

*Weather*  
*and*  
*Seasons*



*by Lillian A. Mitchell*





# Purpose of the Unit

In this unit the students in grades Kindergarten through Third grade will learn about weather conditions, seasonal changes in the weather where they live, and safety during various weather conditions. Students will learn that weather changes from day to day. They will learn about the factors that affect weather; factors like temperature, wind, precipitation and clouds. They will learn about the four seasons and the types of weather within each.

Students will use simple tools to measure weather conditions like temperature, wind and rain. They can graph the daily weather and use this information to predict future weather conditions.

Students will discuss and record information about weather conditions and organize their observations and data on graphs and charts. They will identify various types of severe weather and the safety precautions needed for each such as watch, warning, sirens and safety locations.

They will discuss and record the different animals in the area during each season, how the animals adapt to seasonal changes and where the animals go at the change of the seasons. Students will also observe the changes in plant life during each season.

Students will be encouraged to use expository writing, poetry, art, graphs and charts to show how the concepts covered in the unit can be illustrated through creative expression.

Through a study of this unit, students will develop an understanding of changes in the earth and sky.

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# Pictionary



**Acid Rain:** The kind of polluted rain that damages the environment.



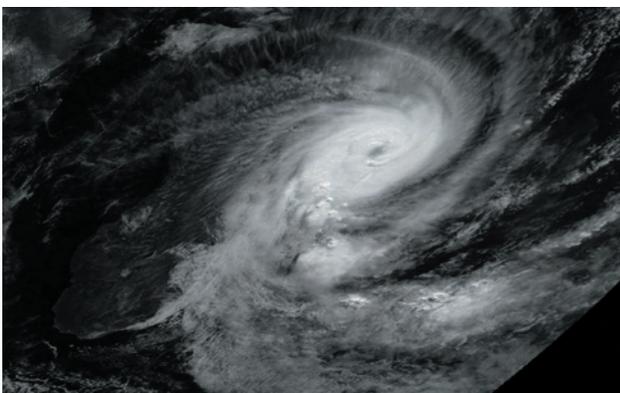
**Dust Storm:** A kind of storm in which dust and dirt are blown across the area.



**Cloud:** A visible white or gray mass that floats in the air and contains water drops or ice particles.



**Hail:** Balls of ice that fall from the clouds and hit the earth.



**Cyclone:** A storm in which air spins rapidly.



**Hurricane:** A large strong storm that has very high winds and a lot of rain.



**Meteorologist:** A scientist who studies the weather



**Rain:** Liquid water that falls from clouds.



**Seasons:** One of the four periods of the year; spring summer, autumn/fall or winter.



**Sleet:** A mixture of rain and snow that falls when from the sky when the temperature is just about freezing.



**Snow:** Fluffy frozen water that falls from clouds



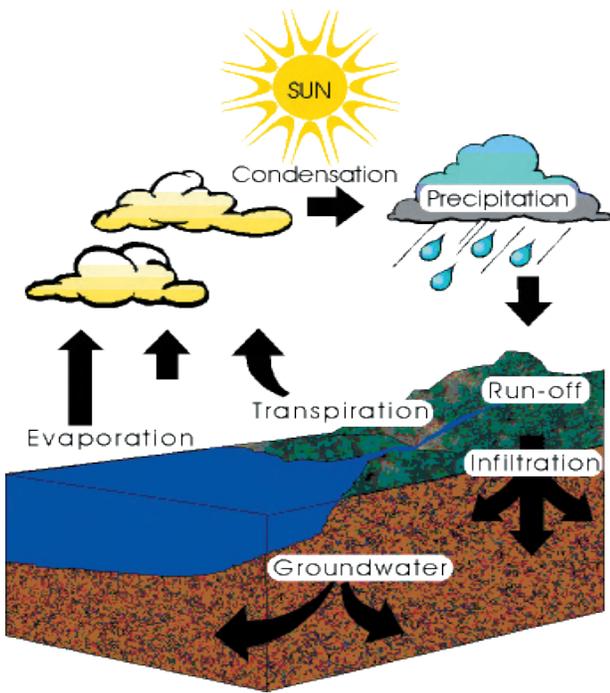
**Snowflake:** Fluffy frozen water that falls from clouds and has six sides.



**Thunderstorm:** A type of storm that causes heavy rain, strong winds, thunder and lightning



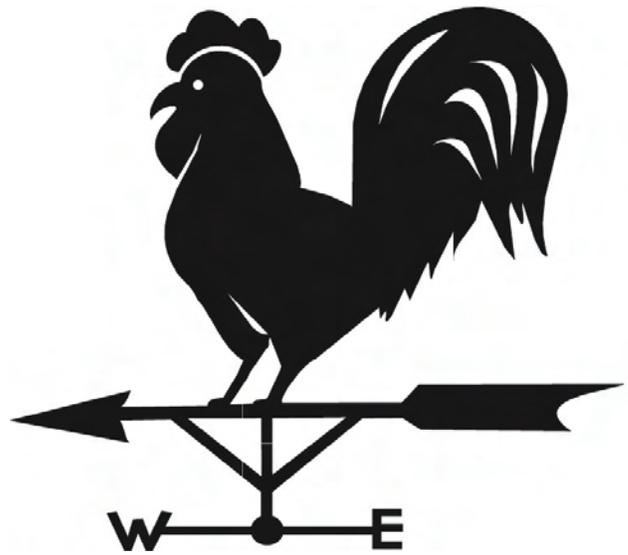
**Tornado and Twister:** Two names for rapidly spinning air that is very dangerous.



**Water Cycle;** The constant exchange of water between the oceans, atmosphere, land and living things.



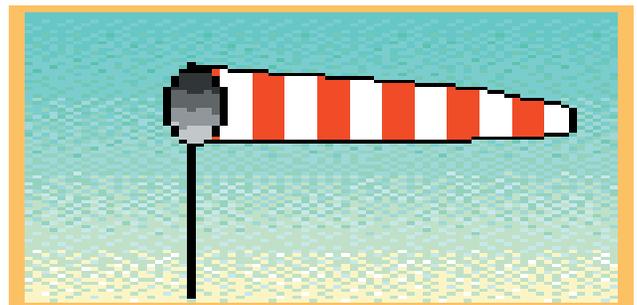
**Weather Balloon:** A device that is sent up into the air to measure information about the weather.



**Weather Vane:** A device that points the way the wind is blowing.



**Wind:** The word for air that blows around outside.



**Wind sock:** It shows which way the wind is blowing and the speed of the wind.

# Find it!

**Name:** \_\_\_\_\_

**Direction:** Use the Pictionary on the previous page to help you answer the questions below.

1. This word starts with an “M.” It is the word for a scientist who studies the weather. What is this word? \_\_\_\_\_
2. This word starts with an “R.” It is the name of liquid water that falls from clouds. What is it called? \_\_\_\_\_
3. This word starts with an “S.” It is fluffy frozen water that falls from clouds. What is it called? \_\_\_\_\_
4. This word starts with an “H.” It is balls of ice that fall from clouds and hit the Earth. What is it called? \_\_\_\_\_
5. This word starts with an “H.” It is a large, strong storm that has very high winds and a lot of rain. What is it called? \_\_\_\_\_
6. This word starts with a “C.” It is the name of a storm in which rapidly-spinning air becomes very dangerous. What is it called? \_\_\_\_\_
7. These two words start with a “T.” They are two more names for rapidly spinning air that is very dangerous. What are they? \_\_\_\_\_ and \_\_\_\_\_  
\_\_\_\_\_
8. This word starts with a “W.” It is the word for air that blows around outside. What is it called? \_\_\_\_\_
9. This phrase starts with a “W.” It is a device that is sent up into the air to measure information about the weather. What is it called? \_\_\_\_\_  
\_\_\_\_\_
10. This two-word phrase starts with a “W.” It is a device that points the way the wind is blowing. What is it called? \_\_\_\_\_
11. This word starts with a “W.” It is another device that points the way the wind is blowing. What is it called? \_\_\_\_\_



Name: \_\_\_\_\_

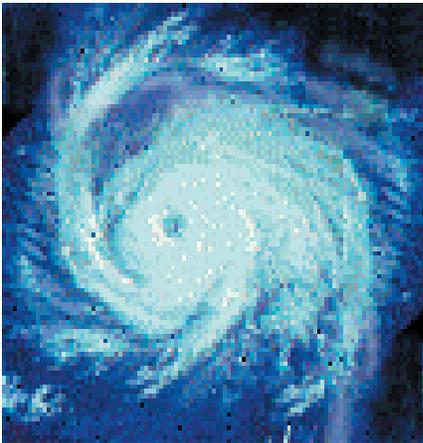


**12.** This phrase starts with a “D.” It is a type of storm in which dirt and dust are blown across dry areas. What is it called? \_\_\_\_\_

**13.** This word starts with a “T.” It is a type of storm that has strong winds, heavy rain, thunder, and lightning. What is it called? \_\_\_\_\_

**14.** This word starts with a “C.” It is a visible white or gray mass that floats in the air and contains tiny water drops or ice particles. What is it called? \_\_\_\_\_

**15.** This phrase starts with an “A.” It is a kind of polluted rain that damages the environment. What is it called? \_\_\_\_\_



# Find it!

**Name:** *Key*

**Direction:** Use the Pictionary on the previous page to help you answer the questions below.

1. This word starts with an “M.” It is the word for a scientist who studies the weather. What is this word? **meteorologist**
2. This word starts with an “R.” It is the name of liquid water that falls from clouds. What is it called? **Rain**
3. This word starts with an “S.” It is fluffy frozen water that falls from clouds. What is it called? **Snow**
4. This word starts with an “H.” It is balls of ice that fall from clouds and hit the Earth. What is it called? **Hail**
5. This word starts with an “H.” It is a large, strong storm that has very high winds and a lot of rain. What is it called? **Hurricane**
6. This word starts with a “C.” It is the name of a storm in which rapidly-spinning air becomes very dangerous. What is it called? **Cyclone**
7. These two words start with a “T.” They are two more names for rapidly spinning air that is very dangerous. What are they? **Tornado and Twister**
8. This word starts with a “W.” It is the word for air that blows around outside. What is it called? **Wind**
9. This phrase starts with a “W.” It is a device that is sent up into the air to measure information about the weather. What is it called? **Weather Balloon**
10. This two-word phrase starts with a “W.” It is a device that points the way the wind is blowing. What is it called? **Weather Vane**
11. This word starts with a “W.” It is another device that points the way the wind is blowing. What is it called? **Windsock**
12. This phrase starts with a “D.” It is a type of storm in which dirt and dust are blown across dry areas. What is it called? **Dust Storm**
13. This word starts with a “T.” It is a type of storm that has strong winds, heavy rain, thunder, and lightning. What is it called? **Thunderstorm**



**Name: Key**

**14.** This word starts with a “C.” It is a visible white or gray mass that floats in the air and contains tiny water drops or ice particles. What is it called? **Cloud**

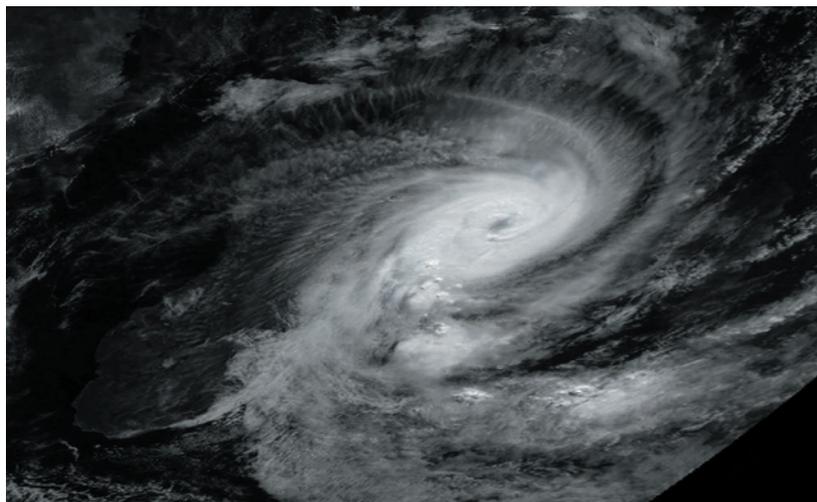
**15.** This phrase starts with an “A.” It is a kind of polluted rain that damages the environment. What is it called? **Acid Rain**



# Weather Stories

## Directions for the teacher:

1. Provide books with weather stories in a reading corner such as *The Snowy Day* by Ezra Jack Keats, to help spark the children's interest and memory.
2. Ask children to think about a day when the weather was important to what they did. Have several children briefly share their stories.
3. Mention that you liked the way the pictures in the stories in the books helped to show the weather, and helped the story. Explain that you would like the children to illustrate the weather in the stories they are thinking of, and to write down the stories.
4. Have the children write and illustrate weather stories.
5. After the children have illustrated their weather stories, ask one child to show the picture and tell the class the story. Tell them that you heard several weather words in their stories, and that you would like to capture those words for the class "Weather Words" chart. Ask the children to circle the weather words in their story, then copy them on a separate sheet of paper. These can be transferred to a "Weather Words" chart.
6. Compile the stories and drawings in a booklet and place it in the Reading Center for all the students to read at their leisure.



# Weather Stories

Name: \_\_\_\_\_

**Directions:** Write an experience you have had with the weather. The students in kindergarten and first grade can tell the teacher their stories and the teacher can write them for the students, or the students can dictate their stories on audiotape. These stories can be used to compile a booklet for the class.

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# What is Weather?

Weather is what the air is like in any one place at any one time. How hot or cold is the air? How much dampness, or moisture, is in it? How fast is the air moving? How heavily does it press on the earth? The basics of weather are light, air and water. Different quantities of these give us the basic weather like sunshine, clouds, rain, wind, fog, snow, and frost.

One Dictionary defines weather as *the condition of atmosphere at a certain place and time, with reference to the presence or absence of sunshine, rain, wind*. The sun is basically the 'engine' that fuels the world's weather. The equator which is the area on earth which faces closest to the sun is heated the most while the north pole and south pole receive the least heat. The atmosphere is constantly trying to even out the temperature irregularities by carrying warm air to places which are cold and cold air to places which are warm. But evening out all these irregularities are more complex than that. Other factors like friction with the land and sea, rotation of the earth and also air which is held within the atmosphere by the earth rarities are involved in looking at weather. These cycles and forces create patterns that are complex and are constantly changing.

In short, weather is the way water changes in the air. Without water, there would be no clouds, rain, snow, thunder, or fog. Weather plays a big part in our lives and affects many of the things that we do. It also affects all things on earth.

Weather is different in different parts of the world. For example, in deserts, it very rarely rains. In tropical jungles, it is hot and steamy. Weather keeps changing all day.

On the other hand, climate stays much the same one year after another. Climate tells what the weather is like in general, all year round. For instance, tropical countries have hot climates and the Arctic has a cold climate.

However, scientists have found that a long time ago, some deserts like the Sahara had a more pleasant climate which was more conducive to plant life than present.



# Weather Words

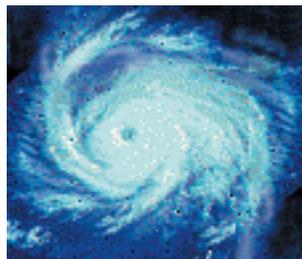
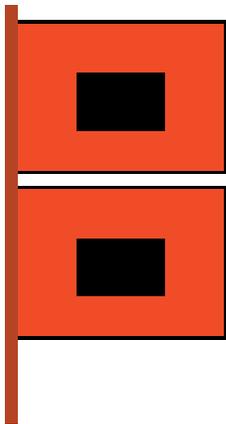
Name: \_\_\_\_\_

Look up the following words in a picture dictionary to answer the questions.

	Look up this Word	Question	Answer
1.	cloud	Clouds contain tiny drops of this substance.	
2.	cyclone	A cyclone is made up of spinning ____.	
3.	dust storm	Where do dust storms occur most frequently?	
4.	hail	Is hail made of snow, ice, or liquid water?	
5.	hurricane	What is the center of a hurricane called?	
6.	lightning	What causes lightning?	
7.	meteorologist	What does a meteorologist study?	
8.	rain	What is the name of the instrument used to measure the amount of rain that has fallen?	
9.	seasons	What season comes after spring?	
10.	sleet	Sleet is freezing ____?	
11.	snow	What does snow fall from?	



12.	snowflake	How many sides does a snowflake have?	
13.	thunderstorm	What happens in a thunderstorm that makes thunder?	
14.	tornado	What is a tornado called when it goes over water?	
15.	twister	Twister is another name for what weather phenomenon?	
16.	water cycle	In the water cycle, where does water go after it is in the sky?	
17.	weather balloon	Where is a weather balloon sent to do its work?	
18.	weather vane	What does a weather vane show you?	
19.	wind	What is the wind made of?	
20.	wind sock	Which of the following does a wind sock show you - the wind's temperature, direction, pressure, and/or speed?	



# Weather Words

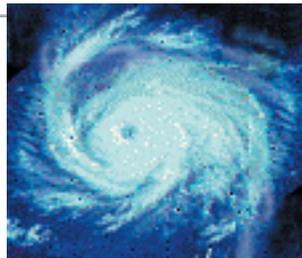
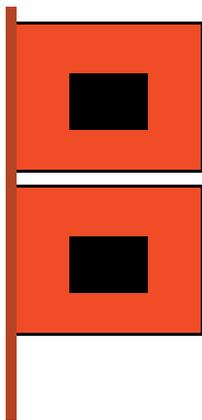
Name: **Key**

Look up the following words in a picture dictionary to answer the questions.

	<b>Look up this Word</b>	<b>Question</b>	<b>Answer</b>
1.	cloud	Clouds contain tiny drops of this substance.	<b>water droplets or ice crystals</b>
2.	cyclone	A cyclone is made up of spinning ____.	<b>wind and rain</b>
3.	dust storm	Where do dust storms occur most frequently?	<b>deserts</b>
4.	hail	Is hail made of snow, ice, or liquid water?	<b>ice</b>
5.	hurricane	What is the center of a hurricane called?	<b>eye</b>
6.	lightning	What causes lightning?	<b>When ice and water inside storm clouds rub together.</b>
7.	meteorologist	What does a meteorologist study?	<b>weather</b>
8.	rain	What is the name of the instrument used to measure the amount of rain that has fallen?	<b>barometer</b>
9.	seasons	What season comes after spring?	<b>summer</b>
10.	sleet	Sleet is freezing ____?	<b>rain</b>
11.	snow	What does snow fall from?	<b>clouds</b>



12.	snowflake	How many sides does a snowflake have?	<b>six</b>
13.	thunderstorm	What happens in a thunderstorm that makes thunder?	<b>lightning</b>
14.	tornado	What is a tornado called when it goes over water?	<b>cyclone</b>
15.	twister	Twister is another name for what weather phenomenon?	<b>tornado</b>
16.	water cycle	In the water cycle, where does water go after it is in the sky?	land
17.	weather balloon	Where is a weather balloon sent to do its work?	<b>high in the sky</b>
18.	weather vane	What does a weather vane show you?	<b>the wind direction</b>
19.	wind	What is the wind made of?	<b>air</b>
20.	wind sock	Which of the following does a wind sock show you - the wind's temperature, direction, pressure, and/or speed?	<b>direction</b>



# The Weather System

The sun is basically the engine for our earth's weather. The heat of the sun is the fuel for the weather. The heat of the sun causes air masses to form and circulate in the atmosphere. These movements create differences in air pressure which in turn, create winds. The air is composed of billions of molecules which are constantly moving in all directions. These molecules bounce when they bump into anything. These collisions constitute air pressure. More collisions mean higher air pressure. Air constantly exerts air pressure on us. The density of air is greater near the surface of earth. Therefore, the greater the height, the lower the density of air. An air mass which is warm expands. Convection is a process where expansion of an air mass causes a drop in density, and the air mass becomes lighter than its surroundings, which then causes the air parcel to rise. This process is constantly taking place in our atmosphere, where the sun provides the heating mechanism. This heating is not uniform because of many factors including the seasons, latitude, cloud cover, reradiation of heat from the land and sea, and winds. Therefore convection occurs more in the warmer parts of the earth.

As warm air rises, an area of low pressure occurs. As cold air sinks, an area of high pressure occurs. Since the atmosphere is constantly evening out all these differences, air from high pressure areas move into lower pressure areas. This movement is called wind. The greater the difference between these two areas the stronger the winds.

Small-scale winds occur as a result of localized differences in air pressure temperature. They may also occur because of the interaction of large scale winds with local land masses.

An example of this is where local winds may develop on clear sunny days. As land heats up faster than water by the sun, the air over the land rises and creates a low pressure area. As the earth is constantly trying to even out all these differences, air from the sea moves to the area over the land. This circulation is called a sea breeze. At night air from the land moves to the area over the sea producing a land breeze.



# Studying Weather

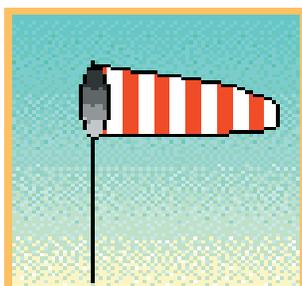
Studying and predicting weather is called meteorology. It is important for many people to know what the weather will be like each day. Farmers will not plant crops if there will be heavy rain or frost. Schools will close if the prediction for snow is very high in terms of the number of inches.

Different types of instruments are used to predict the weather. Many years ago people predicted the weather using signs in nature like the color of the sky at certain times of day. Today, many different kinds of instruments are used to tell about weather conditions.



**A Weathervane** shows wind direction. It has an arrow that moves. This arrow points in the direction the wind is coming from, and a fixed base marked with the compass points.

**An Anemometer** measures wind speed. The cups catch the wind and make the central shaft spin. The number of times it rotates every minute gives the wind speed. The simplest type was invented by Leonardo da Vinci.

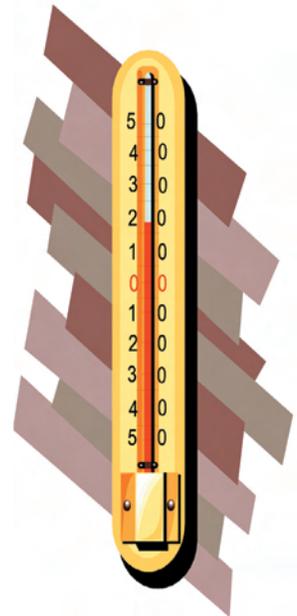


**A windsock** is a device that shows which way the wind is blowing and the wind's speed.

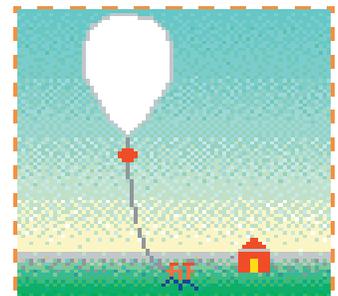


**A barometer** is used to measure air pressure. The barometer below has mercury inside. As air pressure increases, air pushes down on the mercury forcing it up the tube. Air pressure is measured in units called millibars

**A thermometer** measures air temperature. As the temperature changes, the liquid inside the tube expands or contracts. As the liquid expands it moves up the tube, and contracting liquid moves down.



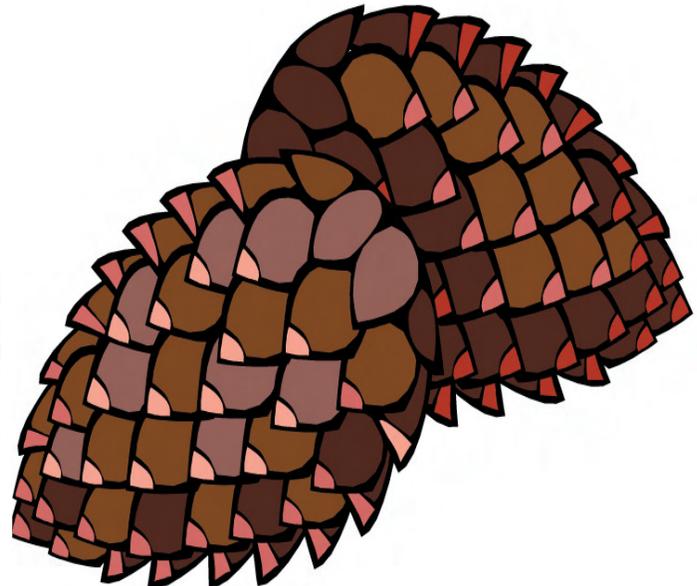
**A weather balloon** is a giant balloon that is sent high in the sky to measure weather information, like temperature, wind speed, and air pressure.





**Hygrometers** measure humidity. The most common type has two thermometers. One is dry and one is kept wet with a damp cloth. Water evaporating from the cloth cools the wet bulb, so the temperature shown is lower than the other thermometer. If the air is dry, more vapor evaporates from the cloth. The difference between the thermometer readings becomes greater. This means that humidity is low.

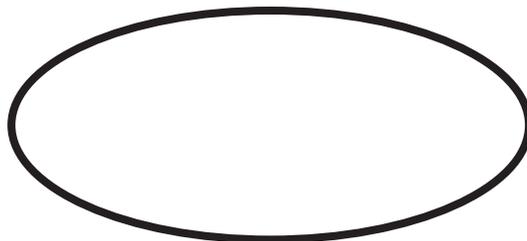
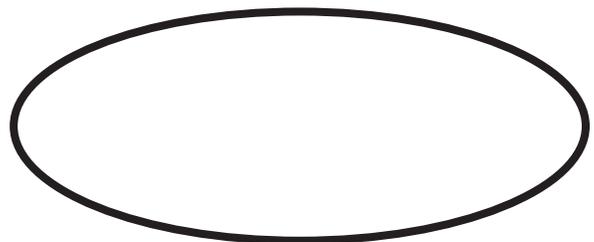
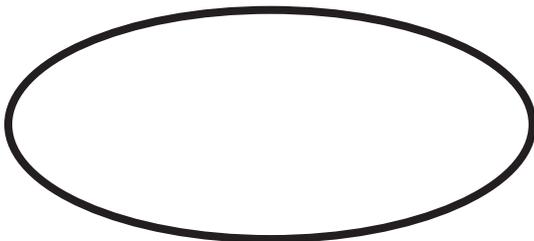
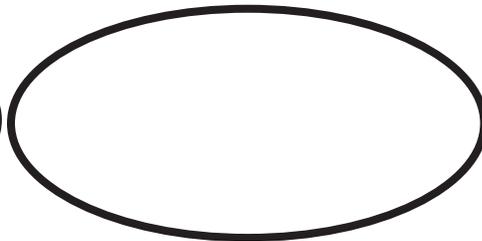
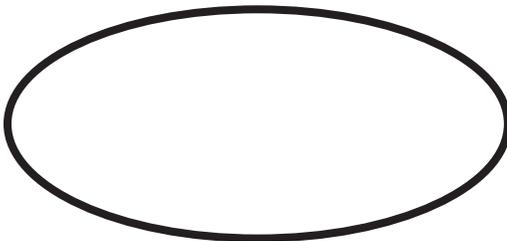
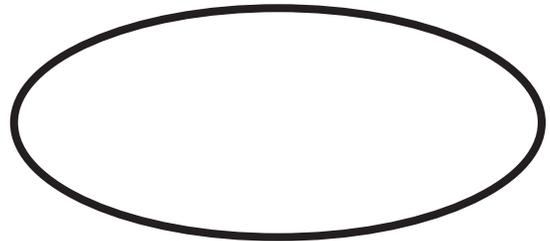
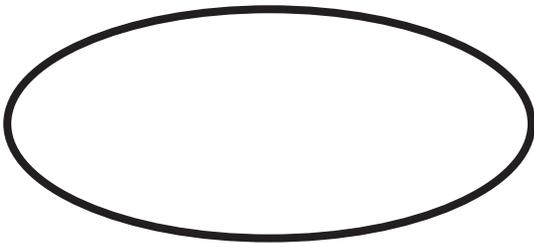
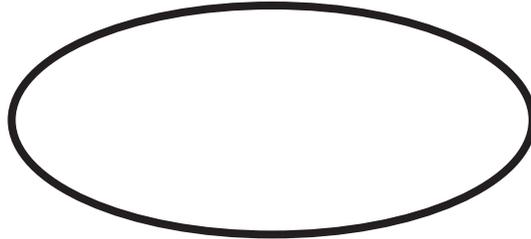
**Pine cones** react to humidity so they can be used to predict wet weather. On a dry day, their scales open out. If the air becomes moist, they close up.



# Weather Words

Name: \_\_\_\_\_

Direction: Write a weather word in each space below.



# Using the Word Weather

Name: \_\_\_\_\_

Direction : Look at the word WEATHER. Form as many words as you can using only the letters in WEATHER.

The form consists of 18 empty ovals arranged in two columns of nine. The ovals are intended for students to write words formed from the letters in the word 'WEATHER'.

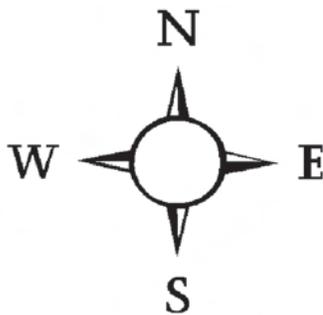
# Observing The Weather

Most of the time it is safe to observe the weather as long as you are dressed appropriately. When the weather report states that it will rain, it will snow, or it will be fine, they are observing the present weather conditions and predicting how they will develop. It helps to see how weather is behaving in the distance so that you can determine how it will affect your local weather. Binoculars can be used to view distant landmarks. Binoculars can also help you study and learn about clouds and their formation. Binoculars should never be used to look at the sun.



## Activity

The movement of smoke from chimneys tells you the direction in which the wind is blowing. Under each picture, write the direction in which the wind is blowing.



# Weather Activity

## Directions:

Divide the class into groups of twos or threes. Be sure that there is one student in each group who can read fluently. The students will read the questions below and write the answer to each question. If the students in one group do not know the answer, they may ask the students from another group.

## Questions

1. Sometimes it is hot outside, sometimes it is cold. Sometimes it is dry and sometimes it is wet. Sometimes the air is still, and sometimes it is breezy. When we describe the conditions outside, what is it called? It starts with a “W.”
2. When water falls from clouds onto the Earth, what is it called? It starts with an “R.”
3. When it is very cold outside, fluffy, frozen water may fall from clouds in the sky. It starts with “S.” What is it called?
4. When it is extremely cold outside, the top layer of lakes and ponds will freeze over. What is the word for frozen water? It starts with “I.”
5. Sometimes, when it is cool outside, frozen, hard balls fall from clouds. What are these balls called? They start with “H” and are made out of frozen water.
6. What warms up the surface of the earth? It starts with an “S.”
7. What is the name of the device that is used to measure temperature? It starts with “T.”
8. What is it called when air moves across the earth? It starts with “W.”
9. What is the name of the device that is sent high into the atmosphere to measure temperature, wind speed, air pressure, and other things? It starts with a “W.”
10. What is the name of a simple device that lets us know which way the wind is blowing? It starts with “W.”



- 11.** What is the name of a puffy thing that moves across the sky? It is made out of water that is in a gaseous state. It starts with “C.”
- 12.** Sometimes, if the sun is shining while it rains, you can see a huge arc of colors across the sky. What is it called? It starts with an “R.”
- 13.** Sometimes, when wind goes around in a circle, it goes faster and faster until it is a very destructive force. What is it called? It starts with “T.”
- 14.** What is another name for this type of rapidly-spinning air? It starts with “C.”
- 15.** Another type of storm is very wet and very windy. It comes from above the tropical oceans and goes onto land, causing a lot of destruction. It starts with “H.” What is it called?
- 16.** This type of storm is very noisy and has very bright flashes of light. What is this storm called? It starts with “T.”
- 17.** These are bright flashes of light and electricity that come from the sky to the ground. They are very dangerous and can make a loud, scary sound. What are these bright flashes called? It starts with “L.”
- 18.** This type of storm is very windy and very dry. It carries bits of dust across the land. What is this storm called? It starts with “D.”
- 19.** Water is constantly recycled on earth. Water falls from the clouds onto the earth. It flows in rivers into the oceans. The water evaporates and turns into clouds, which will make rain again. What is this cycle called? It starts with “W.”



# Weather Activity

**Name: Key**

**Directions:** Divide the class into groups of twos or threes. Be sure that there is one student in each group who can read fluently. The students will read the questions below and write the answer to each question. If the students in one group do not know the answer, they may ask the students from another group.

## Questions

1. Sometimes it is hot outside, sometimes it is cold. Sometimes it is dry and sometimes it is wet. Sometimes the air is still, and sometimes it is breezy. When we describe the conditions outside, what is it called? It starts with a “W.” **Answer: Weather**
2. When water falls from clouds onto the Earth, what is it called? It starts with an “R.” **Answer: Rain**
3. When it is very cold outside, fluffy, frozen water may fall from clouds in the sky. It starts with “S.” What is it called? **Answer: Snow**
4. When it is extremely cold outside, the top layer of lakes and ponds will freeze over. What is the word for frozen water? It starts with “I.” **Answer: Ice**
5. Sometimes, when it is cool outside, frozen, hard balls fall from clouds. What are these balls called? They start with “H” and are made out of frozen water. **Answer: Hail**
6. What warms up the surface of the Earth? It starts with an “S.” **Answer: Sun**
7. What is the name of the device that is used to measure temperature? It starts with “T.” **Answer: Thermometer**
8. What is it called when air moves across the Earth? It starts with “W.” **Answer: Wind**
9. What is the name of the device that is sent high into the atmosphere to measure temperature, wind speed, air pressure, and other things? It starts with a “W.” **Answer: Weather balloon**
10. What is the name of a simple device that lets us know which way the wind is blowing? It starts with “W.” **Answer: Weather vane**



**11.** What is the name of a puffy thing that moves across the sky? It is made out of water that is in a gaseous state. It starts with “C.” **Answer: Cloud**

**12.** Sometimes, if the Sun is shining while it rains, you can see a huge arc of colors across the sky. What is it called? It starts with an “R.” **Answer: Rainbow**

**13.** Sometimes, when wind goes around in a circle, it goes faster and faster until it is a very destructive force. What is it called? It starts with “T.” **Answer: Tornado or Twister**

**14.** What is another name for this type of rapidly-spinning air? It starts with “C.” **Answer: Cyclone**

**15.** Another type of storm is very wet and very windy. It comes from above the tropical oceans and goes onto land, causing a lot of destruction. It starts with “H.” What is it called? **Answer: Hurricane**

**16.** This type of storm is very noisy and has very bright flashes of light. What is this storm called? It starts with “T.” **Answer: Thunderstorm**

**17.** These are bright flashes of light and electricity that come from the sky to the ground. They are very dangerous and can make a loud, scary sound. What are these bright flashes called? It starts with “L.” **Answer: Lightning**

**18.** This type of storm is very windy and very dry. It carries bits of dust across the land. What is this storm called? It starts with “D.” **Answer: Dust Storm**

**19.** Water is constantly recycled on Earth. Water falls from the clouds onto the Earth. It flows in rivers into the oceans. The water evaporates and turns into clouds, which will make rain again. What is this cycle called? It starts with “W.” **Answer: Water cycle**



# What Makes Weather?

By Helen H. Moore

What makes weather?  
Do you know?  
What makes rain,  
and sleet,  
and snow?

What makes summer warm and breezy?  
What makes winter cold and sneezy?  
What makes autumn crisp and keen?  
What makes spring so warm and green?

I know, I know  
what makes weather!  
Lots of things that work together:  
Wind and water,  
earth's rotation,  
bring the seasons  
to each nation.  
So now we all know  
what makes weather  
lots of things that  
work together!

Courtesy of [http://www.k12.hi.us/~shasincl/poems\\_prop\\_cycle\\_weather.html](http://www.k12.hi.us/~shasincl/poems_prop_cycle_weather.html)



# What to Do During Severe Weather

Create a plan for home and school describing what to do during a snow storm, a thunderstorm, a tornado, a tsunami or a hurricane. Use the information in the Unit to help you. Be as creative as you can.

<p><b>Natural Disasters</b></p> <p><b>Tornadoes</b></p>  <p><b>Lillian Mitchell</b></p>	<p><b>Keep these things for emergencies</b></p> <p>Have disaster supplies on hand:</p> <ul style="list-style-type: none"><li>• Flashlight and extra batteries</li><li>• Portable, battery-operated radio and extra batteries</li><li>• First aid kit and manual</li><li>• Emergency food and water</li><li>• Nonelectric can opener</li><li>• Essential medicines</li><li>• Cash and credit cards</li><li>• Sturdy shoes</li></ul> <p><b>Tornado Danger Signs</b></p> <p>Learn these tornado danger signs:</p> <ul style="list-style-type: none"><li>• An approaching cloud of debris can mark the location of a tornado even if a funnel is not visible.</li><li>• Before a tornado hits, the wind may die down and the air may become very still.</li><li>• Tornadoes generally occur near the trailing edge of a thunderstorm. It is not uncommon to see clear, sunlit skies behind a tornado.</li></ul>
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## All About Tornadoes

## All About Tornadoes

### What is a tornado?

A tornado is a violent whirlwind. It looks like a rotating funnel-shaped cloud. It starts as a thunderstorm (or sometimes as a result of a hurricane) and produces warm, cool air overriden a layer of warm air, forcing the warm air to rise rapidly. Tornado season is generally March through August, although tornadoes can occur at any time of year. They tend to occur in the afternoons and evenings over 80 percent of all tornadoes strike between noon and midnight.

### What to do in a storm

When a tornado threatens, people need to have a safe place to go and time to get there. Even though a climatology has more equipment to know when a tornado is going strike, warning times may be short or sometimes not possible. Lives are saved when individuals receive and understand the warning, know what to do, and know the safest place to go.



When a tornado is coming, you have only a short amount of time to make life-or-death decisions. Advance planning and quick response are the keys to surviving a tornado.



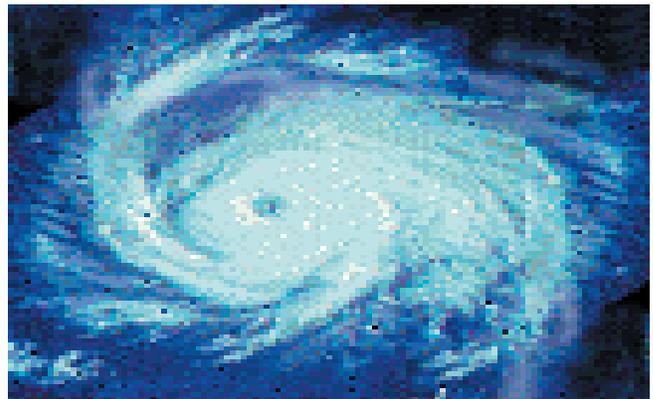
### Before a Tornado How to Plan

- Conduct tornado drills each tornado season.
- Designate an area in the home as a shelter, and practice having everyone in the family go there in response to a tornado threat.
- Discuss with family members the difference between a "tornado watch" and a "tornado warning."
- Contact your local emergency management office or American Red Cross chapter for more information on tornadoes.

# Weather Riddles

Have some fun with your group mates. Be sure that your teacher approves.

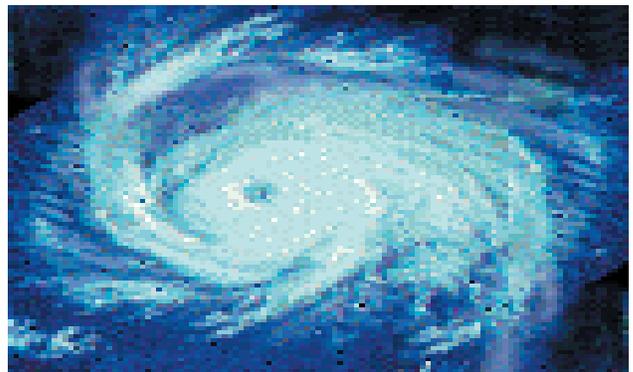
1. What did one tornado say to the other tornado?
2. What did one thermometer say to the other thermometer?
3. What is the difference between a horse and the weather?
4. What did one raindrop say to the other raindrop?
5. Why did the woman go outdoors with her purse open?
6. What is the difference between weather and climate?
7. What happens when it rains cats and dogs?
8. What happens when it rains chickens and ducks?
9. What did one hurricane say to the other hurricane?



# Weather Riddles

Have some fun with your group mates. Be sure that your teacher approves.

1. What did one tornado say to the other tornado?  
***Let's twist again like we did last summer.***
2. What did one thermometer say to the other thermometer?  
***You make my temperature rise.***
3. What is the difference between a horse and the weather?  
***One is reined up and the other rains down.***
4. What did one raindrop say to the other raindrop?  
***My plop is bigger than your plop.***
5. Why did the woman go outdoors with her purse open?  
***Because she expected some change in the weather.***
6. What is the difference between weather and climate?  
***You can't weather a tree but you can climate.***
7. What happens when it rains cats and dogs?  
***You have to be careful not to step in a poodle.***
8. What happens when it rains chickens and ducks?  
***Foul (Fowl) weather.***
9. What did one hurricane say to the other hurricane?  
***I have my eye on you.***



# What Makes the Wind Blow

Wind is just moving air. The earth is surrounded by air, which is unevenly heated by the sun. The equator is surrounded with hot air, cold air surrounds the north and south poles. Warm air rises and cold air sinks, and this movement creates wind. Movement in one place causes movement in another. If we pour a cup of water into a full bucket, all the water swirls and moves. Similarly winds cross the earth's surface. All winds blow from areas of high pressure to areas of low pressure.

The movement of air around the globe creates wind that blows in the same direction and across the same region most of the time. These are called prevailing winds. There are also local winds which exist on a much smaller scale. These blow between smaller areas between high and low pressure that move around and over the land and sea.

In the general movement of the air around the world the following takes place:

1. Warm air rises at the equator and produces a band of low pressure.
2. As the air rises higher, it cools.
3. The cool air sinks to form bands of high pressure in the area around 30 degrees north and south of the equator.
4. The air in these bands meets with the colder denser air moving away from the poles. It is forced to rise again, creating bands of low pressure at about 60 degrees north and south. These are areas of unsettled weather.



# Local and Global Winds

The movement of air around the globe creates winds that blow in the same direction and across the same region most of the time. These are called prevailing winds. There are also local winds which exist on a much smaller scale. These blow between the smaller areas of high and low pressure that move around over land and sea.

Bands of high winds called jet streams go around the earth from west to east. They are so strong that pilots can cut hours off their flight times if they fly along with them.

Local Winds Winds affect the weather and are given special names in many parts of the world.

Brickfielder	Very hot north-east summer wind that blows dust and sand across Australia.
Chinook	Warm, dry wind of the Rocky Mountains, USA. Welcomed by cattlemen because it can remove snow cover very quickly. Named after a local Indian tribe.
Fohn	Warm, dry European wind that flows down the side of mountains.
Haboob	The Arabic name for a violent wind which raises sandstorms, especially in North Africa.
Levanter	Pleasant, moist east wind that brings mild weather to the Mediterranean.
Mistral	Violent, dry, cold, north-west wind that blows along the coasts of Spain and France.



# Local and Global Winds Game

Create a matching game using the words and their meanings in the section titled Local and Global Winds. Play a memory game with your group mates.

Write each word on a separate card.  
Write the meanings on separate cards.

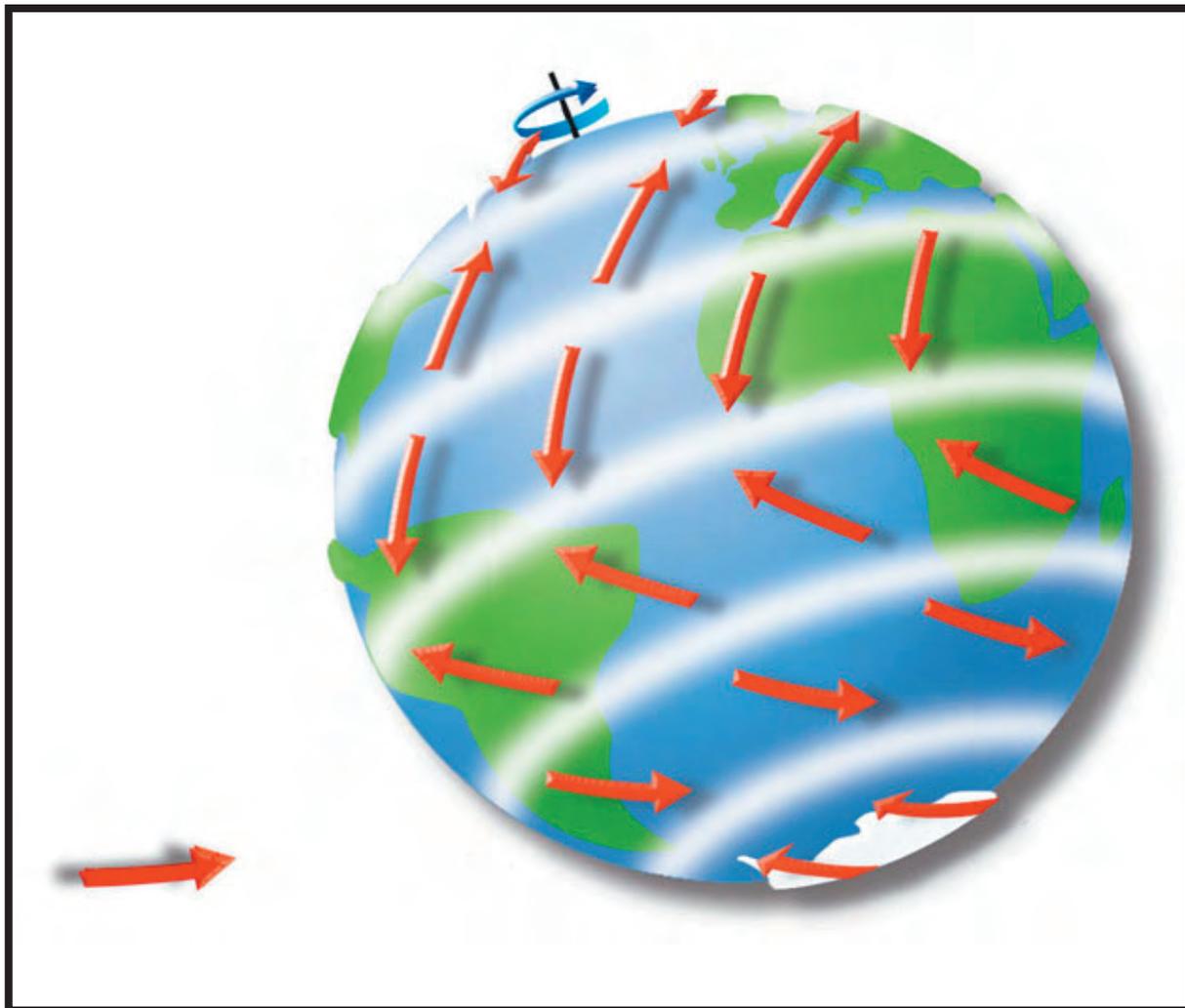
Turn each card face down. The object of the game is to match each word with its meaning.

<b>BRICKFIELDER</b>	<b>Very hot north-east summer wind that blows dust and sand across Australia.</b>

# Swerving Winds

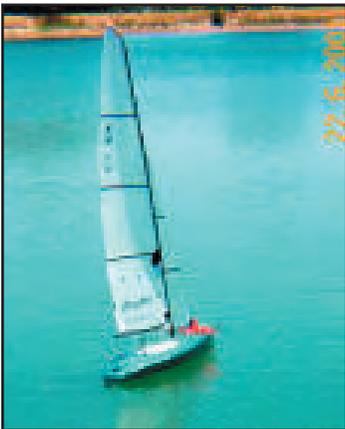
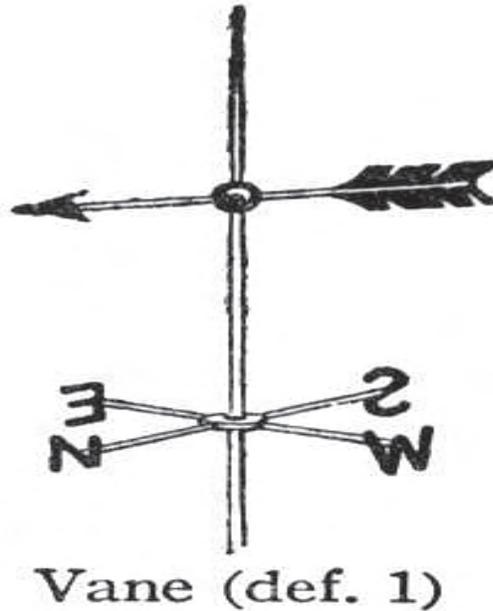
Name: \_\_\_\_\_

**Direction:** Look at the drawing below. Use the internet to help you. Go to [www.usborne-quicklinks.com](http://www.usborne-quicklinks.com). Click on the title "Introduction to Weather and Climate Change". Enter page 47. Click on "Swerving Winds". Use the information to complete the drawing below.



# Measuring the Wind

A wind vane is an instrument that indicates the direction from which the wind is blowing.



**Light air: 1-3 mph**



**Fresh breeze: 19-29 mph**

# How to Measure Wind

The two most important things about the wind are its speed and direction in which it is blowing. We use a weather vane or a windsock which is a kind of long cloth tube through which the wind is funneled to see in which direction the wind is blowing. Wind speed is measured by the Beaufort Scale, windsocks or by special scientific instruments called anemometers. The unit of measurement is kilometres per hour (km/h) or knots.

The Beaufort Scale was invented in 1805 by Admiral Beaufort to estimate wind speed through observations of objects. The original scale was for use at sea but it has been adapted for use on land.

## The Beaufort Scale

	Strength	km/h	Effect
0	Calm	0-1	Smoke rises vertically
1	Light air	1-5	Smoke drifts slowly
2	Light breeze	6-11	Wind felt on face; leaves rustle
3	Gentle breeze	12-19	Twigs move; light flag unfurls
4	Moderate breeze	20-29	Dust and paper blown about; small branches move
5	Fresh breeze	30-39	Wavelets on inland water; small trees move
6	Strong breeze	40-50	Large branches sway; umbrellas turn inside out
7	Near gale	51-61	Whole trees sway; difficult to walk against wind
8	Gale	62-74	Twigs break off trees; walking very hard
9	Strong gale	75-87	Chimney pots, roof tiles and branches blown down
10	Storm	88-101	Widespread damage to buildings
11	Violent Storm	102-117	Widespread damage to buildings
12	Hurricane	Over 119	Devastation

# What Makes the Wind Blow

## Activity for Students

1. Ask children to think about yesterday's weather: "Was it windy?" Ask: "Is today windy?"
2. Ask the class to go outside and check on the wind and also to measure the temperature. Have the children look at trees, bushes, signs, flags, and clouds. Ask: "Is anything moving? Is it really windy, a little windy, or not windy at all?"
3. Ask children to observe the sky. "Is it clear, cloudy? Is any water falling out of the sky?" Have the children read the outdoor air temperature.
4. Return to the classroom and use the class weather chart to record the wind (very windy, somewhat windy, not windy), temperature, and any other observations.
5. "What is wind?" Wind is moving air. "What makes air move?" Children may suggest that something pushes the air. Accept all reasonable ideas.
6. Give each group the tag board, scissors, pin, and straw that they need to make a pinwheel. Supervise their cutting of the pinwheel pattern and help the children fold the pinwheel and pin it so that it will turn. Let them try to turn the wheel by blowing on it or swishing it.
7. Do a demonstration to give the children a clue about what makes air move. Show the class the light bulb before it is turned on. Ask: "Is the bulb hot or cold?" (The bulb is cold). Have a child feel on or near the bulb. Turn the light on. Ask again: "Is the bulb hot or cold?" [Very hot.] Have a child feel above the bulb, warning them strictly that they can get badly burned by actually touching it.
8. Now hold up the pinwheel you have prepared. "Is it moving? What would make it move?" Blow on it. "Did it move? What made it move?" (Moving air.)



9. Hold the pinwheel just above the light bulb. Ask: “Is it moving? What would make it move?” Have a child feel the air above the bulb. Ask: “Is the air hot or cold?” All of your children may want to feel the difference in air temperature. Have them form a line and walk past the demo, carefully feeling the heated air just above the bulb and feeling cooler air farther above, or the side.
10. Ask children to draw pictures of the demonstration and label the warm and cool parts of the air. Have them use arrows to show the direction the air is moving. Explain that when air gets warm it starts to move up. When air starts to cool it moves down. When the sun shines on the earth it warms air. As the air goes up it cools and starts to fall down. The moving air is called wind. Show children a globe. Point to an area that they would recognize as a very warm, sunny place. (Most Michigan children recognize that Florida has hot weather.) Say: “The air gets very warm near the equator, in places like Florida. The hot air is pushed up and then around the world. You were making wind (breathe) to turn your pinwheel. But weather wind is pushed by the sun.”
11. Ask children to orally explain what pushes the wind and help them write it in their Student Pages.
12. Accept children’s input and refer to Internet or news sources as you prepare a prediction for the following day. Write down the forecast.

### **Homework Assignment**

Ask children to explore how early windmills used blades like the pinwheel to catch the wind and to use its power to run pumps.

Students can also research windmill farms that are used to provide electricity.



# Making a Pinwheel

## MATERIALS:

- pin
- scissors
- sharpened pencil with eraser
- square piece of construction paper (about 8.5" x 8.5")

## DIRECTION:

Lay the square piece of paper flat on a table and draw a line diagonally from each corner to the opposite corner.

Mark the center of the square where the two lines cross and punch a small hole through it with the pencil tip.

Cut along each line stopping about an inch from the hole in the center of the square.

Take the pin and punch a hole in the top left corner of each of the four flaps. (No two holes should be next to each other.)

Pick up a flap at each punched corner and carefully curve it over toward the center hole, securing it with the pin. Repeat this for the other flaps.

When all four flaps are held by the pin, carefully lift the paper without letting the flaps unfurl.

Lay the pencil flat on a table and push the point of the pin into the side of the eraser.

Now your pinwheel is complete! Pick up the pinwheel near the pencil point and let it catch the wind. You will notice that the pinwheel only spins when the wind hits its center. Take your pinwheel outside and hold it up. Observe whether it is not windy, somewhat windy or very windy. Do this at the same time each day for one month and record your observation on the chart provided. At the end of the week, plot a graph to show how windy it was during that week.



# Observing the Wind

Name: \_\_\_\_\_

Direction: Each day for one month use your pinwheel to observe the wind. Record your observation on the chart below. Write no wind, slightly windy, or very windy.

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1					
Week 2					
Week 3					
Week 4					



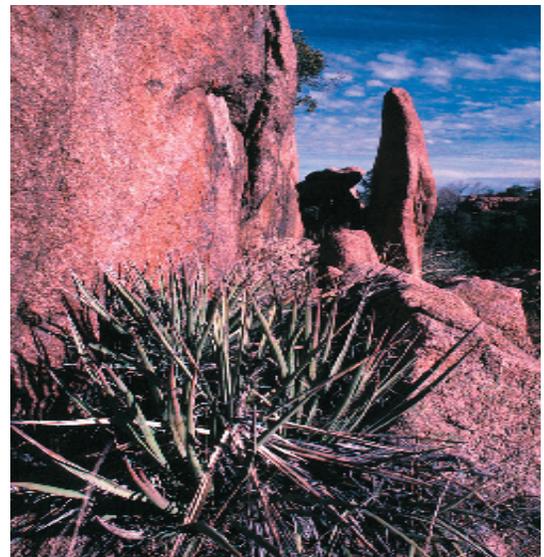
# The Power of the Wind



**Wind energy can drive large ships and it can also be used to generate electricity. Wind turbines like the ones in the picture have large blades mounted on top of tall towers. They are built in exposed windy places, often in a group called a wind farm. Many wind turbines are needed for a wind farm to produce as much electricity as an ordinary power station.**

**When desert sand is blown around by fierce winds, it can wear away solid rock. This leaves weird shapes that look like modern sculptors. Many sand sculptures are top heavy because wind tends to wear away the rock near the ground.**

**What happens to the sand sculptures when the top is too heavy?**



# Patriotic Wind Sock Craft

You can make a patriotic wind sock from an oatmeal box, construction paper, string, and crepe paper streamers.

## Materials:

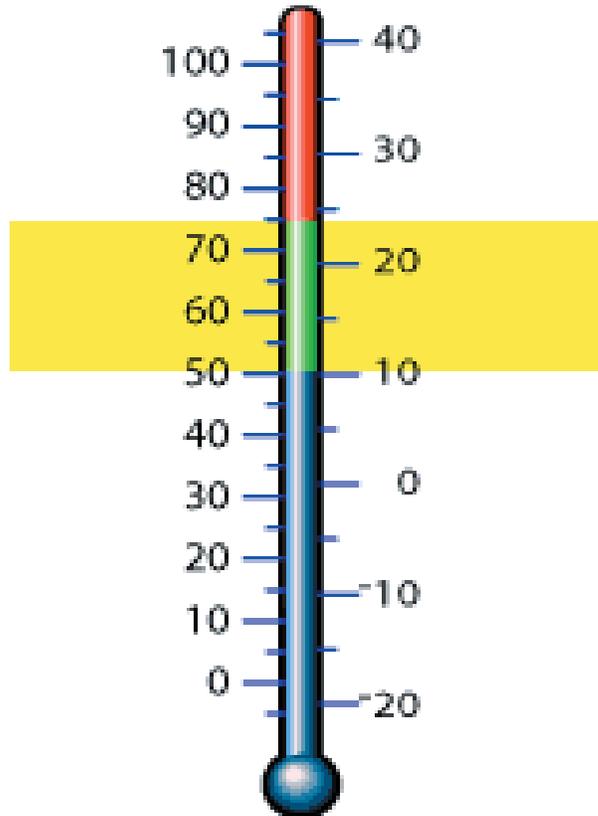
- A cylindrical cardboard oatmeal box
- Construction paper (blue and white)
- Red and white crepe paper streamers
- Glue
- String
- Scissors
- Hole Punch



## Procedure

1. Cut the bottom off a cylindrical cardboard oatmeal box.
2. Cover the box with blue construction paper and then glue on white construction paper stars.
3. Cut some red and white crepe paper streamers and glue or staple them to one end of the wind sock.
4. Punch four holes along the top of the wind sock.
5. Cut two pieces of string about a foot long. Tie the strings to the wind sock (tie the opposite ends of a string to holes on opposite sides of the cylinder).
6. Tie a longer piece of string to the smaller pieces - you'll hang the wind sock from this piece of string.
7. Hang your patriotic wind sock from your window or porch.

# Measuring Temperature of Water



## How to Measure Water Temperature:

Lower the thermometer a few inches below the water surface.

Keep the thermometer in the water for three (3) minutes until a constant reading is obtained.

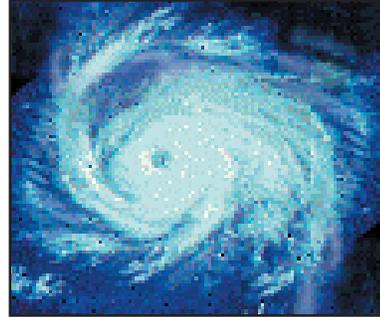
Record the measurement in the temperature data record.

# Hurricanes

## How Hurricanes Form and Die

What does a hurricane need to form?

- low air pressure
- warm temperatures
- moist ocean air
- tropical winds near the equator



Hurricanes form in the tropics over warm ocean water. The water must be over 80°Fahrenheit or 27°Celsius and at latitudes between 8° and 20°. Hurricanes form mostly from June through November. This is called the hurricane season. Once formed, hurricanes follow a path away from the equator. Hurricanes grow stronger over warm water.

Hurricane danger spots are the western Pacific Ocean, the Bay of Bengal and the Caribbean.

A hurricane goes through many stages as it develops.

- It starts as a **tropical wave**, a westward-moving area of low air pressure.
- As the warm, moist air over the ocean rises in the low air pressure area, cold air from above replaces it. This produces strong gusty winds, heavy rain and thunderclouds that is called a **tropical disturbance**.
- As the air pressure drops and there are sustained winds up to 38 miles per hour, it is called a **tropical depression**.
- When the cyclonic winds have sustained speeds from 39 to 73 miles per hour, it is called a **tropical storm**.
- The storm becomes a **hurricane** when there are sustained winds of over 73 miles per hour.

When does a storm end?

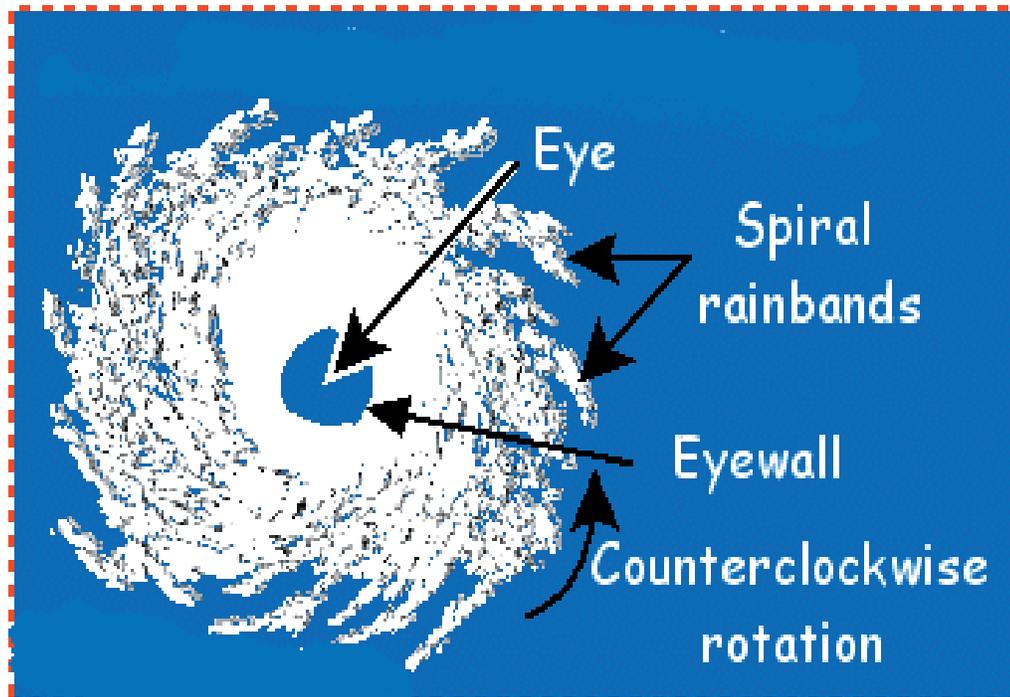
When a hurricane travels over land or cold water its energy source which is warm water is gone, and the storm weakens, quickly dying.

# The Structure of the Hurricane

Hurricanes have a circular center which is called the eye. This area is always calm and there is little or no rain there. The eye is about 20 to 30 miles wide and is the warmest part of the storm. The winds blow counterclockwise spiraling around the eye.

The eyewall surrounds the eye of the storm. This is a wall of thunderclouds. The eyewall has the most rain and the strongest winds of the storm. The winds may blow up to 225 miles per hour during severe storms. The smaller the eye of the storm the stronger the winds blow.

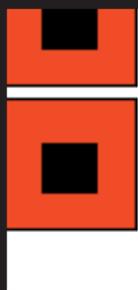
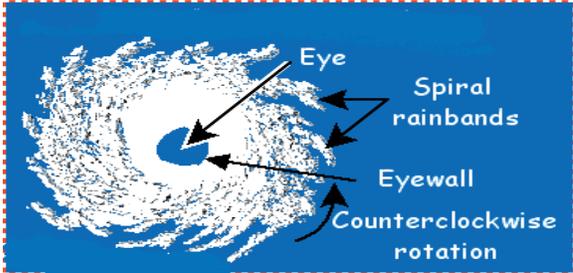
Hurricanes travel about 20 to 30 miles per hour across ocean or land. If you are facing in the direction that the hurricane is traveling, the right side usually has the fastest winds, and the left side usually has the most rain.



# Hurricane Related Words

Name \_\_\_\_\_

Direction: Write a name of the following hurricane related pictures. Where there is no picture, draw and label your own.

# What Hurricanes Can Do

One of the first signs of a hurricane is thick cirrus clouds. Light rain soon becomes torrential and is driven by a wind that becomes increasingly stronger. During the hurricane, wind speed increases and as the eye passes over, the sky clears and the wind stops. As the eye moves on, the rain and wind resume.



Air pressure inside a hurricane drops and allows the sea level to rise and flood low lying areas.

## Experiment showing rising sea level during a hurricane

Materials needed:

- Glass bowl
- Dishpan
- Plastic tubing
- 2 cups
- water

1. Half-fill the dishpan with water. Stand the cups upside down in the pan and place the glass bowl upside down on them so that the edge of the bowl is about the center of each cup. The rim of the bowl must be below the surface of the water.
2. Pinch one end of the tube closed and push it into the air space in the glass bowl. Suck on the tube to reduce the air pressure. The water will rise.
3. Remove the tubing and you will be left with a raised wall of water. Lift the bowl to release the water and you will create a small storm surge.

# Model Hurricane

The clouds around a hurricane form spiral bands. You can make a hurricane vortex in water showing that spiraling water also forms bands.

## Experiment showing a model hurricane

### Materials:

- Eye dropper
- Food coloring
- Mixer
- Bowl
- Water

### Procedure:

1. Fill the bowl with luke warm water. The bigger the bowl the better.
2. Stir the water gently until it is all moving slowly in a circle around the bowl.
3. Release a few drops of food coloring into the center of the bowl.
4. Watch the color move out and form bands—just as clouds in a hurricane do.



# Hurricane Vocabulary

## Air pressure

Air pressure is the weight of the column of air that extends from the ground or the surface of the water to the top of the atmosphere. Air pressure is also called barometric pressure and measured by a barometer. The air pressure is very low in a hurricane.

## Anemometer

An anemometer is a weather instrument that measures wind speed.



## Atlantic Ocean

The Atlantic Ocean is a large body of salt water that separates the Americas from Europe and Africa. It is the second largest ocean.

## Barometer

A barometer is a device that measures air or barometric pressure. It measures the weight per square inch of the column of air that extends from the instrument to the top of the atmosphere.



## Barometric pressure

Barometric pressure is the weight of the column of air that extends from the ground (or water's surface) to the top of the atmosphere. It is also called air pressure. Air pressure is measured by a barometer. The barometric pressure is very low in a hurricane.

## Counter clockwise

Counterclockwise motion goes in a circle in the opposite direction from the way a clock moves. Hurricane winds blow in a counterclockwise direction.

## Cyclone

A cyclone is a closed, rotating wind. Cyclones rotate counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

## **Degree**

A degree is a unit of measurement of an angle; a degree is also written  $^{\circ}$ . There are 360 degrees in a circle. Each degree is divided into 60 minutes, written as the symbol  $'$ . For example, 10 and a half degrees is written  $10^{\circ} 30'$ . Latitude and longitude are measured in degrees.

## **Equator**

The equator is an imaginary circle around the earth, halfway between the north and south poles.

## **Eye**

Hurricane winds blow in a spiral around the calm, roughly circular center called the eye. In the eye, which is about 20 - 30 miles wide, it is relatively calm and there is little or no rain. The eye is the warmest part of the storm.

## **Eyewall**

Also called the wall cloud. Surrounding the eye is the eyewall, a band of thunder clouds. The eyewall has the most rain and the strongest winds of the storm, gusting up to 225 mph (360 km/h). The smaller the eye, the stronger the winds.

## **Forecast**

A forecast is a prediction of future weather made by meteorologists.

## **Hurricane**

A hurricane is a powerful, rotating storm that forms over warm oceans near the equator. Hurricanes have strong, counterclockwise winds (at least 74 miles per hour or 119 kph), a huge amount of rain, low air pressure, thunder and lightning.

## **Hurricane season**

Hurricane season is from June 1 until November 30, when most Atlantic Ocean hurricanes occur. In the eastern Pacific Ocean, hurricane season is from May 15 until November 30.

## **Hurricane Warning**

A hurricane warning means that a hurricane is expected in the warning area within 24 hours or less.

## **Marine flags**

The marine flags that warn of a hurricane are two square red flags, each with a black square in the middle.



## **Hurricane Watch**

A hurricane watch means that a hurricane is possible in a given area within 36 hours.

## **International Date Line**

The International Date Line (IDL) is an imaginary north-south line (at the 180th meridian), in the Pacific Ocean, at which the date changes. The east side of the IDL is a calendar day earlier than the west side. The actual IDL used is not a straight line, but zigzags around certain populated areas.

## **isobar**

An isobar is a line on a weather map that represents constant barometric or air pressure.

## **Jet stream**

The jet stream is a narrow, powerful wind that flows high in the atmosphere.

## **Landfall**

Landfall is when a hurricane first goes over land.

## **Latitude**

Latitude is the angular distance north or south from the equator to a particular location. The equator has a latitude of zero degrees. The north pole has a latitude of 90 degrees north; the south pole has a latitude of 90 degrees south.

## **Longitude**

Longitude is the angular distance east or west from the north-south line that passes through Greenwich, England, to a particular location. Greenwich, England, has a longitude of zero degrees. The farther east or west of Greenwich you are, the greater your longitude. The Midway Islands in the Pacific Ocean have a longitude of 180 degrees they are on the opposite side of the globe from Greenwich.

## **Meteorology**

Meteorology is the science that deals with weather. A scientist who studies weather is called a meteorologist.



## **National Hurricane Center**

The National Hurricane Center is a US government organization that tracks hurricanes in the Atlantic, Caribbean, Gulf of Mexico and eastern Pacific, and issues advisories about the storms.

## **Spiral rainbands**

Spiral rainbands are long bands of rain clouds that seem to spiral into the eye-wall.

## **tropical cyclone**

A tropical cyclone is a violent low-pressure weather system in which the central core is warmer than the surrounding winds. If it forms in the Atlantic or eastern Pacific Ocean, it is called a hurricane. If it forms in the western Pacific Ocean, it is called a typhoon.

## **tropical depression**

A hurricane goes through many stages as it develops. As the air pressure drops and there are sustained winds up to 38 miles per hour, it is called a tropical depression.

## **tropical storm**

A hurricane goes through many stages as it develops. When the cyclonic winds have sustained speeds from 39 to 73 miles per hour, it is called a tropical storm.

## **vortex**

A vortex is a spinning flow of air.



## **weather map**

A weather map is a map that shows weather conditions for a given time. Weather maps show storms, fronts, temperatures, rain, snow, sleet, fog, etc.

## **weather satellite**

A weather satellite is an orbiting machine that takes pictures of the earth's surface that are used for noting the earth's weather.

# Names of Hurricanes

Name: \_\_\_\_\_

**Direction:** Each year the first tropical storm of a season begins with "A", the second storm has a name that starts with a "B" and so on. Women's and men's names are alternated.

The names of very destructive storms are retired. Some very destructive storms are Andrew, Camille and Hugo. These names are never used again. Circle the names of people you know who may have a storm named after them.

2004	2005	2006	2007	2008	2009
Alex	Arlene	Alberto	Andrea	Arthur	Ana
Bonnie	Bret	Beryl	Barry	Bertha	Bill
Charley	Cindy	Chris	Chantal	Cristobal	Claudette
Danielle	Dennis	Debby	Dean	Dolly	Danny
Earl	Emily	Ernesto	Erin	Edouard	Erika
Frances	Franklin	Florence	Felix	Fay	Fred
Gaston	Gert	Gordon	Gabrielle	Gustav	Grace
Hermine	Harvey	Helene	Humberto	Hanna	Henri
Ivan	Irene	Isaac	Ingrid	Ike	Ida
Jeanne	Jose	Joyce	Jerry	Josephine	Joaquin
Karl	Katrina	Kirk	Karen	Kyle	Kate
Lisa	Lee	Leslie	Lorenzo	Laura	Larry
Matthew	Maria	Michael	Melissa	Marco	Mindy
Nicole	Nate	Nadine	Noel	Nana	Nicholas
Otto	Ophelia	Oscar	Olga	Omar	Odette
Paula	Philippe	Patty	Pablo	Paloma	Peter
Richard	Rita	Rafael	Rebekah	Rene	Rose
Shary	Stan	Sandy	Sebastien	Sally	Sam
Tomas	Tammy	Tony	Tanya	Teddy	Teresa
Virginie	Vince	Valerie	Van	Vicky	Victor
Walter	Wilma	William	Wendy	Wilfred	Wanda



# Name the Hurricane

Name: \_\_\_\_\_

Direction: Each year there are only about 23 tropical storms in the Atlantic Ocean. Because of this the names for the storms only go up to "W". If you could name the storms for the season what name would you give them?

A \_\_\_\_\_

M \_\_\_\_\_

B \_\_\_\_\_

N \_\_\_\_\_

C \_\_\_\_\_

O \_\_\_\_\_

D \_\_\_\_\_

P \_\_\_\_\_

E \_\_\_\_\_

Q \_\_\_\_\_

F \_\_\_\_\_

R \_\_\_\_\_

G \_\_\_\_\_

S \_\_\_\_\_

H \_\_\_\_\_

T \_\_\_\_\_

I \_\_\_\_\_

U \_\_\_\_\_

J \_\_\_\_\_

V \_\_\_\_\_

K \_\_\_\_\_

W \_\_\_\_\_

L \_\_\_\_\_  
\_\_\_\_\_

# Hurricane Word Search

Name: \_\_\_\_\_

**Direction:** Look for each word listed in the box below. Draw a line through it when you find it.

H	L	I	G	H	T	N	I	N	G
D	U	T	H	U	N	D	E	R	H
I	Y	R	O	L	A	R	I	P	S
S	T	O	R	M	S	U	R	G	E
A	R	P	R	I	O	C	E	A	N
S	E	I	T	R	C	S	E	A	O
T	G	N	I	N	R	A	W	G	L
E	R	A	I	N	B	A	N	D	S
R	F	L	S	A	T	I	D	E	T
K	E	N	A	C	I	R	R	U	H
I	O	T	X	C	L	O	U	D	N
D	O	O	L	F	R	Y	P	H	I
W	A	T	E	R	C	E	Y	E	N
Y	T	M	W	I	N	D	T	C	R
L	A	N	D	F	A	L	L	A	A
F	L	O	O	D	S	E	V	A	W
L	O	L	L	A	F	N	I	A	R
C	Y	C	L	O	N	E	N	E	S

## Word Bank

cloud cyclone eye flood hurricane landfall lightning  
ocean rainfall sea spiral storm surge thunder tide  
water waves wind rain bands warning



# Hurricane Word Search

Name: Key

**Direction:** Look for each word listed in the box below. Draw a line through it when you find it.

H	E	I	G	H	T	N	I	N	G
D	U	T	H	U	N	D	E	R	H
I	Y	R	O	L	A	R	I	P	S
S	T	Θ	R	M	S	U	R	G	E
A	R	P	R	I	Θ	G	E	A	N
S	E	I	T	R	C	S	E	A	O
T	G	N	I	N	R	A	W	G	L
E	R	A	I	N	B	A	N	D	S
R	F	L	S	A	T	I	D	E	T
K	E	N	A	G	I	R	R	U	H
I	O	T	X	G	L	Θ	U	D	N
D	Θ	Θ	L	F	R	Y	P	H	I
W	A	T	E	R	C	E	Y	E	N
Y	T	M	W	I	N	D	T	C	R
L	A	N	D	F	A	L	L	A	A
F	L	O	O	D	S	E	V	A	W
L	O	L	L	A	F	N	I	A	R
G	Y	G	L	Θ	N	E	N	E	S

## Word Bank

cloud cyclone eye flood hurricane landfall lightning  
ocean rainfall sea spiral storm surge thunder tide  
water waves wind rain bands warning



# Sunshine

The sun is a huge ball of burning gases in space. It produces heat and light and controls the earth's weather. Nothing could survive on earth without the heat and light from the sun. However, a person can die from too much exposure to sun. The sun is big enough to swallow the earth a million times.



Heat from the sun turns the moisture from leafy trees and plants into invisible water vapor in the air. The same thing happens with the water in lakes and oceans.

The sun gives out rays called solar radiation. The rays travel in waves of energy. Waves can have long or short wave lengths. Waves with short wavelengths have more energy than waves with long wavelengths.

A sunny day is usually a warm one. Direct sunshine warms every surface on which it shines. A thermometer that is placed in the shade will measure the temperature of the air. If it is placed in direct sunlight, the sun will warm the materials of the thermometer itself and that is the temperature it will show.

In the morning and evening the sun is lower in the sky so its rays have to travel longer distance through the atmosphere. Red and orange light have the longest wavelengths. They pass through atmospheric particles more easily than any others. These colors reach your eyes and make the sky look red.

On a clear day the sky looks blue. When the sun is overhead, light rays scatter through the atmosphere. Blue light is scattered a lot so the sky looks blue.

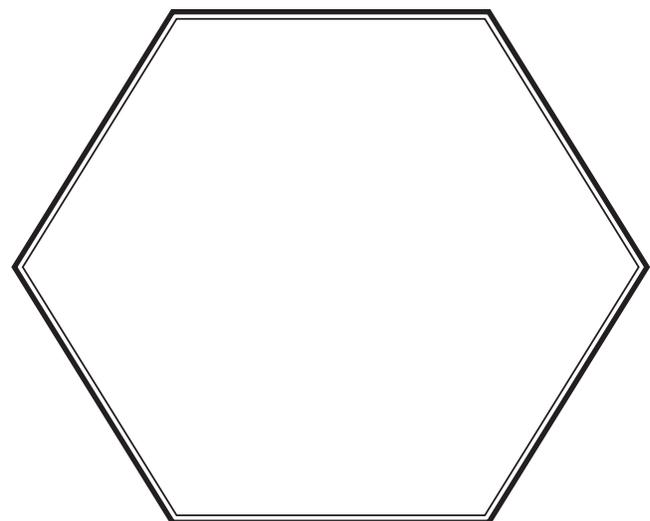
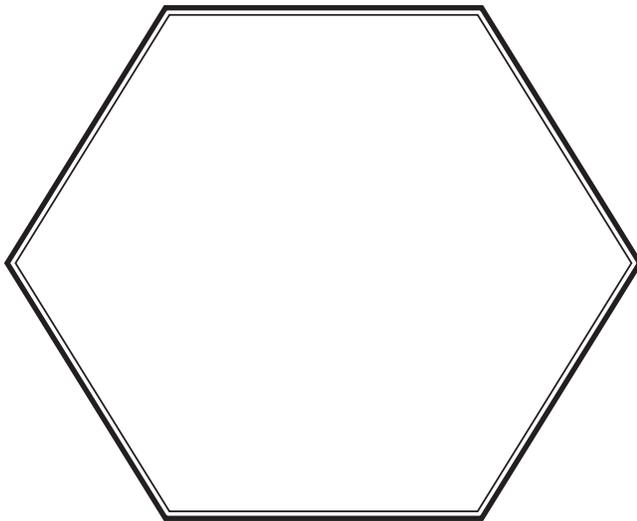
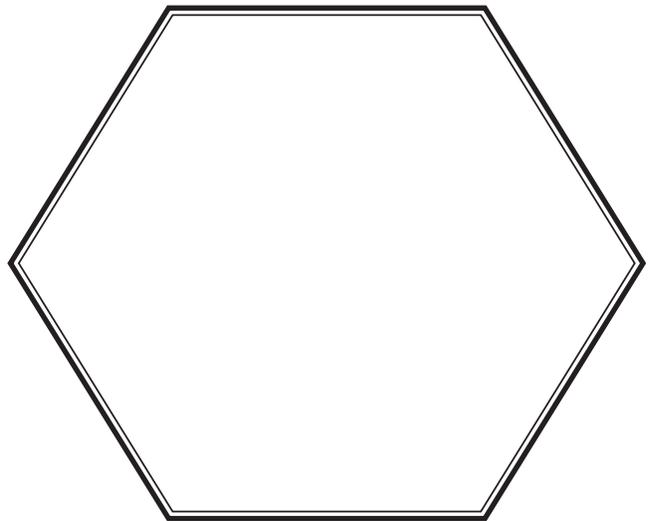
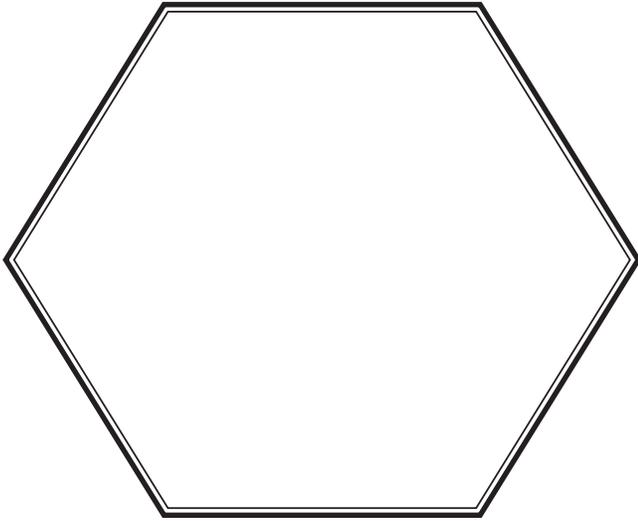
One should never look directly at the sun because it can damage the eye.

The heat of the sun can make certain materials such as roads and bridges expand.

# Protecting Yourself From the Sun

Name: \_\_\_\_\_

Direction: It is summer and your family is planning to spend a lot of time at the beach. You can only take four safety items with you. What four things would you take to help keep you safe.



# Making Metal Grow

The heat of the sun can make certain metals grow. You can see this by leaving a piece of copper outside on a sunny day.

## Materials needed

- o Scissors
- o Tape
- o Pen
- o Ruler
- o Poster board
- o Copper pipe

1. Place a length of copper pipe on the poster board.
2. Tape them together in the middle and mark the pipe ends on the board.
3. Put them in the sun for a few hours then check to see if the pipe has grown.
4. Measure the difference.



# Would You Like to Make a Thunderstorm?

## MATERIALS:

- clear, plastic container (size of shoebox)
- red food coloring
- ice cubes made with blue food coloring

## Direction:

Fill the plastic container two-thirds full with lukewarm water

Let the water sit for one minute.

Place a blue ice cube at one end of the plastic container.

Add three drops of red food coloring to the water at the other end of the plastic container.

Watch what happens.

## EXPLANATION:

The blue and cold water sinks while the red and warm water rises. This happens because of convection. The blue water represents the cold air mass and the red water represents the warm, unstable air mass. A thunderstorm is caused by unstable air and convection plays an important part. A body of warm air is forced to rise by an approaching cold front therefore thunderstorms form.



# Electricity in the Skies

Bolts of lightning are huge electrical charges that are created when the ice and water inside storm clouds rub together. It is powerful and dangerous. If it hits you it can burn or even kill you. More than three million of them flash across the skies every day. Thunder is the noise lightning makes but it is not heard right away. We see the lightning before we hear the thunder because light travels faster than sound so you see lightning before you hear thunder. You can tell how far lightning is by counting the seconds between the lightning and the thunder. Every five seconds is equal to one mile.



One fork of lightning carries enough electricity to light an entire town for one year. When lightning flashes it makes the air five times as hot as the surface of the sun.



Lightning is attracted to anything that stands high above the ground, so you should never shelter from a storm under a tree.

A bolt of lightning lasts only a fraction of a second. However, its heat is so intense that it can set fire to buildings or trees. One bolt of lightning can be up to four miles long.

Donner and Blitzen, the name given to two of Santa's reindeers

are the German words for thunder and lightning.

# Lightning Safety Tips

To stay safe in lightning you should observe the following guidelines:

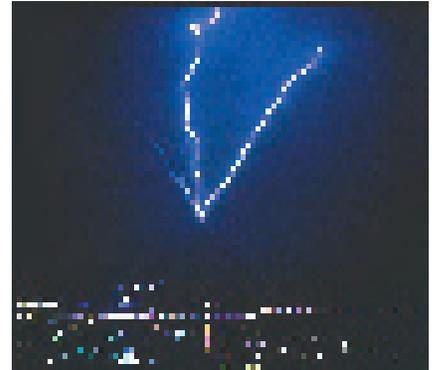
- Listen for storms. If a storm is coming, find shelter. Whenever you see thunder or lightning go inside.
- A house is the best choice. A car is second best.
- Never go under a tree and stay away from open spaces.
- During a lightning storm do not use the phone, the sink, the shower or bathtub.
- If someone is hit by lightning, call 911 right away.



# Creating Lightning

## MATERIALS:

- fluorescent light bulb
- rubber balloon



## PROCEDURE:

Turn off all of the lights in the room. Make the room as dark as you can.

Blow up your rubber balloon and tie it so you will not lose the air.

Rub the balloon on your hair for several seconds.

Hold the statically charged balloon near the end of the light bulb. This will illuminate the bulb.

Repeat the demonstration as many times as you wish.

## THIS IS THE EXPLANATION:

When you rub the balloon on your hair, the balloon builds up an electrical charge. This is called static electricity. Touching the charged balloon to the end of the fluorescent light bulb causes the electrical charge to jump from the balloon to the bulb. This is what illuminates the light bulb.

Lightning is an electrical discharge within a thunderstorm. As the storm develops, the clouds become charged with electricity. Scientists are still not sure exactly what causes this, but they do know that when the voltage becomes high enough for the electricity to leap across the air from one place to another, lightning flashes! Lightning can spark within a cloud, from one cloud to another, from a cloud to the ground, or from the ground to a cloud.

# Tracking a Thunderstorm

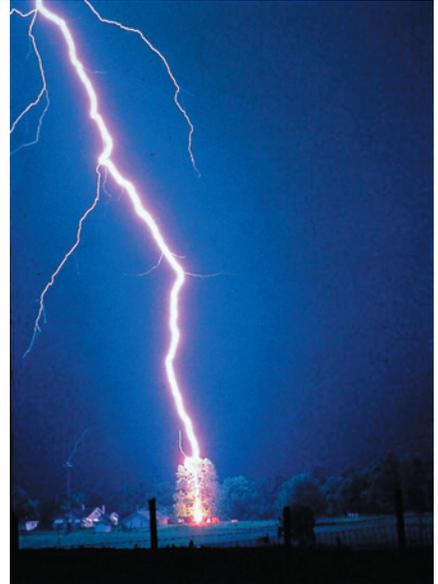
## MATERIALS:

- thunderstorm
- stopwatch

## DIRECTION:

Be on the lookout for a flash of lightning. After you see a flash of lightning, use a stopwatch or count the number of seconds until you hear the thunder. If you do not have a stopwatch you count the number of seconds by saying one thousand one, one thousand two and so on.

For every five seconds the storm is one mile away. To find out how far away the storm is, you divide the number of seconds you count until you hear the thunder by five all you have to do is divide the number of seconds you count by five.



## Example

If you count to fifteen and then you hear the thunder you divide fifteen by five. That will give you three. This means that the storm is three miles away.

## EXPLANATION:

Light travels faster than sound. The lightning and thunder happen at the same time, but light reaches your eye instantly, while sound takes a little longer. Have you ever seen lightning without thunder? You may have heard people call that 'heat lightning'. Well actually there is no such thing as 'heat lightning'. It's just lightning that is over 15 miles away and too far away for you to hear the thunder.

# Making Thunder

## MATERIALS:

- brown paper lunch bag

## DIRECTION:

1. Fill the brown paper lunch bag by blowing into it
2. Twist the open end and close with your hand
3. Quickly hit the bag with your free hand

<b>OBSERVATION:</b>	Write your observation on the lines below.

## EXPLANATION:

Hitting the bag causes the air inside the bag to compress so quickly that the pressure breaks the bag. The air rushes out and pushes the air outside away from the bag. The air continues to move forward in a wave. When the moving air reaches your ear, you hear a sound. Thunder is produced in a similar way. As lightning strikes, energy is given off that heats the air through which it passes. This heated air quickly expands producing energetic waves of air resulting in a sound called thunder.

# Rain and Water in the Air

Rain is the name given to water droplets that fall from the sky. The droplets are more than 1/50<sup>th</sup> inch across. Droplets that are smaller than this are called drizzle. The difference between raindrops and drizzle is that raindrops make a splash when they fall into puddles but drizzle droplets do not. Most people think that raindrops are shaped like teardrops, but they actually look more like squashed buns.



Rain is formed when tiny water droplets form inside a cloud. They are carried around by air movements but they are too small and too light to fall out of the cloud. As they move they collide with one another which make them merge to form larger droplets. When these droplets get to a certain size they are too heavy to be supported by air currents and they fall from the cloud. That is rain.

Rain clouds hold a huge amount of water which makes them so dense that light cannot go through. The heaviest rain falls from the biggest blackest clouds.

Rain provides the clean fresh water that almost every living thing on land needs to live.

Heavy rain can cause terrible floods that can destroy life and property.

A rainbow appears when sunlight shines through water droplets in the air. White light is made of seven colors; red, orange, yellow, green, blue, indigo and violet. As the light shines through water it bends. Each of the colors bends by a different amount, so they separate and become visible.

A meteorologist is the person who measures rainfall.



# Making Rain

**Directions:** Use the information below to create rain. Record your observation in the space marked observation.

## MATERIALS:

- glass mayonnaise or canning jar
- plate
- hot water
- ice cubes
- index cards

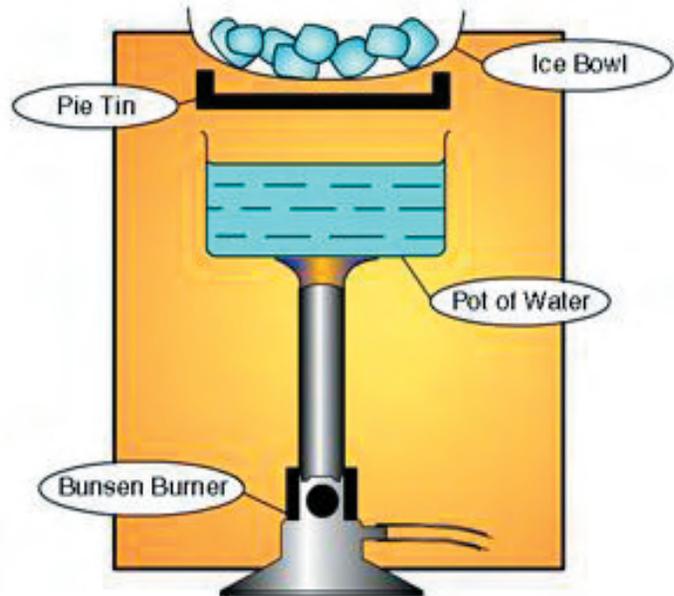
## PROCEDURE:

1. Pour about two inches of very hot water into the glass jar.
2. Cover the jar with the plate and wait a few minutes before you start the next step
3. Put the ice cubes on the plate.

## OBSERVATION:

## EXPLANATION:

What happens? The cold plate causes the moisture in the warm air, which is inside the jar to condense and form water droplets. This is the same thing that happens in the atmosphere. Warm, moist air rises and meets colder air high in the atmosphere. The water vapor condenses and forms precipitation that falls to the ground.



# Create Your Own Rainbow

## MATERIALS:

- large glass bowl
- small mirror
- flashlight
- dark room with white walls

## PROCEDURE:

1. Fill the large glass bowl with water.
2. Place the small mirror inside the water filled glass bowl.
3. Tilt the mirror slightly upward so that the sunlight falls on it.
4. Move a piece of paper around in front of the bowl until a reflected rainbow appears.



**Record what you observe on a separate sheet of paper.**



## INFORMATION:

The mirror reflects light that passes back through the water, traveling at an angle. The water bends, or refracts, the light. As the light bends, it separates into the colors of the rainbow...red, orange, yellow, green, blue, indigo and violet.

# The Rainbow Song

red

and

yellow

and

pink

and

green

purple

and

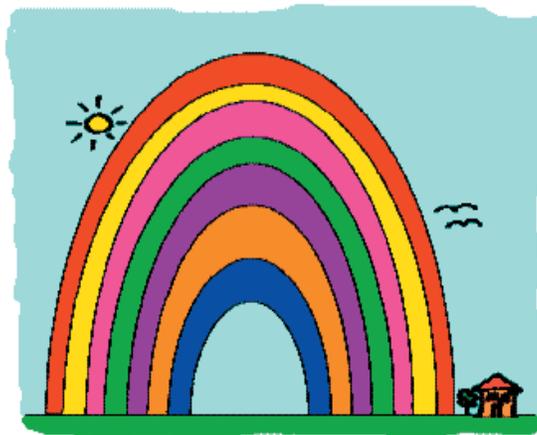
orange

and

blue

*I can sing  
a rainbow,*

*Sing a  
rainbow,*



*Sing  
a rainbow,  
too.*

# Average Yearly Rainfall

Kauai, Hawaii	460 inches
New York	44.5 inches
London, England	24 inches
Berlin, Germany	23 inches
Cairo, Egypt	1 inch
Arica, Chile	0.03 inches

## Greatest Observed Rainfall

Time	Rainfall in inches	Place
1 minute	1.2	Unionville, USA
12 minutes	7.8	Plumb Point, Jamaica
12 hours	52.8	Belouve, Reunion near Madagascar
24 hours	73.6	Cilaos, Reunion
1 month	366	Cherrapunji, India
1 year	1,041	Cherrapunji, India

# Nursery Rhymes

Compose your own nursery rhyme about rain. These nursery rhymes may vary in length and can be illustrated. Share your nursery rhymes with the class. Display your nursery rhyme on the bulletin board. The teacher may use the nursery rhymes to make a book for the class.

Some nursery rhyme models include:

## Rain Rain Go Away

**Rain rain go away,  
Come again another day.  
Little Johnny wants to play;  
Rain, rain, go to Spain,  
Never show your face again!**

## History and origins of nursery rhyme

The history and origins of the lyrics to this English nursery rhyme date back to the reign of Elizabeth I, one of the Tudor monarchs. During this period of English history there was constant rivalry with Spain culminating in the Spanish Armada consisting of many Spanish galleons being sent to attack England. This attempt failed, not only because of the swift nature of the smaller English ships but also by the stormy weather which scattered the Armada fleet. Hence the origins of the nursery rhyme!

Doctor Foster went to Glo'ster,  
In a shower of rain;  
He stepped in a puddle, up to his middle,  
And never went there again.



# Flood in the Bible

Name: \_\_\_\_\_

Direction: Summarize the story of the flood as recorded in Genesis 7 and 8.

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# The Rainbow - a Sign

Name: \_\_\_\_\_

Direction: Read Genesis 9:13 and then write it on the lines below. This verse gives the sign that God gave that tells us that the earth will never be again be destroyed by a flood.

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Read Genesis 9: 14-17 and write what the covenant mentioned in verse 13 was.

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## Hail



Hail is made of clumps of ice. It forms in cumulonimbus clouds. Strong air currents carry water drops up into very cold parts of the atmosphere. There they freeze and are tossed up and down becoming coated with many layers of ice. They later fall as hailstones. Hailstones can cause serious damage.

## Dew

During clear nights the ground loses heat very quickly. The air above it cools down. Water vapor in the cooling air condenses coating everything on the ground with tiny water droplets. This is called dew. Dew evaporates very quickly in the morning sunlight.



Dew starts to form soon after sunset

## Frost

Frost is formed when water from the atmosphere freezes.



# Snow

Snowflakes are made of many ice crystals joined together. If the air is extremely cold and dry, ice crystals fall as fine powdery snow. A short light snowfall is called a flurry. Heavy snow in wind is called a blizzard.



# Avalanche

An avalanche can be anything falling down the side of a mountain. Snow avalanches can be very dangerous because of the power of the snow falling. Avalanches occur when snowfall piles up on top of each other. Loud noises or movement can trigger an avalanche. They are more likely to happen after a fresh snowfall. The ski patrol use large guns to shoot explosives at the mountains to create avalanches. This is done when no one else is around. creating avalanches make it safer for people to ski down the mountain without the risk of being hurt by dangerous avalanches.



# Preparing for a Snowstorm

## What Does a Winter Storm Watch Mean?

Severe winter weather may develop within the next day or two. The storm has not yet arrived, but if it does, it might include heavy snow, blizzards, freezing rain, ice, sleet.

## What Does Winter Storm Warning Mean?

Severe winter weather is occurring or is on the way. Be alert. Be prepared. Do not go outside during a heavy snow storm.

## What should you do Before a Storm Arrives?

### PREPARE YOUR CAR FOR DEEP SNOW

Remind your parents to have the following things in the car:



# Why Do We Need...

Give one reason we need the following items during a snowstorm.



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# Making a Snowman

Make a cute snowman decoration using two paper plates. This makes a nice decoration to put on a door or hang in a window.

## Materials:

- 2 white paper plates
- Construction paper (black, red) or wrapping paper
- An orange pipe cleaner (for the nose)
- A short length of yarn or ribbon
- Hole punch
- Marker or crayons
- Scissors
- Glue
- Large buttons for eyes



## Procedure:

1. On one of the paper plates, cut off the outer rim, making a smaller plate.
2. Punch a hole near the rim on both plates.
3. Tie the two plates together, using the yarn or ribbon.
4. On black construction paper, draw and then cut out a top hat and two boots. On colored construction paper or gift wrap paper, draw and then cut out two mittens.
5. Glue the hat, boots and mittens on the snowman. Glue on buttons where eyes should be. Draw a mouth. For the nose, cut a short length from an orange pipe cleaner. Stick the pipe cleaner through the plate to secure it, if the plate is too tough, make a tiny hole with the tip of the scissors.

For the buttons, you can cut out shapes from construction paper, use round stickers, glue on real buttons, or simply draw them. You now have a cute snowman decoration!

# Coloring a Snowman

Name: \_\_\_\_\_

Direction: Color the snow man.



# Tsunami

A tsunami, pronounced sue-**nahm**-ee, is a series of huge waves that can cause great destruction and loss of life when they strike a coast. Tsunamis are caused by an underwater earthquake, a volcanic eruption a sub-marine rockslide, or, more rarely, by an asteroid or meteoroid crashing into the water from space. Most tsunamis are caused by underwater earthquakes, but not all underwater earthquakes cause tsunamis - an earthquake has to be over a magnitude of about 6.75 on the Richter scale for it to cause a tsunami. About 90 percent of all tsunamis occur in the Pacific Ocean.

Many tsunamis could be detected before they hit land, and the loss of life could be less, with the use of modern technology, including seismographs, which detect earthquakes, computerized offshore buoys that can measure changes in wave height, and a system of sirens on the beach to alert people of a tsunami danger.

**TSUNAMI VISUAL WARNING:** If you see the water recede quickly and unexpectedly from a beach (this is called drawback), run toward higher ground or inland -- there may be a tsunami coming. Also, if you are on the coast and there is an earthquake, it may have caused a tsunami, so run toward higher ground or inland. Some beaches have tsunami warning sirens -- do not ignore them. The first wave in a tsunami is often not the largest; if you experience one abnormally-huge wave, goes inland quickly -- much bigger waves could be coming soon.

## The Word Tsunami

The word tsunami comes from the Japanese word meaning “harbor wave.” Tsunamis are sometimes incorrectly called “tidal waves” -- tsunamis are not caused by the tides. Tides are caused by the gravitational force of the moon on the sea. Regular waves are caused by the wind.

## The Development of a Tsunami

A tsunami starts when a huge volume of water is quickly shifted. This rapid movement can happen as the result of an underwater earthquake, when the sea floor quickly moves up or down, a rock slide, a volcanic eruption, or another high-energy event.

After the huge volume of water has moved, the resulting wave is very long, the distance from crest to crest can be hundred of miles long but not very tall about three feet tall. The wave spreads across the sea in all directions; it can travel great distances from the source at tremendous speeds.



## The Size of a Tsunami

Tsunamis have an extremely long wavelength (wavelength is the distance between the crest (top) of one wave and the crest of the next wave) -- up to several hundred miles long. The period or the time between two successive waves is also very long about an hour in deep water.

In the deep sea, a tsunami's height can be only about 3 feet tall. Tsunamis are often barely visible when they are in the deep sea. This makes tsunami detection in the deep sea very difficult.

## The Speed of a Tsunami

A tsunami can travel at well over 600 mph in the open ocean - as fast as a jet flies. It can take only a few hours for a tsunami to travel across an entire ocean. A regular wave generated by the wind travels at up to about 90 km/hr.

## A Tsunami Hits the Coast

As a tsunami wave approaches the coast where the sea becomes shallow, the trough or bottom of a wave hits the beach floor, causing the wave to slow down, to increase in height, the amplitude is magnified many times and to decrease in wavelength, the distance from crest to crest.

At landfall, a tsunami wave can be hundreds of meters tall. Steeper shorelines produce higher tsunami waves.



In addition to large tsunami waves that crash onto shore, the waves push a large amount of water onto the shore above the regular sea level (this is called runup). The runup can cause tremendous damage inland and is much more common than huge, thundering tsunami waves.

### **Tsunami Warning Systems**

Tsunami warning systems exist in many places around the world. As scientists continuously monitor seismic activity or earthquakes, a series of buoys float off the coast and monitor changes in sea level. Unfortunately, since tsunamis are not very tall in height when they are out at sea, detection is not easy and there are many false alarms. Sirens at affected beaches may be activated -- do not ignore them!

### **Wind-Generated Waves versus Tsunami Waves**

Regular waves that are caused by the wind are very different from tsunami waves. Tsunami waves are much faster than wind-generated waves and they have a much longer wavelength which is the distance from crest to crest. In the deep sea, tsunami waves are very small, but by the coast, they make regular waves look small.

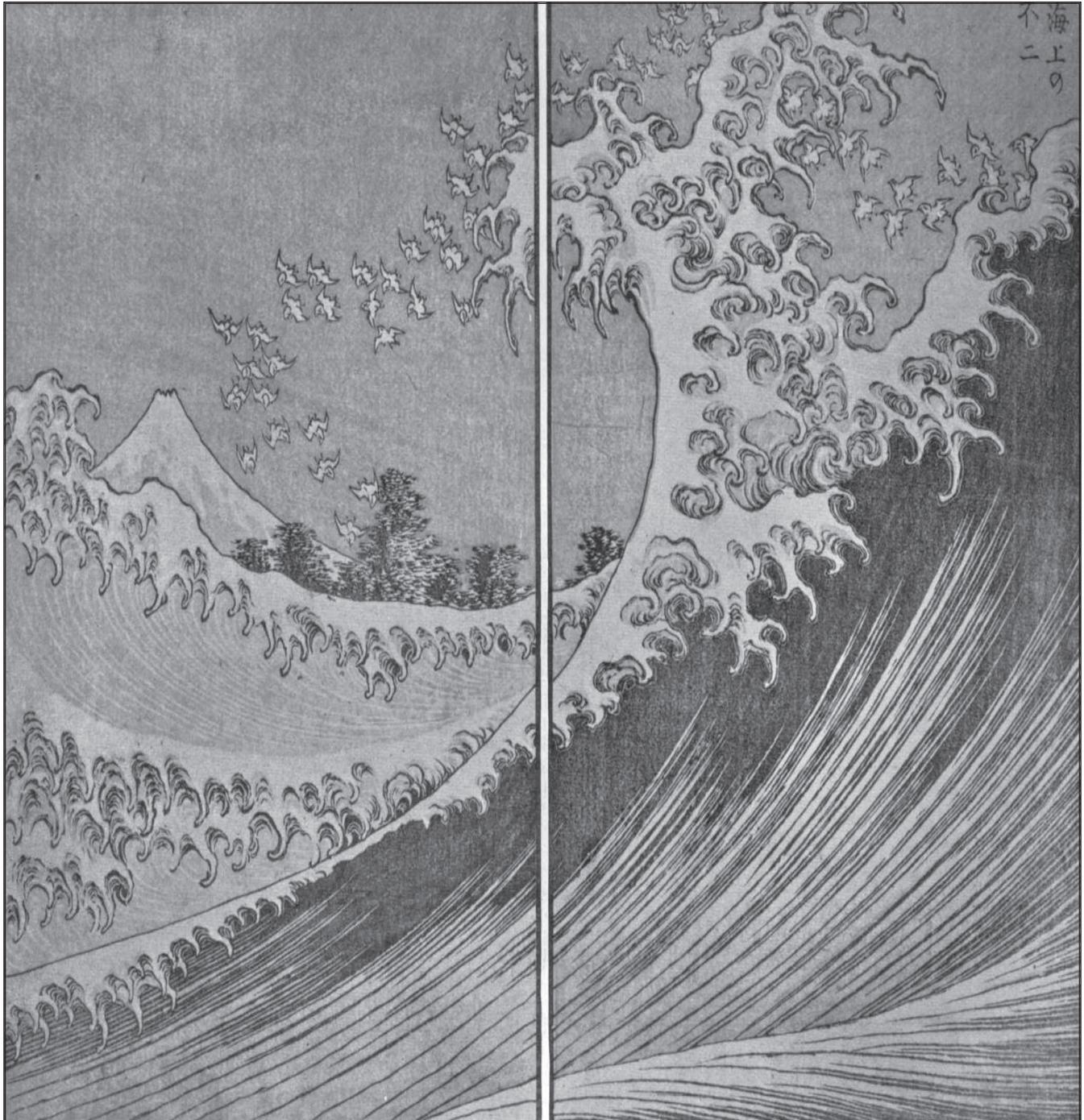
### **How Often do Tsunamis Occur?**

Tsunamis are very rare. There are roughly six major tsunamis each century. On December 26, 2005 a tsunami occurred off the coast of Southeast Asia and over 150,000 people died.



# Tiny Model of a Tsunami

You can make a tiny model of a tsunami by dropping a rock into a bowl of water, causing ripples to propagate or travel outwards from the site of impact. Another way is to slightly jolt the bowl of water and watch it slosh over the rim on one side.



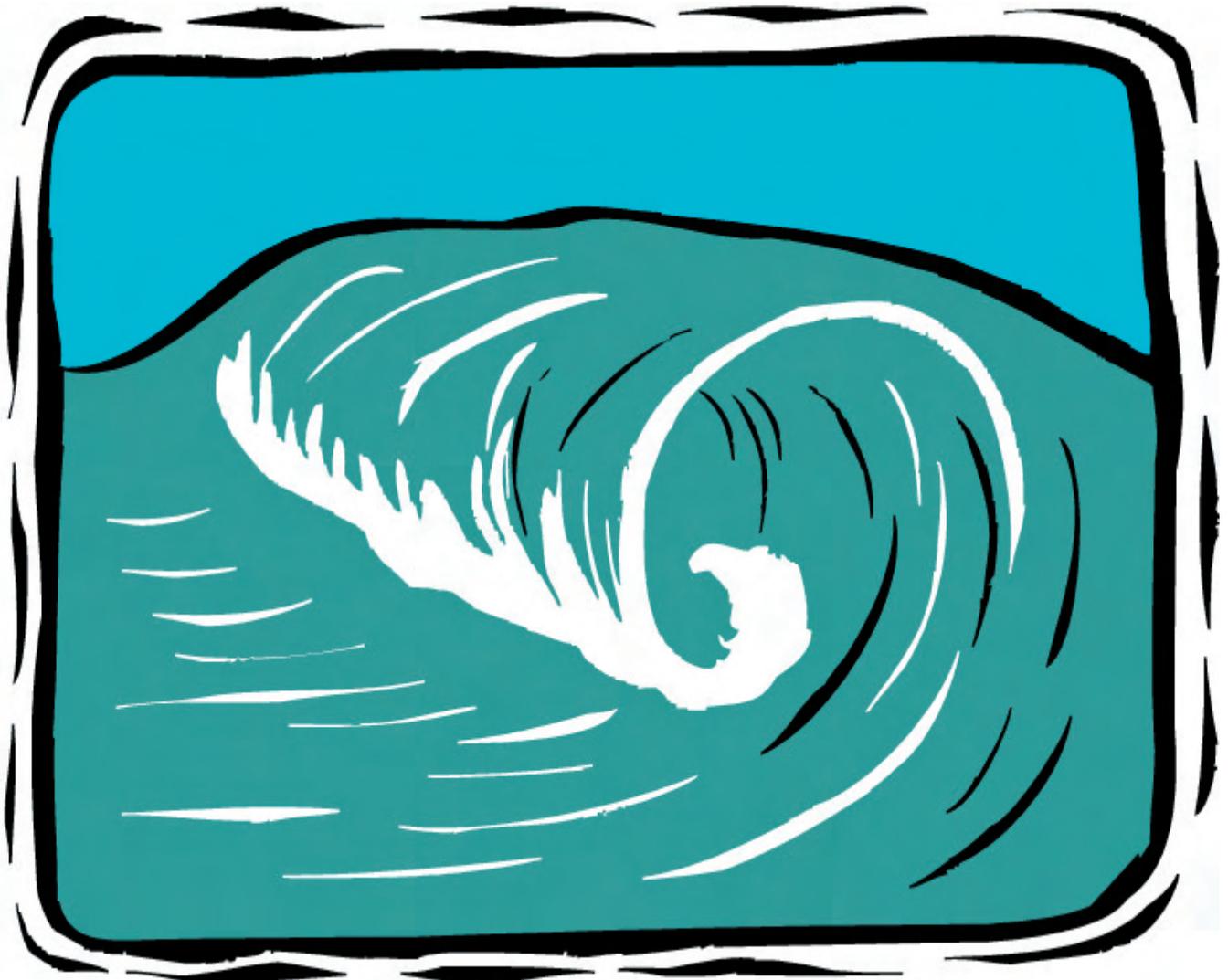
# Major Tsunamis

Tsunamis occur in oceans, seas, and large bodies of water; 90 percent of tsunamis occur in the Pacific Ocean. Some of the world's largest tsunamis include:

- **1490 B.C.** Greece (Aegean Sea) -- Tsunami caused by the eruption/collapse of the volcano of Santorini. This tsunami may have caused the end of the Minoan civilization in Greece.
- **January 26, 1700** - Japan (Pacific Ocean) -- Tsunami caused by an earthquake of magnitude 9.0 off the western coast of Vancouver Island, Canada.
- **August 26, 1883** Indonesia -- Tsunami caused by the eruption/collapse of the volcano Krakatoa. Almost 40,000 people died.
- **June 15, 1896** Honshu, Japan -- 28,000 people killed.
- **November 18, 1929** Grand Banks, Canada (Atlantic Ocean) -- Tsunami caused by an offshore earthquake of magnitude 7.2. 27 people died.
- **April 1, 1946** Aleutian Islands, Alaska (Pacific Ocean) -- Tsunami caused by an earthquake of magnitude 7.8 in the Aleutian Islands of Alaska. Over 170 people died.
- **November 4, 1952** Kamchatka Peninsula, Russia (Pacific Ocean) -- Tsunami caused by an earthquake of magnitude 8.2 off the coast of the Kamchatka Peninsula (Russia). No lives lost.
- **March 9, 1957** Aleutian Islands, Alaska (Pacific Ocean) -- Tsunami caused by an earthquake of magnitude 8.3 that occurred south of the Andreanof Islands (in the Aleutian Islands of Alaska). No lives lost.
- **July 9, 1958** Lituya Bay, Alaska -- Tsunami caused by a landslide. Initial wave up to 1,720 feet high traveling at 100 mph.
- **May 22, 1960** Chile (Pacific Ocean) -- Tsunami caused by an earthquake of magnitude 8.3 that occurred off the coast of South Central Chile. Up to 2,290 people died (due to the Earthquake and tsunami).
- **March 28, 1964** Prince Williams Sound, Alaska (Pacific Ocean) -- Tsunami caused by an an earthquake of magnitude 8.4 in Prince William Sound (Alaska). 122 people died.



- **November 29, 1975** Hawaii (Pacific Ocean) -- Tsunami caused by an earthquake of magnitude 7.2 (and subsequent rock slide). 2 people died.
- **September 1, 17, 1992** Nicaragua (Pacific Ocean) -- Tsunami caused by an offshore earthquake of magnitude 7.0. About 200 people killed.
- **July 17, 1998** Papua-New Guinea -- Tsunami caused by an underwater landslide that was triggered by an earthquake. Thousands of people killed.
- **June 23, 2001** Southern Peru (Pacific Ocean) -- Tsunami caused by an earthquake.
- **December 26, 2004** Indonesia, W Thailand, Sri Lanka, South East India (Indian Ocean) -- Tsunami caused by an earthquake of magnitude 9.0 in the Southern Indian Ocean. About 150,000 people died in the tsunamis.

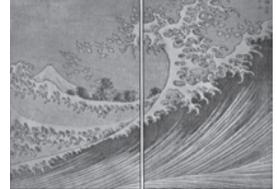


# Tsunami Zones

Name: \_\_\_\_\_

Direction: Use the facts in "Major Tsunamis" to help you solve the following problems.

1. On March 18, 1964 122 people died in a tsunami.  
On April 1, 1946 170 people died in a tsunami.



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

How many people died as a result both tsunamis?

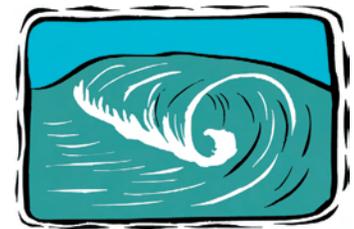
\_\_\_\_\_

What is the difference between the number of people who died in 1964 and 1946?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



How many years elapsed between both tsunamis?

\_\_\_\_\_

2. How many people died as a result of the tsunamis of 1946, 1952, 1957, and 1964?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

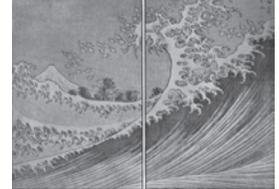


# Tsunami Zones

Name: \_\_\_\_\_

Direction: Use the facts in "Major Tsunamis" to help you solve the following problems.

- 1. On March 18, 1964 122 people died in a tsunami.  
On April 1, 1946 170 people died in a tsunami.  
How many people died as a result both tsunamis?



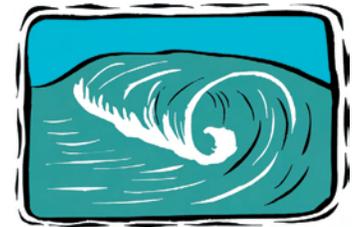
$$\begin{array}{r} 170 \\ + 122 \\ \hline 292 \end{array}$$

What is the difference between the number of people who died in 1964 and 1946?

$$\begin{array}{r} 170 \\ - 122 \\ \hline 48 \end{array}$$

How many years elapsed between both tsunamis?

$$\begin{array}{r} 1964 \\ - 1946 \\ \hline 18 \end{array}$$



- 2. How many people died as a result of the tsunamis of 1946, 1952, 1957, and 1964?

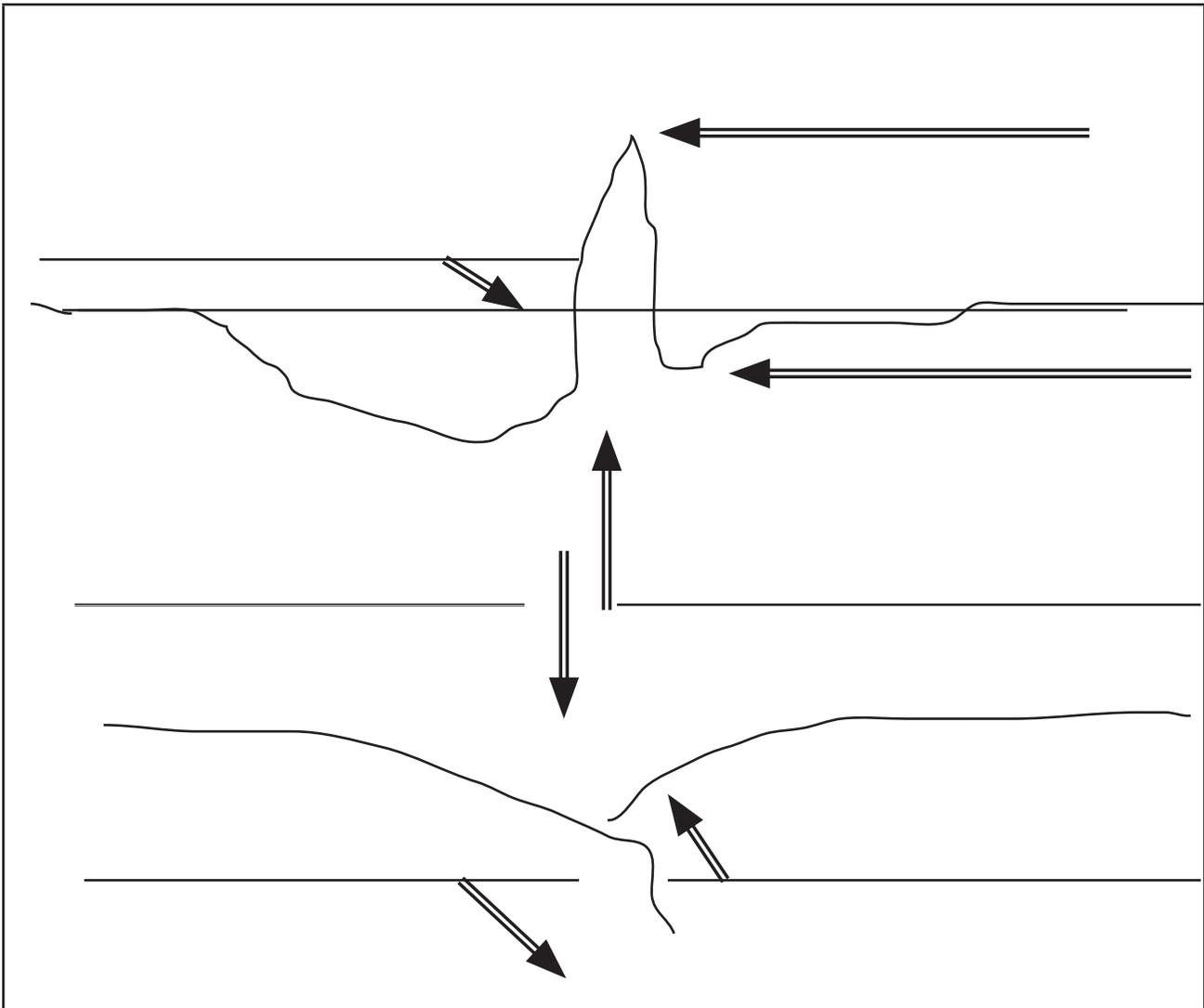
$$\begin{array}{r} 170 \\ + 122 \\ + 0 \\ + 0 \\ \hline 292 \end{array}$$



# Label How a Tsunami Starts

Name: \_\_\_\_\_

A tsunami starts when a huge volume of water is quickly shifted. This can happen as a result of an underwater earthquake. After the high volume of water moves the wave that is formed is very long. It spreads across the sea in all directions and can travel great distances.

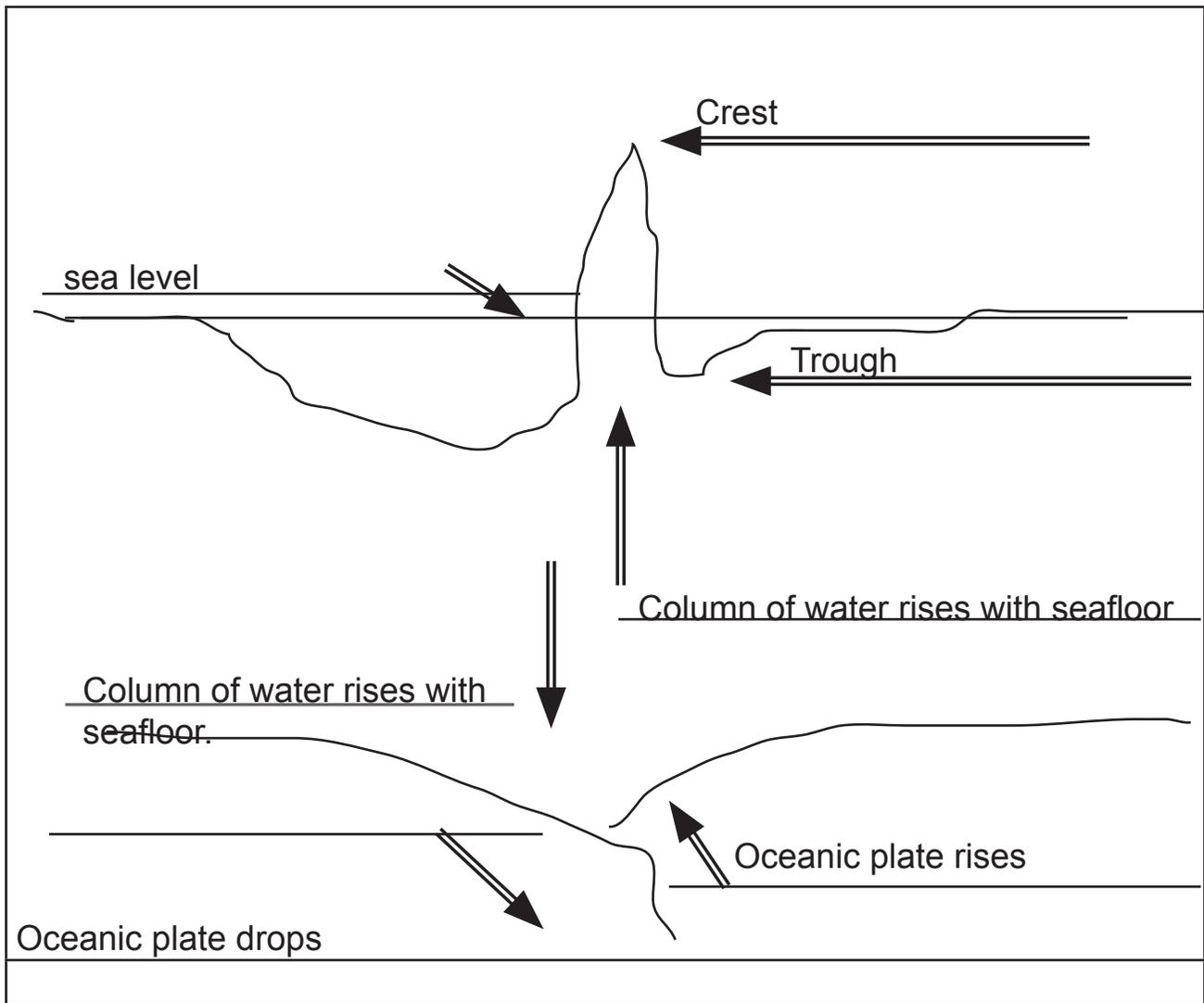


Sea level	Oceanic plate drops	Oceanic plate rises
Column of water rises with seafloor	Column of water drops with seafloor	Crest Trough

# Label How a Tsunami Starts

Name: Key

A tsunami starts when a huge volume of water is quickly shifted. This can happen as a result of an underwater earthquake. After the high volume of water moves the wave that is formed is very long. It spreads across the sea in all directions and can travel great distances.



Sea level	Oceanic plate drops	Oceanic plate rises
Column of water rises with seafloor	Column of water drops with seafloor	Crest Trough

# Clouds and Cloud Types

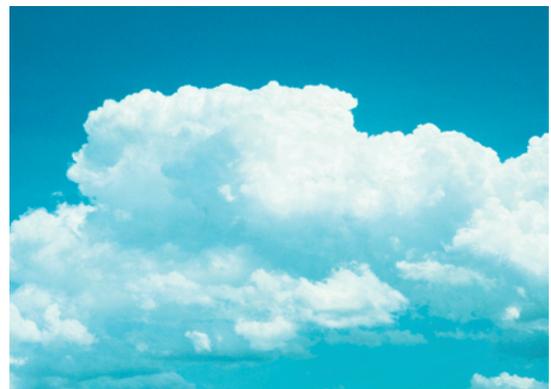
Heat from the sun causes water on earth from rivers, lakes or oceans to go into the air and change into a gas called water vapor. This is called evaporation. Clouds are formed from warm air that rises from the earth carrying water vapor in it. The water vapor cools as the warm air rises higher. When it cools it changes into droplets of water or crystals of ice. Clouds form when these droplets of water collect around small bits of dust, sea salt or pollution floating in the air. The word for this is condensation.

The droplets bump into each other and get bigger and bigger. When the water droplets become too heavy to stay in the air they fall to the ground as rain or snow. Another word for rain or snow is precipitation. Some of this precipitation will collect into the rivers, lakes and oceans on earth and start the cycle all over again.

There are three main types of clouds, Cumulus, Stratus, and Cirrus. Clouds are named according to their height and how they are formed. Even those that look alike can have different names at different height. The amount of water in each cloud, the height of the cloud and the air temperature determines what kind of cloud it is. Cumulus clouds that stack up, turn dark gray and grow taller early in the day can turn into thunderstorms later.

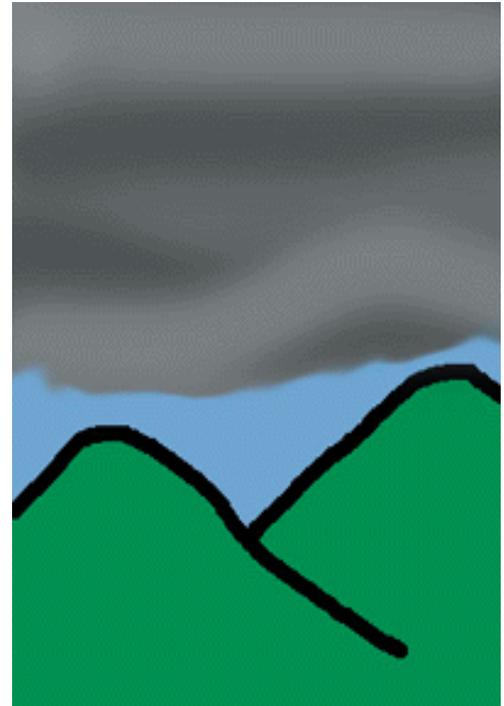
Some clouds are so low they touch the ground, while others are high in the sky. Clouds come in many shapes. Pilots can predict the weather just by watching the clouds and the direction they are moving in. Clouds can give them messages about what the weather will be like many hours in advance. Just by studying a cloud's shape they can tell a great deal about the cloud.

Cumulus clouds are large and fluffy like cotton balls. On clear sunny days small white ones can be seen. When the cumulus clouds are big and dark they are called cumulonimbus clouds. The big black clouds mean that rain or snow storm is on the way. Cumulus clouds hold a huge amount of water which makes them so dense that light cannot go through. That is why they look so dark. The heaviest rain falls from the biggest and darkest clouds.



**Stratus clouds** are lowest in the sky. They sit in layers across the sky. Sometimes they are so low that they sit on the ground. They appear very large since they are so close to the ground. Their soft gray shapes often produce drizzle or light rain or a few snowflakes. Sometimes stratus clouds only make the sky look gray.

**Stratus** clouds may be common along a coast or in a valley where moisture is often plentiful. Elsewhere, stratus clouds may accompany warm or cold fronts or tropical and subtropical disturbances. During the summer, stratus clouds may represent areas of high humidity. It is important to note that stratus clouds are very uniform in appearance. Stratus clouds may form overnight as a result of surface cooling. This is especially common in low areas or near lakes. Stratus clouds also represent the transition to or from fog and cumulus clouds.



**Cirrus** clouds are the very high feathery looking clouds. These form high up in the sky where the air is so cold that the clouds are made from ice crystals rather than water drops. Sometimes strong winds blow them into long strands so they look like a horse's tail. If the cirrus clouds are moving from right to left, there is high pressure and the weather

will be warmer. If the cirrus clouds are moving from left to right, there is low pressure on a summer day and colder weather with rain may be coming.

# Predicting Weather

Name: \_\_\_\_\_

**Direction:** Predicting weather is a wonderful way to put observation and classification skills at work.

Observe the clouds every morning for one week. Fill in the following chart every morning for one week. Compare your predictions to the actual weather in the afternoon.

Date/Time	Cloud Type	AM Weather	Predicted Weather/PM	Actual Weather/Time



# Making Your Own Cloud in a Bottle

## Materials:

- 2 liter clear plastic bottle
- matches (children will need adult supervision with these)
- warm water

## Procedure:

1. Fill the clear plastic 2 liter bottle with warm water. As warm water evaporates, it adds water vapor to the air inside the bottle. This is the first ingredient to make a cloud.
2. Squeeze and release the bottle and observe what happens. You will notice that nothing happens. This is because the squeeze represents the cooling that occurs in the atmosphere. The release represents the cooling that occurs in the atmosphere. If the inside of the bottle becomes covered with condensation or water droplets, just shake the bottle to get rid of them.
3. Take the cap off the bottle. Carefully light a match and hold it near the top of the bottle.
4. Drop the match in the bottle and quickly put on the cap, trapping the smoke inside. Dust, smoke, or other particles in the air is the second ingredient to make a cloud.
5. Once again, slowly squeeze the bottle hard and release. Notice that a cloud appears when you release the bottle and disappears when you squeeze. The third ingredient in a cloud is a drop in air pressure.



## INFORMATION:

Water vapor, which is water in its invisible gaseous state can be made to condense into the form of cloud droplets. By adding particles such as smoke enhances the process of water condensation and by squeezing the bottle causes the air pressure to drop. This creates a cloud.

# Seasons

The seasons are the result of the tilt of the earth's axis. The four seasons of the year are spring, summer, autumn (fall) and winter. Since the axis is tilted, different parts of the globe are towards the sun at different times of the year.

Summer is warmer than winter in each hemisphere because the sun's rays hit the earth at a more direct angle during summer than during winter and also because the days are much longer than the nights during the summer. During the winter, the sun's rays hit the earth at an extreme angle, and the days are very short.



*Spring Garden*



The earth travels on a long journey around the sun. When one part of the earth is enjoying hot summer days another part of the earth is having cold winter days. The earth takes 365 days to travel around the sun.

The equator is an imaginary ring around the middle of the earth. The area above the line is called the northern hemisphere and the area below the line is called the southern hemisphere. The places near the equator are always sunny so the temperature is warm all through the year.

The solstices are days when the sun reaches its farthest northern and southern declinations. The winter solstice occurs on December 21 or 22 and marks the beginning of winter. This is the shortest day of the year. The summer solstice occurs on June 21 and marks the beginning of summer. This is the longest day of the year.

# Earth's Seasons Quiz

Name: \_\_\_\_\_

Read the page about seasons. Then answer the questions below. Write your answer on the space provided.

1. Name the four seasons in each year. \_\_\_\_\_  
\_\_\_\_\_
2. What causes the earth's seasons? \_\_\_\_\_  
\_\_\_\_\_
3. How long does it take the earth to travel around the sun? \_\_\_\_\_  
\_\_\_\_\_
4. During which season are the days shortest? \_\_\_\_\_  
\_\_\_\_\_
5. What is the imaginary ring around the earth called? \_\_\_\_\_
6. What is the area above the line called? \_\_\_\_\_
7. What is the area below the line called? \_\_\_\_\_
8. Which date is the longest day in the year? \_\_\_\_\_
9. Which date is the shortest day in the year? \_\_\_\_\_
10. Why are the places near the equator warm all year? \_\_\_\_\_  
\_\_\_\_\_

# Earth's Seasons Quiz

Key \_\_\_\_\_

Read the page about seasons. Then answer the questions below. Write your answer on the space provided.

1. Name the four seasons in each year.

**spring, summer, autumn or fall, winter**

2. What causes the earth's seasons?

**The tilt of the earth on it's axis**

3. How long does it take the earth to travel around the sun?

**365 days**

4. During which season are the days shortest?

**Winter**

5. What is the imaginary ring around the earth called?

**Equator**

6. What is the area above the line called?

**Northern Hemisphere**

7. What is the area below the line called?

**Southern Hemisphere**

8. Which date is the longest day in the year?

**June 21**

9. Which date is the shortest day in the year?

**December 21**

10. Why are the places near the equator warm all year?

**It is always sunny**



# Likely Weather in Your Area During the Seasons

Talk with your classmates about the seasons and the kinds of weather that occurs. Ask your teacher to help you with the temperature.

<b>Season</b>	<b>Temperature</b>	<b>Wind</b>	<b>Water</b>
Spring			
Summer			
Fall			
Winter			



# Predicting the Weather for a Month

Pretend that you are a meteorologist. Write the high and the low temperature for each day for one month. Each day, write if your prediction was right or wrong. At the end of the month record the number of right and wrong answers.

**Monday**

**Tuesday**

**Wednesday**

**Thursday**

**Friday**




# Weather Conditions During the Seasons

Compare yesterday's weather predictions with today's weather. Label the chart with words typical of each season. Some examples are listed below on the chart.

Season	Precipitation	Wind	Temperature	Other
Spring	Rain Floods	High	Cool Warmer	Tornadoes
Summer				
Fall/Autumn				
Winter				



# Building for the Seasons

Name: \_\_\_\_\_

Directions: Research how the homes in your area are constructed to withstand the different seasons.

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# Dressing for the Season

Name \_\_\_\_\_

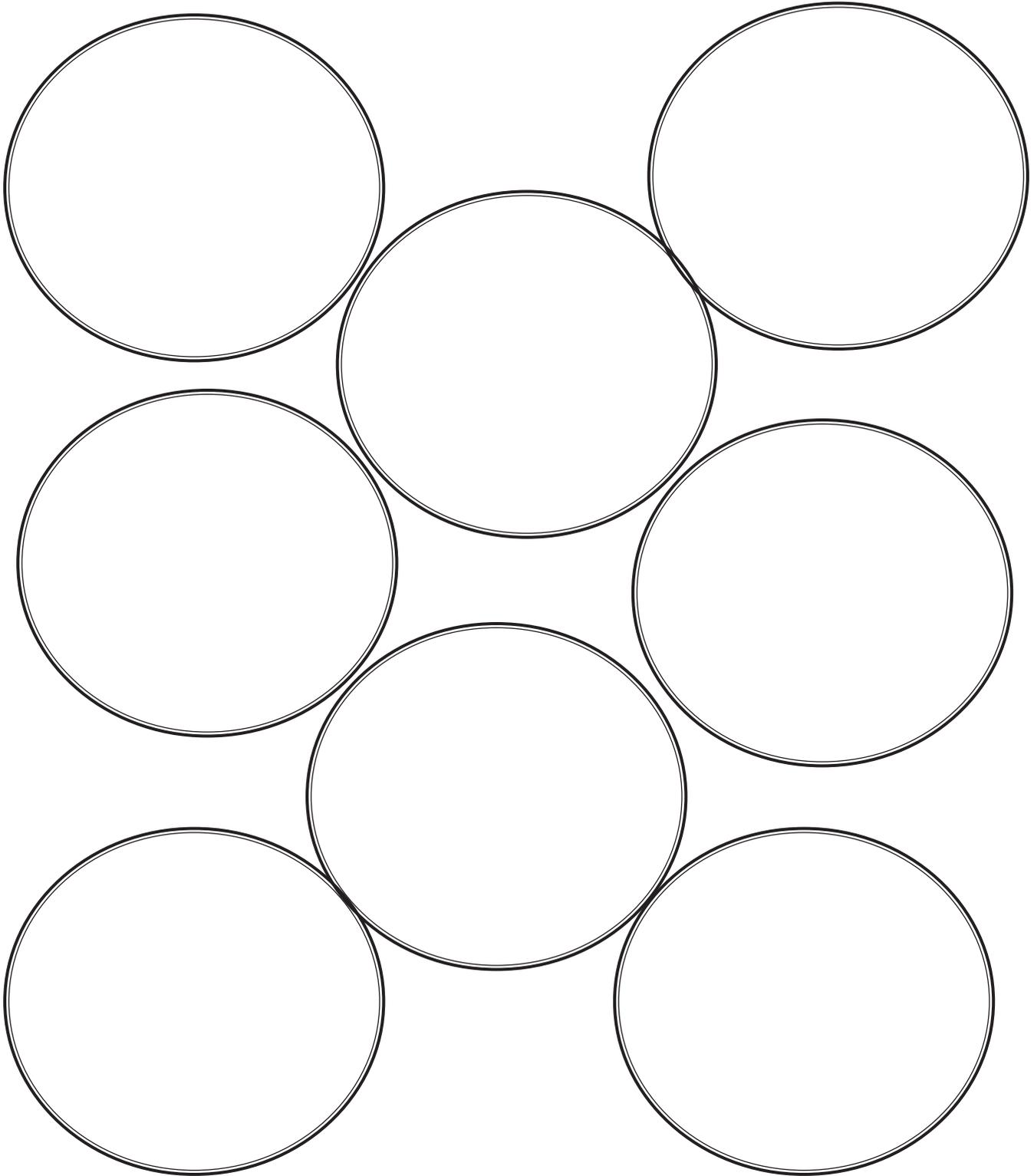
Direction: On a separate sheet of paper write why you need to wear each of the following articles of clothing in the winter.



# Compare and Contrast

Name \_\_\_\_\_

Direction: Make a list of articles of clothing that can be worn in summer but not in winter. Write the reasons you would wear them in the summer and not in winter.



# The Four Seasons

Directions: On the following four pages color each apple tree to represent what it would look like during each season of the year. Each apple tree must represent one season.

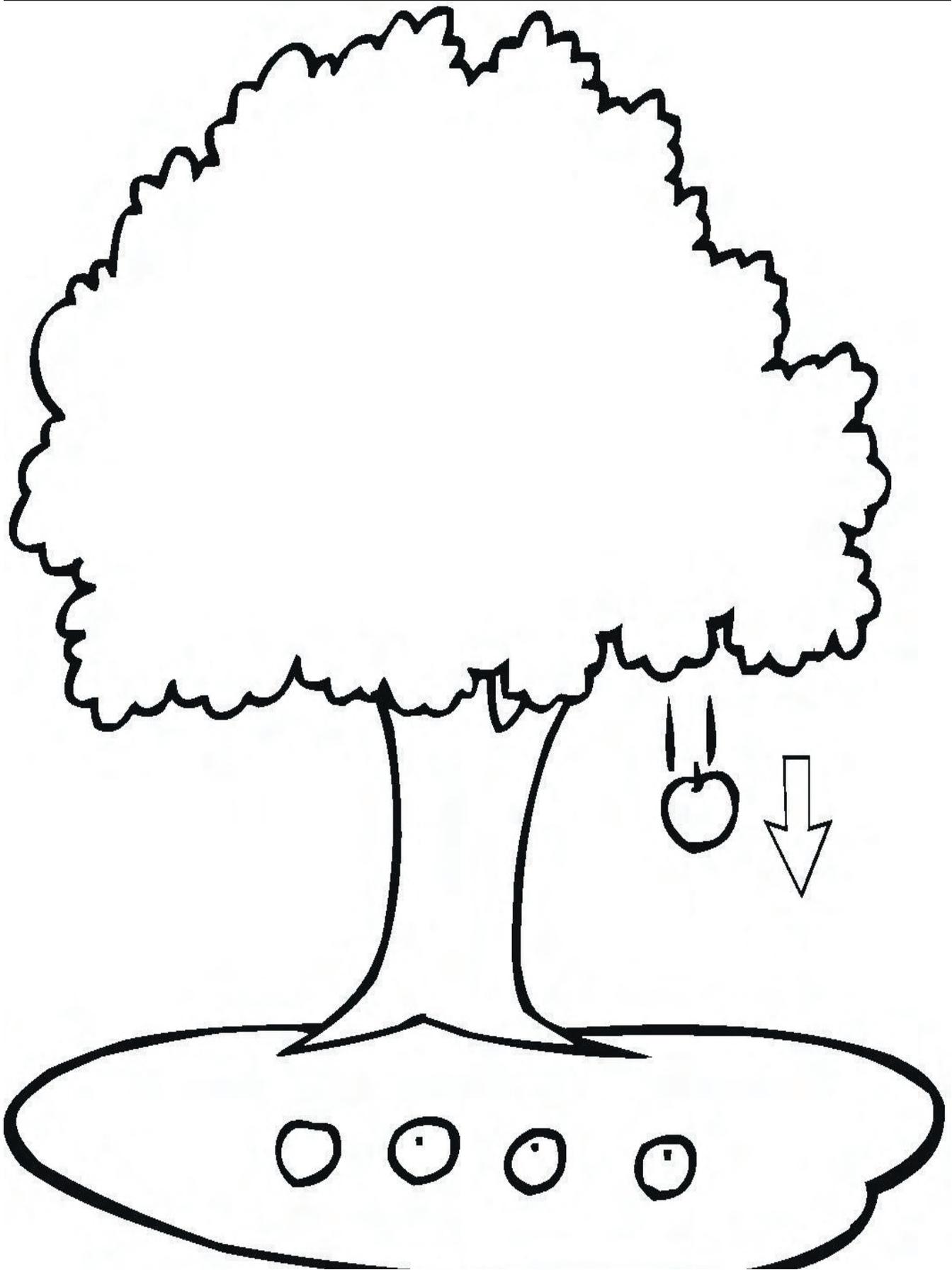
spring

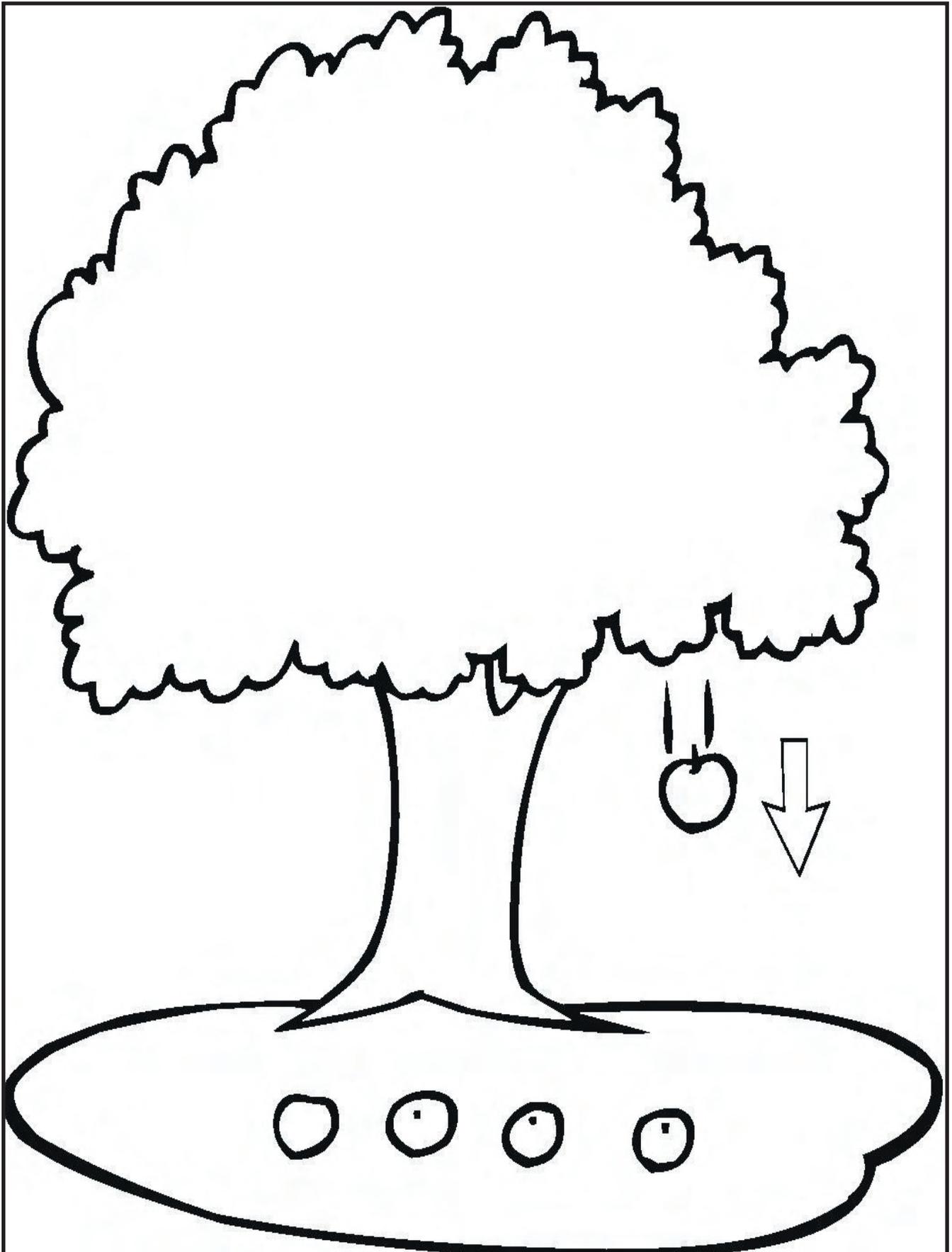
summer

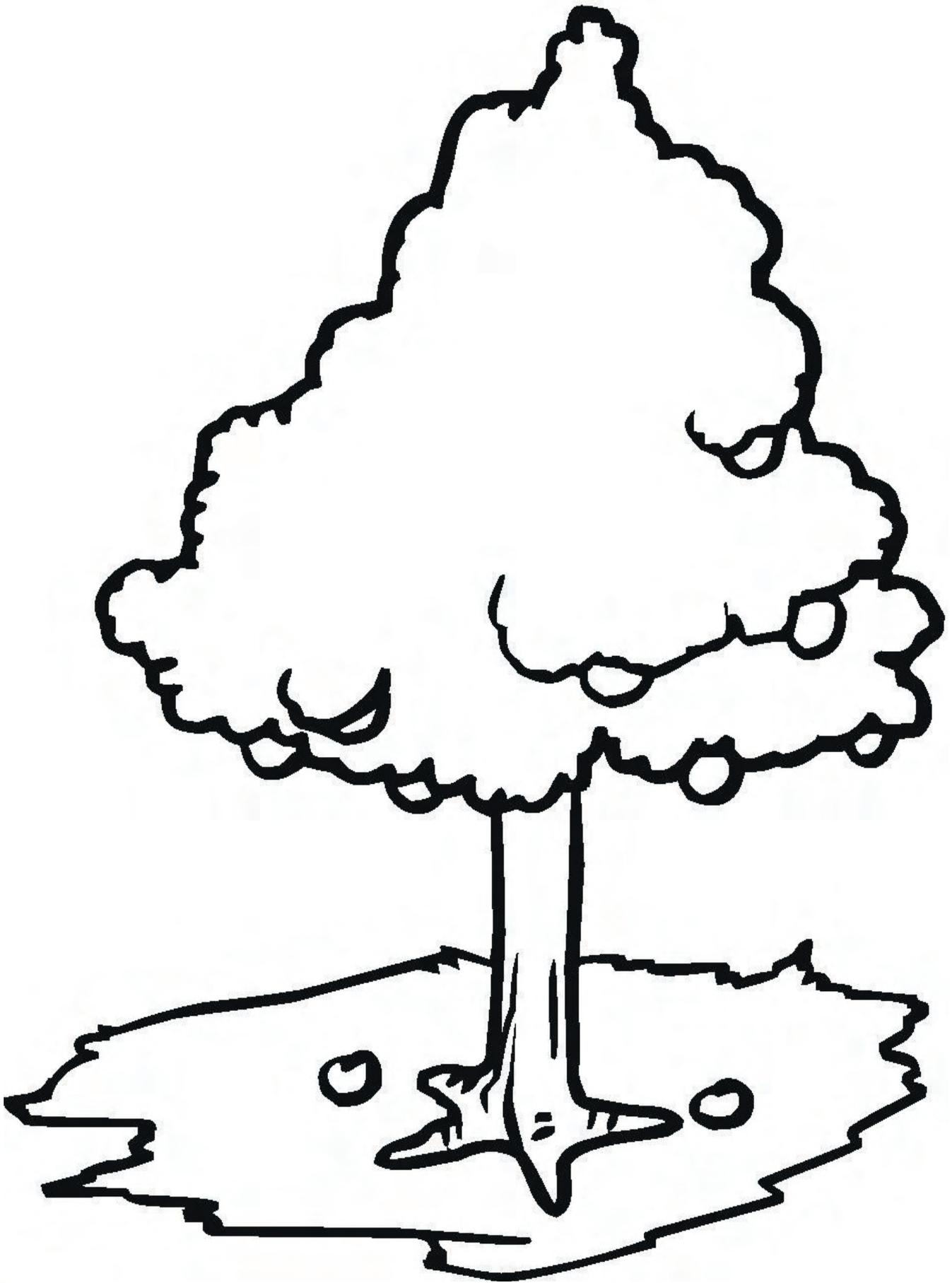


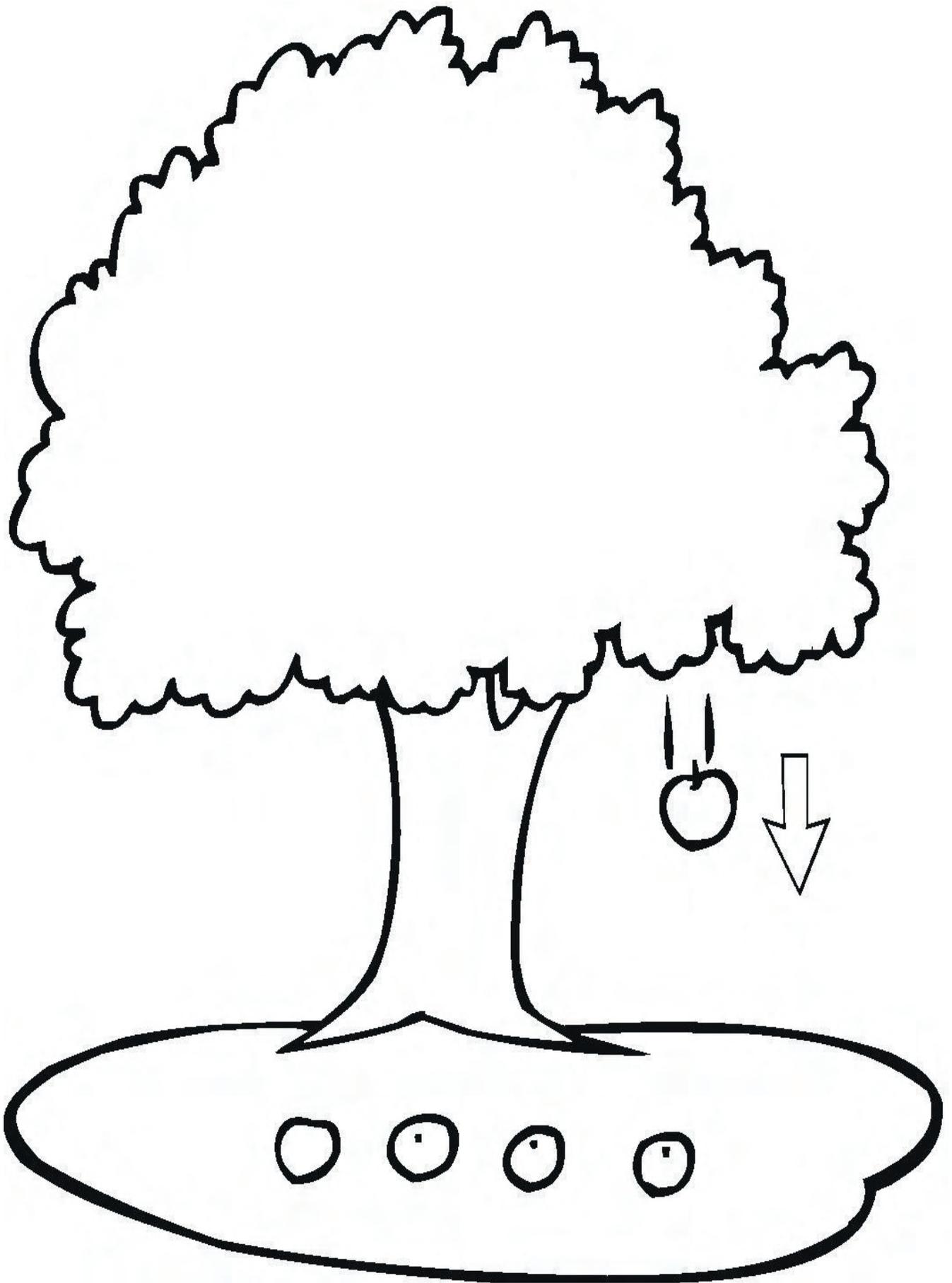
winter

fall/autumn









# Animals in Spring

Directions: Visit the website and type in animals in spring, and the name of your state. Cut out the cards below. Write one name of each animal on one card Find a picture of each animal and paste each one on one card. Use these cards to play a matching game.





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