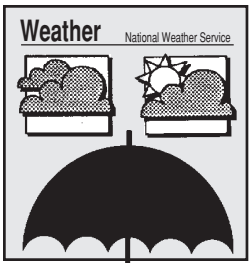


Activity #14: **Relative Humidity**

Did You Know?

The amount of moisture in the atmosphere at any one time is equivalent to only about 1 inch (25 mm) of rainfall when it is spread over the whole surface of the earth.

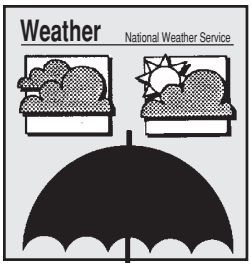
Water vapor in the air of one city (like San Francisco at 60° F) could bring a damp, bone-chilling fog and drizzle, but in another city (like Los Angeles at 85° F), the same amount would contribute to a comfortable and sunny day. The likelihood of precipitation depends on the amount of water relative to the maximum amount of water the air can hold at that temperature. Warm air can hold more water vapor than cold air. Relative humidity is the comparison of the amount of moisture present in the air and the amount of moisture that it could hold. When the relative humidity is 67 percent, the air holds about two-thirds of the water vapor it could potentially hold at that temperature before precipitation. A relative humidity reading of 100 percent means that the air is completely filled with water vapor. A relative humidity reading of 0 percent means that there is no water vapor in the air.

1. How does the average relative humidity in the region where you live compare with other geographic areas in your state? Using the weather section of your daily newspaper, compare the humidity levels in your region with three other locations in your state.

2. Record humidity information each day, then calculate a weekly average. Continue for a six-week period. Evaluate your data. What can you conclude from this exercise?

TIME PERIOD	YOUR REGION	LOCATION #1	LOCATION #2	LOCATION #3
WEEK #1				
WEEK #2				
WEEK #3				
WEEK #4				
WEEK #5				
WEEK #6				

Extension Activity: A hygrometer is an instrument for measuring humidity. A human hair can be used to measure humidity since it stretches in moist air and shrinks in dry air. Some early hygrometers used a paper strip to move a needle. The paper shrank or stretched as it responded to the dampness in the air. Make your own simple hygrometer using newspaper. (Visit your library or look in an encyclopedia for more detailed information about hygrometers and how to build one.)



Activity #15: **High Humidity**

Did You Know?

Warm air can hold more water vapor than cold air. In certain places in the Tropics, the air is hot and sticky and contains nearly as much water vapor as the air in a sauna.

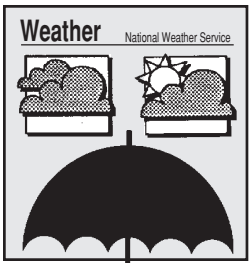
Humidity affects our comfort and health. The higher the humidity, the more uncomfortable a person will feel. When the temperature and humidity are high, people feel "sticky." Their perspiration does not evaporate. To overcome the discomforts of humidity, people buy and use different consumer products. Air conditioners, for example, take the water vapor out of the air making the environment more comfortable.

1. Look through today's newspaper for consumer products that work to overcome the discomforts brought on by high humidity.

2. Clip your newspaper examples and list them below. Explain how each product plays a part in lowering or eliminating humidity.

PRODUCT EXAMPLE FROM THE NEWSPAPER	EXPLANATION OF PRODUCT UTILITY

Extension Activity: Fluid replacement is key to avoiding dehydration while exercising or playing sports. When the humidity is low, perspiration evaporates quickly, and although you may feel cool, your body could actually be in danger of overheating. Look in the sports section of your daily newspaper for articles or information about dehydration or overheating during exercise. Next, locate the grocery advertisement section to find drinking products that replenish fluid in the body during sports or heavy exercise. Can you explain how these products work?



Activity #16: **Heat Index**

Did You Know?

The Heat Index prepared by the U.S. National Weather Service shows what the temperature feels like as the humidity changes. With this chart, you can figure out how hot it feels any day.

HEAT INDEX:				POSSIBLE HEAT DISORDERS FOR PEOPLE IN HIGHER RISK GROUPS:
130°F	or	higher	=	Heatstroke or sunstroke highly likely with continued exposure
105°F	—	130°F	=	Sunstroke, heat cramps, or heat exhaustion likely, and heatstroke possible with prolonged exposure or physical activity
90°F	—	105°F	=	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure or physical activity
80°F	—	90°F	=	Fatigue possible with prolonged exposure or physical activity

1. If you live in a city where summers are hot and humid, like New Orleans, Houston, Miami, or Washington D.C., you know from first-hand experience how uncomfortable it can feel. Turn to the weather page in today's newspaper. What was yesterday's high temperature in each of those four cities? Using the heat index below and the newspaper temperature listings, determine how hot it would have felt in each city (yesterday) if the relative humidity was 65%, 75%, 85%, or 95%.

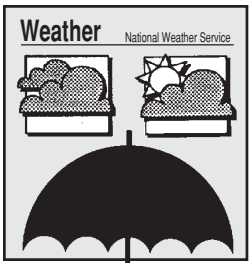
2. The air temperature in Houston or New Orleans on a normal summer day could range between 90° and 100° with 50% to 70% humidity. Using the heat index, determine how hot it would feel at that temperature range.

HEAT INDEX

RELATIVE HUMIDITY (%)

AIR TEMPERATURE (F°)	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
140																
135																
130																
125																
120	139	148														
115	127	135	143	151												
110	117	123	130	137	143	150										
105	109	113	118	123	129	135	142	149								
100	101	104	107	110	115	120	126	132	138	144						
95	94	96	98	101	104	107	110	114	119	124	130	136				
90	88	90	91	93	95	96	98	100	102	106	109	113	117	122		
85	83	84	85	86	87	88	89	90	91	93	95	97	99	102	105	108
80	77	78	79	79	80	81	81	82	83	85	86	86	87	88	89	91
75	72	73	73	74	74	75	75	76	76	77	77	78	78	79	79	80
70	66	67	67	68	68	69	69	70	70	70	70	71	71	71	71	72

Extension Activity: Refer to the heatstroke and sunstroke information in the top section of this lesson. Are heat disorders more likely to occur in hot, humid areas? Explain. Visit your school library to obtain heatstroke and sunstroke information for your community. Begin a newspaper clipping file with articles about heatstroke, heat exhaustion, or physical activity during prolonged heat exposure.



Activity #17: **Clouds**

Did You Know?

For centuries, sailors lost at sea have used clouds to guide them to land. Fleecy clouds on the horizon often form above islands.

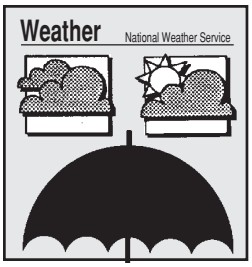
Clouds are made up of millions of droplets of water or ice, which are so small and light they can float in the air. Clouds form when warm air rises, then cools below its dew point. The dew point is the temperature at which the air becomes so filled with moisture that its state turns to a visible water vapor. Raindrops are formed from these water droplets. With further cooling, the water particles grow together and fall as rain. If the atmosphere is cold enough, the droplets become ice crystals. Clouds are without color, but they appear to be white because they diffuse or scatter sunlight. Clouds reflect part of the heat from the sun back into space. This process keeps our planet from becoming too warm. Clouds also trap heat radiating from the ground, keeping the earth from becoming too cool.

1. Check the weather page of today's newspaper for cloud cover predictions. Find predictions for three different days. Weather forecasters describe the predicted cloud cover with special terminology (Fair= less than 40% of the sky is covered by clouds; Partly Sunny / Partly Cloudy = 40% to 70% of the sky is covered by clouds; Cloudy / Mostly Cloudy = 70% or more of the sky is covered by clouds).

2. List the day and the cloud cover prediction on the chart below. Then, convert the cloud cover percentage (according to the range given above) into any 5 decimals that fall within that range. Next, express those decimals as fractions.

DAY OF THE WEEK	CLOUD COVER PREDICTION	PERCENTAGE RANGE	CONVERT TO ANY 5 DECIMALS IN RANGE	EXPRESS AS FRACTIONS

Extension Activity: Conduct a simple cloud-making experiment! Warm a narrow-necked bottle by shaking hot water in it. Put an ice cube on top of the bottle. Because this demonstration does not add particles of dust or smoke that act as nuclei to help the water vapor condense more visible, you will have to turn off the room lights and shine a flashlight into the bottle to see the cloud. Another variation of this experiment is simply to fill a narrow-necked bottle with 1 to 2 inches of hot water and put the ice cube on top of the bottle.



Activity #18: **Cloud Families**

Did You Know?

The tallest cloud is the giant cumulonimbus. It can reach a height of 11 miles (18 km) which is twice as high as Mount Everest and can hold more than a half million tons of water.

There are three families of clouds. In 1804, Luke Howard, a British biologist, gave them Latin names: "cirrus" (curl of hair), "cumulus" (heap, mass), and "stratus" (layer). There are ten main types of clouds made up of combinations of these families. Clouds are also grouped by their height above the ground, "alto" (high), and by their amount of precipitation, "nimbus" (rain). Each cloud carries a message about the weather to come. Meteorologists use clouds to help them make forecasts.

1. Cirrocumulus clouds are clouds resembling "a mass of curls." The word, cirrocumulus, is a combination of the two words, cirrus and cumulus. The English language is made up of hundreds of words that are combinations of other words. They are called compound words. Look at the front page of today's newspaper. Circle as many compound words as you can find.

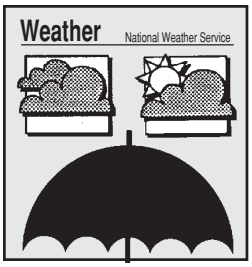
2. Using a dictionary, define each compound word on the front page. How does the definition relate to the meaning of the two smaller words?

FRONT PAGE COMPOUND WORD	DEFINITION OF COMPOUND WORD	TWO SMALLER WORDS WITH DEFINITIONS

Extension Activity: When you look at the clouds, how do they make you feel? Do they make you feel dreamy or sad, happy or hopeful? Clouds are quite often used to convey emotions in poetry and songs. Listen to the lyrics (words) of some of your favorite songs. How many songs mention clouds, storms, or rain? Pretend you are a writer for the entertainment section of your daily newspaper. Write a critique for one of those songs. Be sure to mention how the weather-related lyrics make you feel.

Activity #18: **Cloud Families**

CLOUD TYPE (AND SYMBOL)	DESCRIPTION	COMPOSITION	HEIGHT	RELATED WEATHER	FORECAST
High Clouds:					
Cirrus 	delicate, threadlike	ice crystals	above 20,000 ft. (often higher than 35,000 ft.)		1st sign of approaching storm or weather change
Cirrocumulus (rare) 	small tufts of cotton	ice crystals	above 20,000 ft.	quiet winter weather	
Cirrostratus 	thin sheet; causes halo around sun or moon	ice crystals	above 20,000 ft.		rain or snow likely within 24 hours
Middle Clouds:					
Altocumulus 	unconnected piles or layers piled together	water droplets	6,000 to 20,000 ft.	quiet winter weather	summer thunderstorm
Altostratus 	smooth white or gray sheet; sun may be seen through clouds	water droplets	6,000 to 20,000 ft.	maybe light rain or snow	rain or snow likely in 6 to 8 hours
Nimbostratus 	smooth layer of gray; may not be seen because of rain or snow	water droplets	6,000 to 20,000 ft. or lower	widespread and continuous rain or snow	
Low Clouds:					
Stratus	smooth, even sheet	water droplets	below 5,000 ft.	drizzle	
Stratocumulus 	more uneven than stratus; light and dark patches on underside	water droplets	below 5,000 ft.	overcast	follows storm
Clouds Through All Levels:					
Cumulus 	heaped up in piles	water droplets	up to 20,000 ft.		in morning, precedes storm; in afternoon, follows storm
Cumulonimbus 	deep piles; may be anvil-shaped on top (cirrus layer)	water droplets; maybe ice crystals on top	usually 5,000 to 15,000 ft. thick; can reach 60,000 ft. thick	thunderstorms; heavy rain; hail possible	in winter, followed by north wind and colder weather



Activity #19: **Precipitation**

Did You Know?

A cloud can develop and produce rain in less than an hour. It takes an average of nine minutes for a raindrop to reach the ground from a cloud 20,000 ft (6,250 m) thick.

Precipitation is moisture that falls from clouds. Rain, snow, sleet, and hail are forms of precipitation. The water vapor attaching to nuclei in clouds becomes precipitation when the water droplets become too heavy to be held aloft by air currents. Water droplets become heavier by bumping into each other and sticking together, or by colliding with ice crystals and then freezing and sticking together. This combining of water vapor droplets is called coalescing. The form that precipitation takes: rain, snow, sleet, or hail, depends on the temperature of the various layers of air it passes through on the way to the ground. Rain can originate either as water or as ice. If sleet or snow passes through a layer of warm air, it will melt and reach the earth as rain.

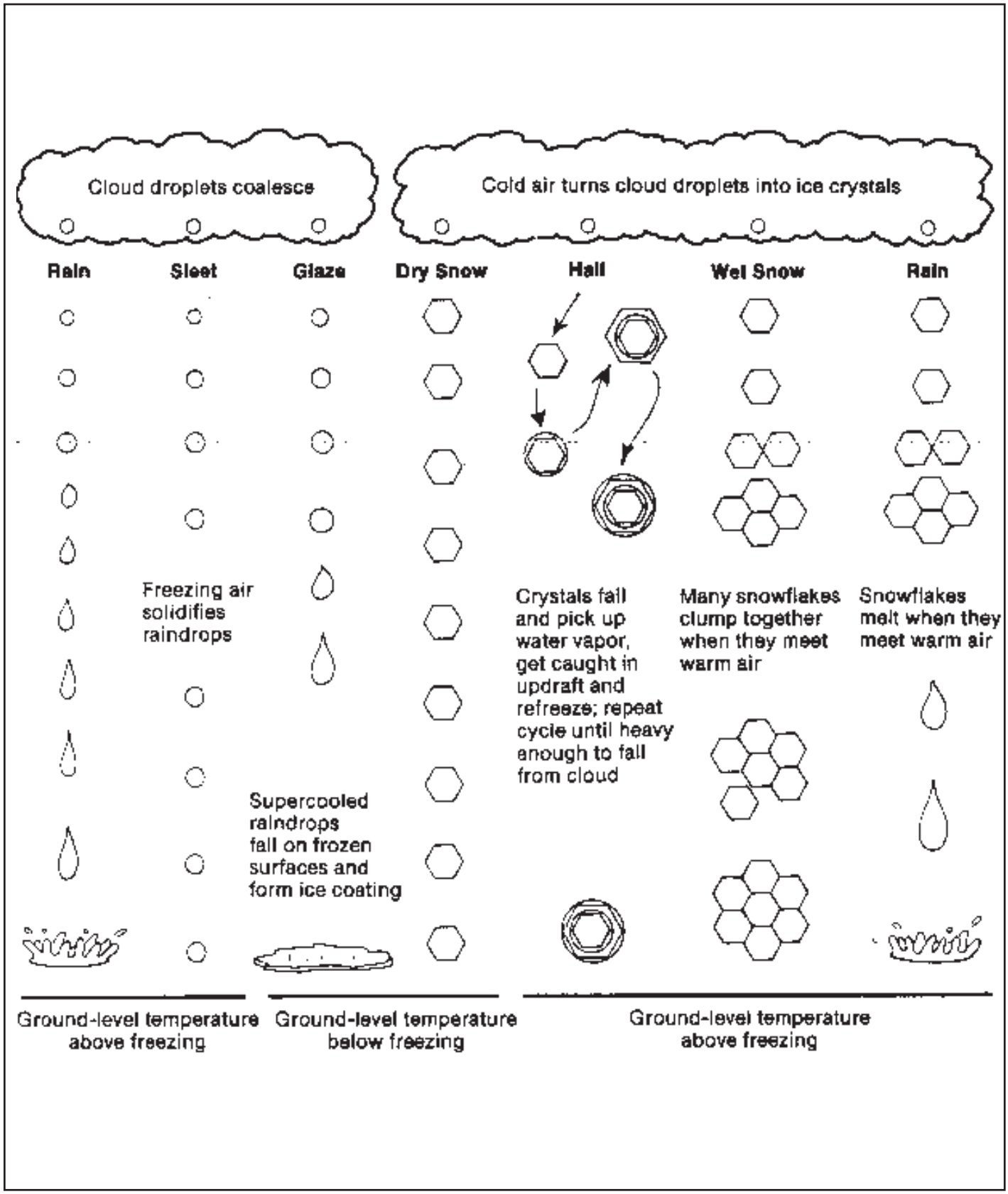
1. Turn to the weather page in your daily newspaper. Find the section on precipitation. Most newspapers list the daily, monthly, and yearly amounts of precipitation. They also list monthly and yearly averages, as well as the previous year's totals. Can you find this information?

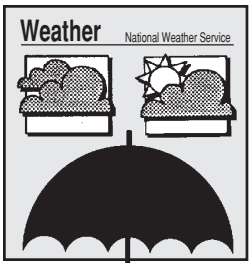
2. Create a method for tracking: (a) the actual precipitation, (b) the average precipitation for your area, and (c) the precipitation for the preceding year. Then, graph your information and analyze your data. Have you had more or less precipitation than last year? Is the precipitation above or below average?

ACTUAL PRECIPITATION	AVERAGE PRECIPITATION	LAST YEAR'S PRECIPITATION

Extension Activity: Can you make rain? Put a tray of ice over a boiling steam kettle that is giving off steam. Turn off the room lights and hold a flashlight under the tray near the kettle. A cloud should form and rain will fall. The cooling of the air decreases its ability to hold water and it becomes saturated.

Activity #19: **Precipitation**





Activity #20: **Hail**

Did You Know?

A hailstone the size of a melon fell in Coffeyville, Kansas on September 3, 1970. This, the largest hailstone on record, weighed 1.67 lbs (750 g) and was 17.5 in (44.5 cm) round.

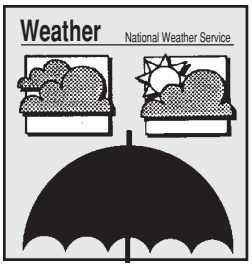
Hail is formed by the collision of supercooled water droplets with small ice crystals. Water freezes on to the crystals in layers, like the skin or layers of an onion. Hail is formed when there are strong updrafts that bounce the crystals between moister and drier areas. Every time it bounces, the hailstone adds another layer of ice, so the bigger the hailstone, the longer it has been bouncing around in the clouds. Pilots have spotted hail when they are several miles away from a cloud. Sometimes hail is shot out of the sides of clouds because of the force and instability of the air currents. To reach golf-ball size, a hailstone must remain in the cloud for at least 20 minutes and must be bounced by the updraft at least two or three times before falling to earth. Hail is most common during spring and summer, usually during thundershowers.

1. Locate the comics section in your daily newspaper. Notice the many different types of comic strips (fantasy, romance, science fiction, action-adventure, situational comedy, childish viewpoint). Which type of comic strip do you like best?

2. Create your own new comic strip series! Begin your first segment below with a story about a hail storm. Use the weather information from this lesson for background material.

MY COMIC STRIP			
NAME OF COMIC STRIP: _____		**TYPE OF COMIC STRIP:** _____	

Extension Activity: Try making your own hailstone by repeatedly adding more and more water drops to a piece of ice placed in a container in your freezer. What is the diameter of your hailstone? How much does it weigh? Pretend your hailstone was real and had fallen near your house during a recent thunderstorm. Write a late breaking news story about it. Be sure to include the who, what, when, where, why, and how!



Activity #21: **Snow**

Did You Know?

The most snow to fall in a year was at Paradise, Mount Rainier in Washington state during the winter of 1971-1972. Some 1,224 inches (31,102 mm) of snow fell, enough to reach a third of the way up the Statue of Liberty in New York.

Snow falls to earth either as individual crystals or as snowflakes, which are large masses of crystals. In the atmosphere, snow grows directly from water vapor into solid crystals, formed around microscopic particles of dust or ice. Snow crystals that fall through very cold, dry air will not accumulate many other crystals and will fall as dry snow, which has a very low water content; as much as 20 inches of dry snow would have to melt to make an inch of water. Snow crystals that fall through moist air that is not too cold grow much larger and fall as wet snow; six or seven inches of wet snow can make an inch of water. Snow crystals usually form in hexagonal, or six-sided shapes. The shape of the crystals depends on the air temperature. In colder air, needle and rod shapes form. More complicated shapes form in warmer air.

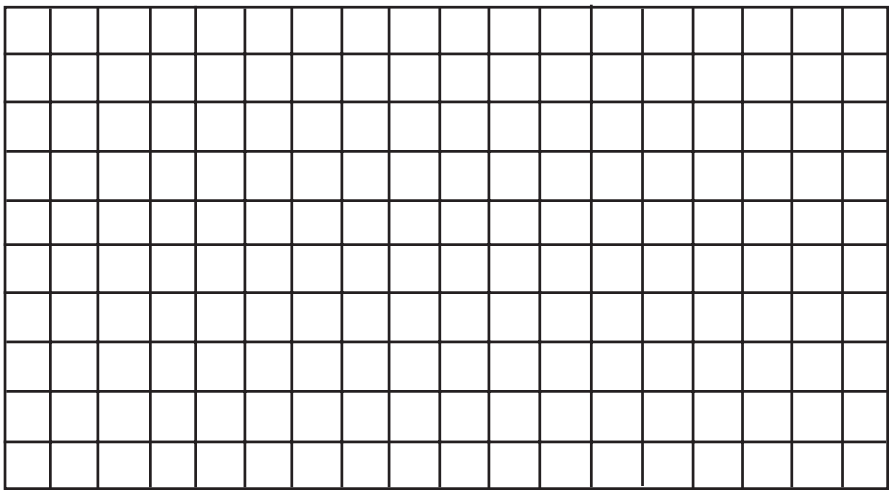
1. Scan today's newspaper for words that relate to snow or snowfall. (For example: snowflake, precipitation, crystals, wet, dry, etc.) Find at least 20 words.

2. Arrange your newspaper words on a grid with "like" letters intersecting. In other words, create a crossword puzzle! Define your snow words and place the definitions in the correct "across" and "down" columns (for the complete crossword puzzle and answer key). Then, give a blank grid with your "across" and "down" instructions to a classmate. See if your classmate can solve the puzzle.

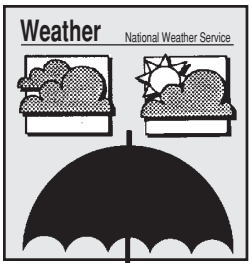
CROSSWOOD PUZZLE:

Across:_____
_____
_____
_____
_____
_____

Down:_____
_____
_____
_____
_____



Extension Activity: An avalanche can bury a village in seconds and smash trees as if they were matchsticks. It can happen when fresh snow falls on top of an icy layer on slopes. Avalanches can be triggered by a rise in temperature, a strong wind, or even a loud noise. For this reason, hikers and campers should be extremely cautious in the mountains. During the winter season, create a newspaper clipping file of snow or avalanche-related stories. Study the information given in each news story. How could different circumstances have changed each situation?



Activity #22: **What Causes A Rainbow?**

Did You Know?

A rainbow is actually a full circle. The arc seen from ground level is only part of the rainbow. When flying in an airplane, far above the ground, you can see a rainbow's full circle.

A rainbow is caused by sunlight shining through droplets of water, which act as prisms. A rainbow is only visible when the sun is low in the sky. To see a rainbow, you must have your back to the sun. Rainbows are usually seen in the early morning and late afternoon. A morning rainbow is seen in the west. It is usually an indicator of rain later in the day, because weather generally moves from west to east. An afternoon rainbow, which is seen in the east, means that the rain is to the east. In other words, the rain has moved past the observer. There are seven main colors in a rainbow. In visible order they are: red, orange, yellow, green, blue, indigo, and violet. In a single rainbow, red is always at the top and violet at the bottom. If a double rainbow forms, the second is a fainter rainbow and the colors are reversed.

1. A rainbow is simply a curved spectrum of color. A newspaper press is able to print the colors of a rainbow by using a combination of the primary colors: Magenta (red), Cyan (blue), and Yellow. Look through today's newspaper for examples of photographs, graphics, and headlines printed in color.

2. Using a powerful magnifying glass, inspect each example. Notice the size and number of dots which blend together to produce a particular color. Dot size and ink density determine the shade of a color. Can you tell which primary colors were used in each example and how they were combined?

PHOTOGRAPHS	GRAPHICS: ICONS, CHARTS, GRAPHS, MAPS	HEADLINES AND LETTER TYPE

Extension Activity: Make your own rainbow! Stand a glass of water on a window ledge in bright sunlight. Place a sheet of white paper on the floor (or somewhere across the room where the sunlight hits). You will see the colors of a rainbow on the sheet of paper. What you are doing is separating the various colors that make up white light. When light passes at a slant of 40° to 42° from the air through the glass of water, the rays change direction. They are "refracted." Each color bends differently: violet bends the most and red the least. So, when the light comes out of the glass of water, the different colors travel in slightly different directions and strike the sheet of paper at different places. It is the same with a rainbow in the sky.