins fill with too much water, too quickly and overtop its bank. Other floods are sudden, resulting from heavy localized rainfall. These flash floods are raging torrents which rip through river beds, urban streets, coastal sections and mountains canyons after heavy rains, and sweep everything before them.

Hurricanes are storms that start over tropical waters. The blazing Sun beats down on the ocean waters day after day and the air above this water gets hot. As cold air moves in, it pushes the hot air up until the hot air reaches a cool layer of air. The water vapor

condenses very suddenly and becomes a driving rain. Cooler air from the outside moves in, in a whirling motion, like water going down a drain. The center or "eye" of the hurricane is calm, but all around it the winds and rain are swirling.

PROCEDURE:

1. There are many books and Internet sites on different meteorological conditions where students can get more information. In a book like *Tornado Alert,* the author weaves information with a story. When having the students read this book, inform them they are going to get asked questions. You may want to give the questions before the class reads the book aloud, so students can take notes of the answer. If you only have one book have certain students read a page in front of the class.

2. You may want to have the students play with the "Tornado in a Bottle" before or just after you read the book. Don't quite tell them why they are playing. (You will later ask them if this "model" of a tornado is scientifically accurate.)

3. Ask the following questions to see if students can transfer knowledge from a literature book. You can easily add to the list.

a. Why does a real tornado "twist?"

Cold air meets warm air. The warm air is lighter and moves upward rapidly. As the warm air moves upward it spins around. As the warm air rises it spreads out, giving it a "funnel" look.

b. If you don't live in "tornado alley" should you know how to protect yourself?

Yes, because you never know when you may be traveling into such an area.

c. Is the tornado in the bottle the same as a real tornado?

No, the "twirling" action is caused by a physical circular motion. In a real tornado the motion is caused by warm and cool air. The water temperature in the bottle is the same throughout.

d. How does a tornado "suck" up houses? [Example of not all questions are answered in one book?]

This was not answered in the book. The air pressure inside the funnel plunges several hundred millibars lower than the air pressure outside. This creates a "vacuum cleaner" type suction that can tear trees and suck house up in the funnel. When the tornado stops, the items then plumage to the ground.