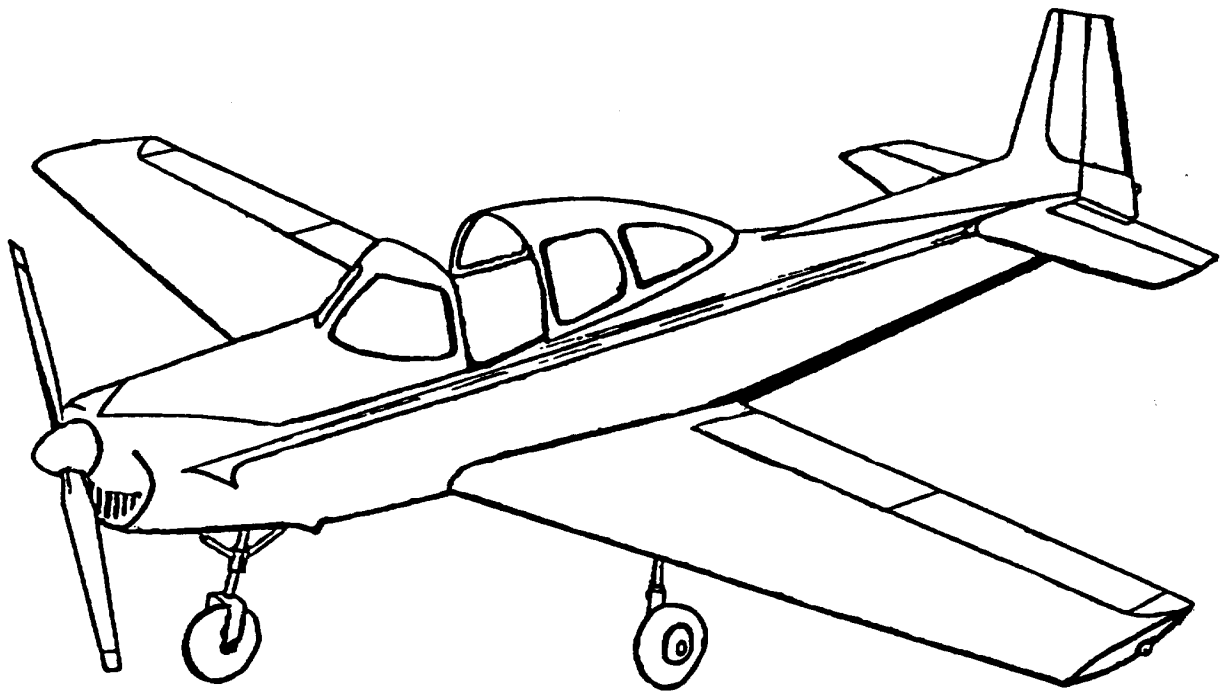


UNIT 4 ACTIVITY 7

STUDENT HANDOUT 4

PARTS THAT CONTROL AIRPLANE MOVEMENT

- Directions:
1. Color the rudder red.
 2. Color the ailerons green.
 3. Color the elevators blue.



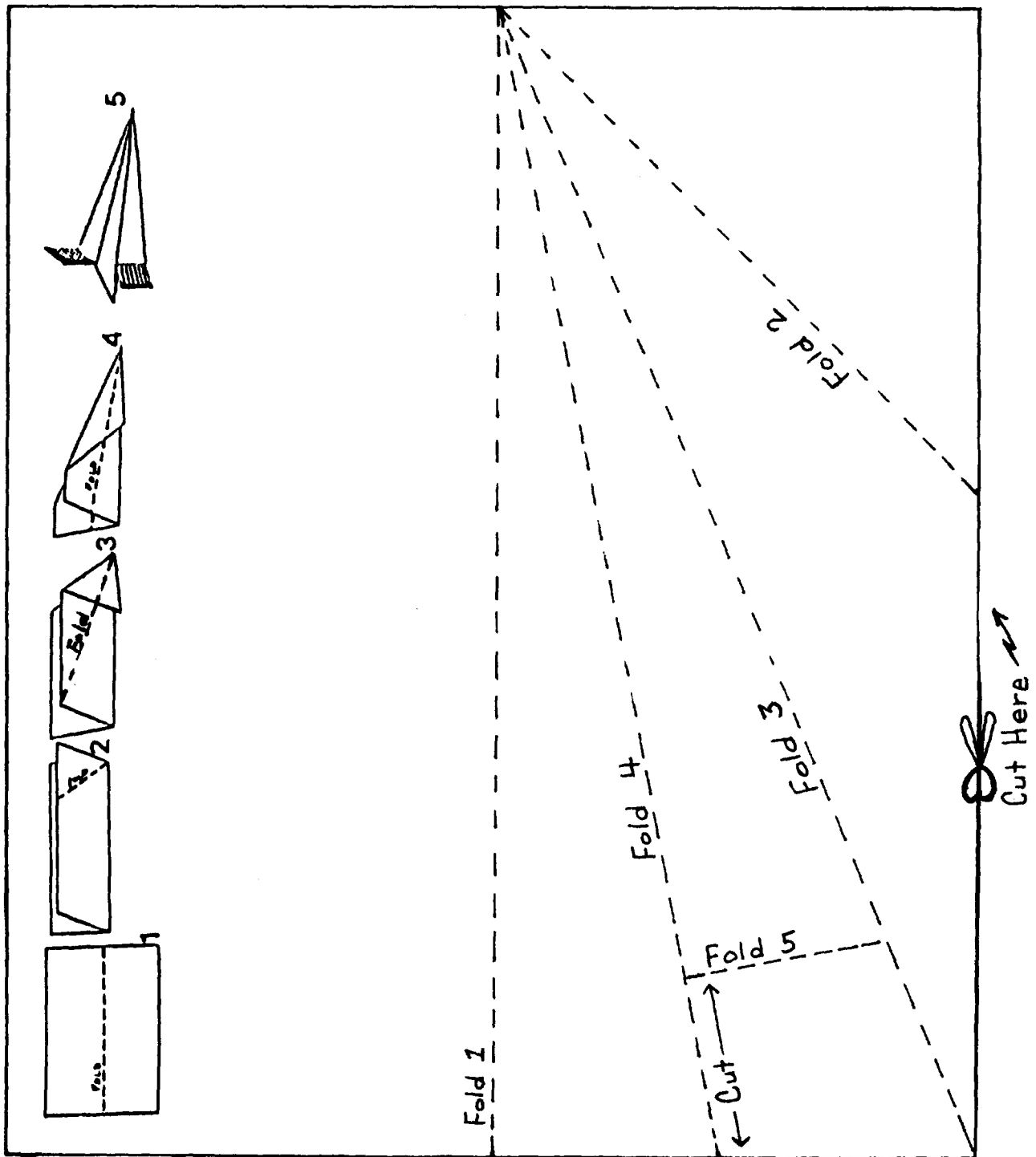
Fill in the blanks. Use the words rudder, aileron and elevator.

1. The _____ makes the plane climb and descend.
2. The _____ makes the plane turn left or right.
3. The _____ makes the plane tilt left or right.

UNIT 4 ACTIVITY 9 AND 10

STUDENT HANDOUT 5

Directions: Cut out along solid line. Fold using five folding steps.



UNIT 4 ACTIVITY 11

STUDENT HANDOUT 6

Directions: Select a word from the word bank for each description below.

Word Bank

rudder climb elevator
descend left turn turn tilt right

1. _____ aircraft part that makes the aircraft move up (climb) or down (descend).
2. _____ aircraft part that turns the aircraft left or right.
3. _____ aircraft part that makes the aircraft tilt left or right.
4. _____ pull control wheel out.
5. _____ push control wheel in.
6. _____ push left rudder.
7. _____ turn control wheel to the right.

UNIT 5: WEATHER

PURPOSE OF UNIT 5

The purpose of Unit 5 is to develop the students' understanding of weather. Specifically, students should:

1. sense that weather changes daily;
2. experience weather reporting first hand through visual observations;
3. construct and demonstrate simple instruments to determine wind direction and speed, temperature and air pressure; and
4. demonstrate the-ability to interpret radio, newspaper, and TV weather forecasts.

MAJOR MESSAGES IN UNIT 5

- Weather changes daily.
- Weather affects our daily lives.
- Weather plays a major role in aviation and space activities.

BACKGROUND INFORMATION FOR UNIT 5

Unit 5 consists of 5 topics:

TOPIC 1: WEATHER CHANGES DAILY

TOPIC 2: CLOUDS

TOPIC 3: WIND

TOPIC 4: AIR

TOPIC 5: FRONTS

Topic 1 presents weather as changing daily. The changes affect our daily lives.

Topic 2 introduces types of clouds and how they affect weather.

Topic 3 demonstrates ways to measure wind speed and direction.

Topic 4 demonstrates that air has weight and takes up space and presents ways to measure air temperature and pressure.

Topic 5 introduces air masses and weather fronts and emphasizes interpretation of weather reports.

VOCABULARY WORDS FOR UNIT 5

Topic 1	weather calendar sun
Topic 2	clouds stratus clouds cumulus clouds fog
Topic 3	wind air windsock
Topic 4	atmosphere weight pressure meteorologist barometer temperature thermometer
Topic 5	air mass cold front warm front stationary front occluded front

TOPIC 1: WEATHER CHANGES DAILY

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

<u>ACTIVITY</u>	<u>MATERIALS NEEDED</u>	<u>GRADE LEVEL</u> <u>SUBJECT</u>
1. What's It Doing Today?	WHAT'S IT DOING TODAY? Student Handouts 1, 2, 3, and 4 large wall calendar Teacher Resource Sheet 1 Student Handouts 5 and 6 Fantastic Flight Dictionary	Grades K-3 language arts mathematics science

ACTIVITY 1: WHAT'S IT DOING TODAY?

Direct the students' attention to weather. Develop a sense of changing weather by displaying pictures of a sunny day, a cloudy day, a rainy day, a snowy day, and a windy day. Ask questions about each picture, such as:

1. Name things in each picture that help tell what the weather is like.
2. What in each picture tells us there is air in motion (wind)?
3. What in each picture tells us there is moisture (rain or snow) in the air?
4. What in each picture tells the temperature (hot or cold)?

Explain to the students that weather is the condition of the air (wind, temperature, and air pressure) surrounding the earth. Weather changes daily.

Distribute WHAT'S IT DOING TODAY? (Student Handouts 1, 2, 3, and 4).



Cut sheets apart, stack and staple to form a book. Read the story, or have the students read it. Discuss questions similar to the following:

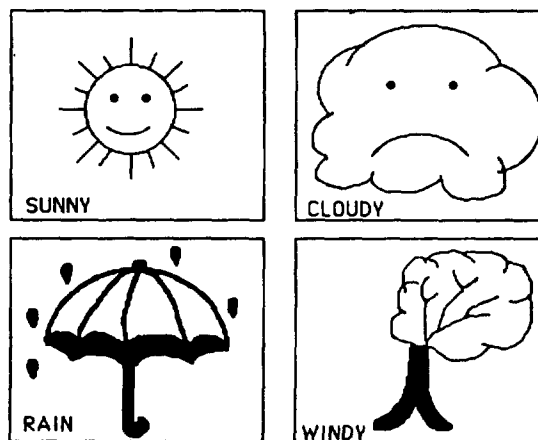
1. What makes weather?
2. Why are days warmer than nights?
3. How can clouds make the day cooler?
4. What is inside some clouds?
5. How can the wind make the day warmer or cooler?

ACTIVITY 1 (Continued)

Explain to students that weather affects everything we do. Stimulate students' thoughts about how weather affects our lives by asking questions such as the following:

1. How does knowing about the weather help us dress for school?
2. Why does the farmer watch the weather before he plants his crops?
3. Why do pilots watch the weather?

Display a large calendar on a classroom wall. Discuss the term 'symbol.'" Introduce the weather symbols from Teacher Resource Sheet 1.



Each morning have students determine the weather for the day. Let students take turns pasting weather symbols to the calendar. At the end of the week, review the weather. Summarize the month-long weather watch by telling students that Weather changes daily. We can't change what the weather does. We can observe the weather and make changes in our daily plans for our comfort and safety.

Emphasize that weather gives us hints about what will happen. We can look at the hints (clouds, wind, air pressure, air masses, and fronts) to find what will happen next.

ACTIVITY 1 (Continued)

Extended Activities

- Distribute Student Handouts 5 and 6. Tell students they will become daily weather reporters. Ask students to color and cut out the correct weather symbol for the day and paste it in the correct date box. Write the number of the day in the box. Review the overall weather picture at the end of each week or month.
- Write Topic 1 vocabulary words in the Fantastic Flight Dictionary.

TOPIC 2: CLOUDS

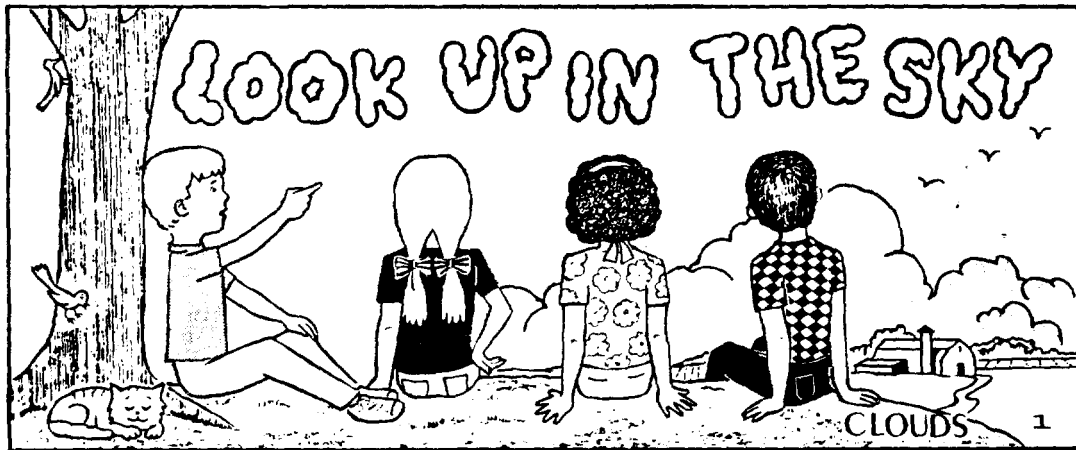
The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

<u>ACTIVITY</u>	<u>MATERIALS NEEDED</u>	<u>GRADE LEVEL</u> <u>SUBJECT</u>
2. Look Up in the Sky	LOOK UP IN THE SKY, Student Handouts 7,8, and 9	Grades K-3 language arts mathematics science
3. Cloud Making	Teacher Resource Sheet 2 kettle, water, strainer, ice	Grades 1-3 science
4. Stratus and Cumulus Clouds	Student Handouts 5 and 10 blue construction paper, cotton balls, glue, crayons Fantastic Flight Dictionary	Grades 1-3 science mathematics art

ACTIVITY 2: LOOK UP IN THE SKY

Excite students by telling them clouds give us messages about the weather. Clouds let us see what is happening in the air.

Distribute LOOK UP IN THE SKY (Student Handouts 7, 8, and 9).



Cut sheets apart, stack and staple to form a book. Read the story, or have students read it. Discuss questions similar to the following:

1. What messages do clouds give us about the weather?
2. Describe the look of stratus clouds.
3. Describe the look of cumulus clouds.
4. What do we find inside clouds?
5. What is fog?
6. How do clouds affect the weather?

ACTIVITY 2 (Continued)

Extended Activities

- Tell students to write a story using the following idea:

"If I could move a cloud, I could help mankind by....."

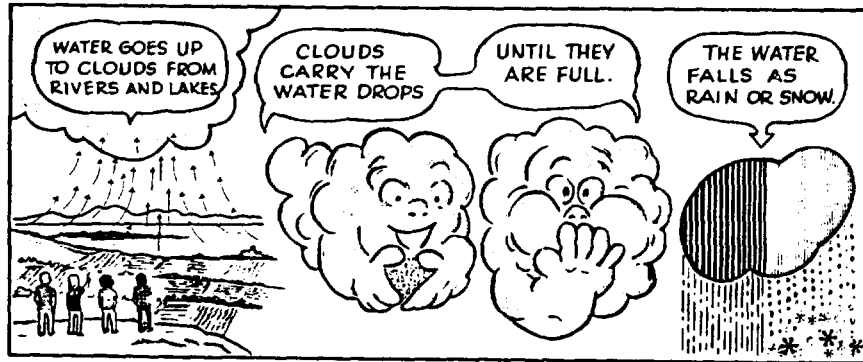
Ask students to illustrate their work. Have students share their stories with the class.

For K-1 students, have the class dictate an experience chart about clouds.

- On a cold day, instruct students to blow their breath into the air. Ask students to explain what happened.

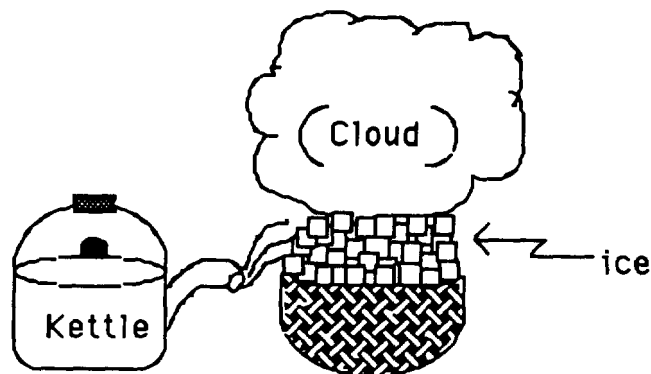
ACTIVITY 3: CLOUD MAKING

Explain to students that clouds are visible bodies of very fine droplets of water (or ice) dispersed in the air. Clouds filled with water grow large and can reach a height of several miles. When full, the water falls as rain or snow. Display Teacher Resource Sheet 2. Explain the cloud cycle and how temperature affects falling moisture.



Further explain the formation of a cloud by conducting the following experiment:

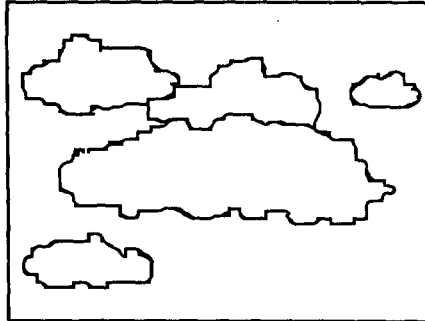
Boil water in a kettle until steam comes from the spout. Point out to the students that the steam disappears into the air almost immediately. Fill a strainer with ice and hold it near the spout of the kettle so the steam will go through it. Point out the formation of a cloud. Ask the students to retell in their own words what happened.



ACTIVITY 4: STRATUS AND CUMULUS CLOUDS

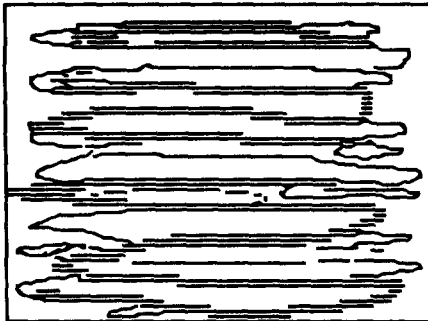
Explain to the students that the two basic types of clouds are cumulus and stratus.

CUMULUS clouds are fluffy, dome-shaped masses that may produce heavy rainstorms and strong winds, forecasting colder weather.



Cumulus Clouds
White, Puffy, Full

STRATUS clouds are low horizontal layers that create poor visibility in the form of haze, fog, drizzle, or rain, forecasting warmer weather.



Stratus Clouds
Gray, Glooms

ACTIVITY 4: (Continued)

Using the above information, help students formulate some conclusions on how clouds affect air transportation by asking questions such as:

1. How will low stratus clouds or fog affect a pilot's take-off or landing?
2. What message would a cumulus cloud give us?
3. What type clouds would concern a pilot most?

Explain that air transportation depends on accurate weather reports to make flying safe and comfortable. Bad weather still causes delayed flights and accidents. Pilots must be able to see to take-off or land. Aircraft have not been built that will fly through thunderstorms or very high winds.

Distribute Student Handouts 5 and 10. Discuss cloud symbols. Have students observe sky conditions for a month and record their findings on Student Handout 5. Leave the date box empty if it is a clear or sunny day. At the end of the month, ask students to examine the weather calendar to determine the number of clear days, days with cumulus clouds, and days with stratus clouds.

Extended Activities

- Distribute blue construction paper and two cotton balls. Ask students to draw a simple picture of an outdoor scene with crayons. Glue puffy cotton balls in the sky to represent cumulus clouds or stretched cotton balls in the sky for stratus clouds. Have each student tell the class about the weather conditions portrayed in their picture.
- Write Topic 2 vocabulary words in the Fantastic Flight Dictionary.

TOPIC 3: WIND

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

<u>ACTIVITY</u>	<u>MATERIALS NEEDED</u>	<u>GRADE LEVEL</u> <u>SUBJECT</u>
5.. Air In Motion	string, small dish strong perfume, cotton balls electric fan, strips of paper	Grades K-3 science
6. Windsock Making	<u>Grades K-1</u> 2" X 18" construction paper strips, 1 1/2" X 20" tissue paper strips, glue, string, paper punch <u>Grades 2-3</u> 36" X 24" nylon cloth, four 10-inch lengths of heavy wire, wire coat hanger, 36" X 1" wooden dowel, large nail, wooden spool, two paint stir sticks helium-filled balloons, string, tags, United States map posterboard, magazines, glue	Grades K-3 science art

TOPIC 3: WIND (Continued)

<u>ACTIVITY</u>	<u>MATERIALS NEEDED</u>	<u>GRADE LEVEL</u> <u>SUBJECT</u>
	Student Handout 11	
7. Airplanes In The Wind	string, wooden glider, small fan	Grade 3 science
	Student Handout 12 Fantastic Flight Dictionary	

ACTIVITY 5: AIR IN MOTION

Direct students' attention to the wind. Stimulate students' thoughts about the wind by asking question such as:

1. What is wind?
2. How do we know air is moving?
3. Does air always move at the same speed?
4. Does air always move in the same direction?

Demonstrate air in motion by conducting the following experiments:

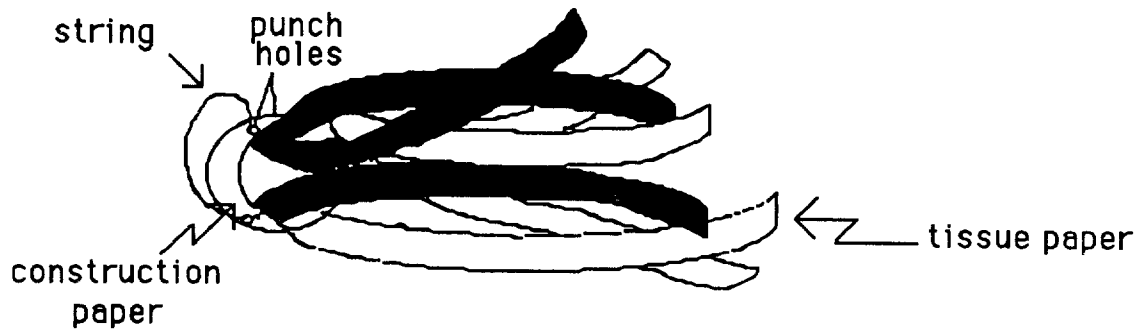
1. Ask students to blow into the palms of their hands, Ask them how they know air is moving.
2. Burn a string or some incense in a dish. Ask students to observe the direction the smoke travels. Ask them why the smoke is moving.
3. Take students on a hike around the school grounds. Ask them to observe the leaves on the trees. Are the leaves moving? Are the trees bending? Why?
4. Put strong perfume on a cotton ball. Ask students to raise their hands as soon as they smell it. Ask them why they are able to smell the perfume across the room.
5. Tell students to fan themselves with a piece of paper, move their arms rapidly back and forth, or turn around rapidly. Ask students to describe what they felt.
6. Fasten some strips of paper to an electric fan. Ask students to explain what happens with the fan on and what happens with the fan off. What did the fan do to the air?

ACTIVITY 6: WINDSOCK MAKING

Explain to the students that wind can change direction and speed. A windsock can tell us the direction in which the wind is blowing and how hard (fast) it is blowing.

Grade K-1 Windsock

1. Glue two construction paper strips together to form a loop.
2. Glue tissue paper strips to the inside of the loop.
3. Punch a hole on each side of the loop and attach a string.
4. Take finished windsocks to outside play area. Have students determine the wind direction.



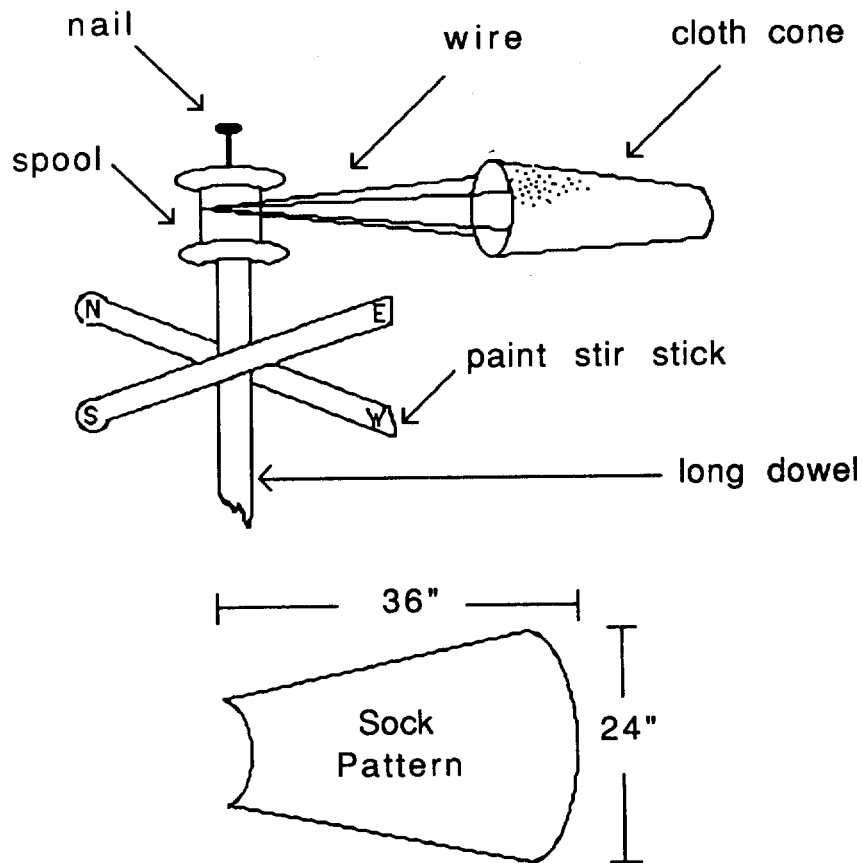
Grade 2-3 Windsock

1. Shape a hanger into a 9" diameter loop.
2. Attach four wires to this circular loop at four equidistant points.
3. Cut cloth (see diagram) and glue sides together to form a cone.
4. Glue large end of cone to wire loop.
5. Gather the four lengths of wire and bind the exposed ends to the spool with wire.
6. Place a nail through the spool so that the spool pivots freely. Hammer nail into the end of the long dowel.
7. Nail paint stir sticks to long dowel about twelve inches below the windsock.
8. Mark the ends of each paint stir stick with N, S, E, and W.

ACTIVITY 6 (Continued)

Grade 2-3 Windsock (Continued)

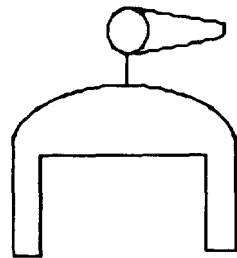
9. Place the windsock outdoors on a tall post. Make sure the paint stir stick marked N is pointing North.
10. Have students observe newly constructed windsocks daily for wind direction and speed.



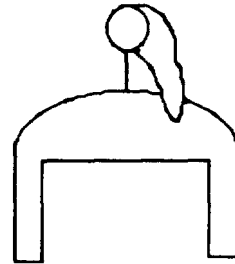
Explain that the wind blows into the big end of the windsock and out the little end. Tell the students that the direction and speed of the wind is very important to the pilot. Point out that the little end of the windsock

ACTIVITY 6 (Continued)

points in the direction the pilot must land or take off. Emphasize that airplanes must take off and land as directly into the wind as possible. Explain that the more the sock is extended, the greater the speed of the wind.



strong wind



no wind

Extended Activities

- Give each student a helium-filled balloon. Attach a card to the balloon asking the finder to return the card and give the location where it was found and the date when it was found. Release the balloons as a group. Display a large map of the United States on the classroom wall. Clearly mark north, south, east, and west. Mark your school/city location with a red star. Attach the returned cards to the map at the location where they were found.

After a month, ask students to look at the map and make observations such as the following:

1. Was the wind blowing in the same direction for all the balloons? How do you know?
2. In what direction was the wind blowing?
3. What was the distance traveled by the balloon that went the farthest?

ACTIVITY 6 (Continued)

- Divide the class into four groups. Explain to students that many devices depend on the force of wind for successful operation such as pinwheels, sailboats, kites, gliders, balloons, and windmills. Give each group a sheet of poster board. Ask students to collect and cut out pictures of devices that depend upon wind for operation. Have them glue the pictures to poster board and decide on a name for the poster. Ask each group to tell the class about its poster.
- Distribute Student Handout 1 1. Instruct students to observe and record the wind direction and wind speed each day. At the end of the recording period, ask students to examine the chart for wind direction and wind speed patterns during the observation period. Help students interpret the chart by asking questions similar to the following:
 1. In what time period was the wind speed the greatest?
 2. Did the wind change direction during the day?

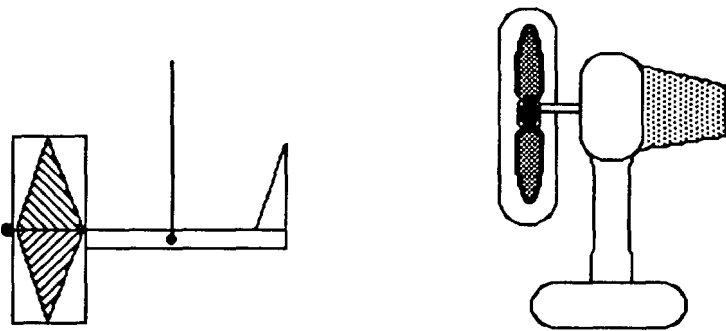
ACTIVITY 7: AIRPLANES IN THE WIND

Direct the students' attention to the wind and the effect it has on flying. Ask students questions similar to the following and allow time for several responses.

1. What happens if an airplane flies into the wind?
2. What happens if the wind blows against the rear of the airplane?
3. What will an airplane do if the wind blows against its side?

Using a small fan and a wooden glider, demonstrate what wind does to an airplane.

1. Attach a string to the glider.
2. Hold the glider several feet away from the front of the fan (point nose toward the fan, then the tail and finally the sides.)



ACTIVITY 7 (Continued)

After the experiment, discuss the outcome with the students. The outcome should be similar to the following:

1. If the pilot flies into the wind, the wind will hold back (retard) the airplane's forward movement. The airplane will move forward but not as fast.
2. If the wind is on the tail of the airplane, the wind will help push the airplane to its destination faster.
3. If the wind direction is from the side of the airplane, the wind will push the airplane away from the desired course (route) of flight.

Extended Activities

- Instruct students to complete Student Handout 12.
Answers: 1. North
 2. East
 3. West
- Write Topic 3 vocabulary words in Fantastic Flight Dictionary.

TOPIC 4: AIR

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

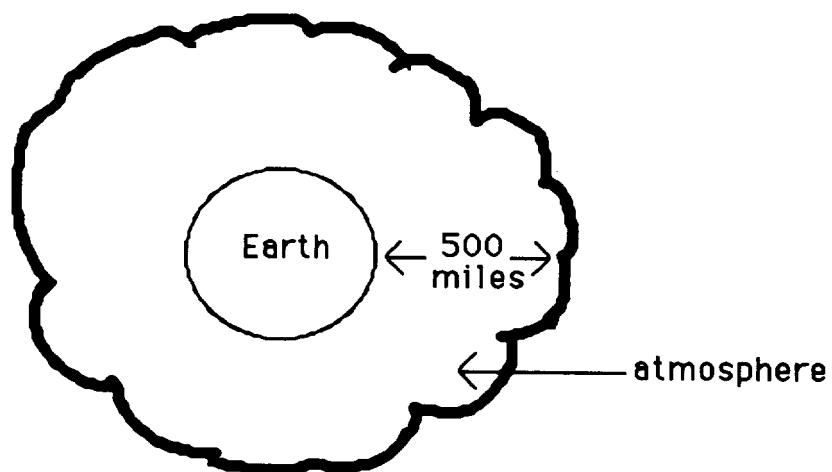
<u>ACTIVITY</u>	<u>MATERIALS NEEDED</u>	<u>GRADE LEVEL</u> <u>SUBJECT</u>
8. Air Takes Up Space	paper cups, soil, rocks, water balloon, basketball, swim float, plastic bag dish pan, water, bottle	Grades K-3 science
9. Air Has Weight	two balloons, string, balance scale 5" X 5" cloth squares, string, toy Student Handout 13	Grades 1-3 science
10. Barometer	glass barometer tube (36" long and closed on one end), small peanut butter jar, mercury, ring stand with clamp, 2" X 10" card strip, yardstick, masking tape	Grade 3 science
11. Thermometer	two thermometers, Student Handout 14 Fantastic Flight Dictionary	Grades 1-3 science mathematics

ACTIVITY 8: AIR TAKES UP SPACE

Develop the students' inquiring minds by directing attention to air. Stimulate the students' thoughts by asking questions such as the following:

1. Can we see air?
2. Where do we find air?
3. Can we feel air?
4. Why do we need air?

Explain to students that we live, play, and work in an ocean of air. The ocean of air called ATMOSPHERE surrounds the earth. The atmosphere extends some 500 miles upward from the earth's surface. Draw the following diagram on the board to illustrate:



Distribute two paper cups per student. Ask students to fill one cup loosely with soil and the other with rocks. Fill each cup with water. Tell students to observe and explain their observations.

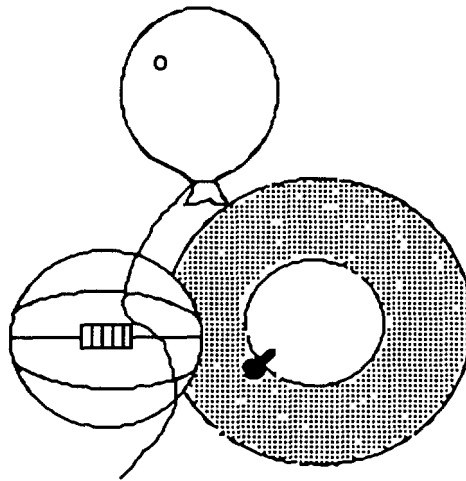
Explanation: Air (bubbles) that is trapped in the soil or rocks is pushed out by the water.

Emphasize that the atmosphere is all around us, including the inside of every building, car, crack, or hole.

ACTIVITY 8 (Continued)

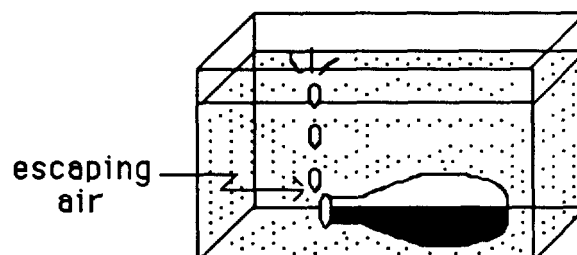
Extended Activities

- Blow air into deflated objects such as the following:
 1. a balloon
 2. a basketball
 3. a swim float
 4. a plastic bag



- Blow soap bubbles.
- Make a list of things that depend upon air as a filling. Example: automobile tires and basketballs.
- Fill a pan with water. Put a bottle into the pan. Observe the bottle fill with water. Ask students to explain what happens.

Explanation: The bottle is full of air. Air must escape from the bottle before filling with water.

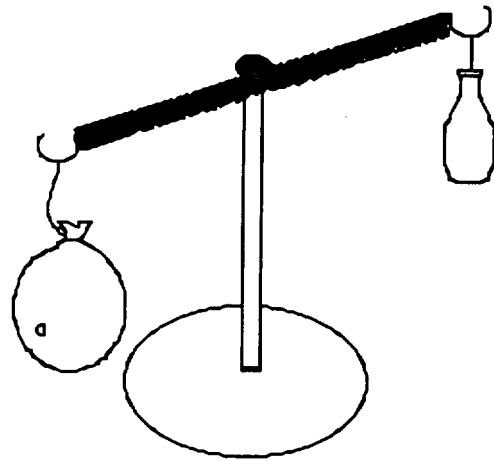


ACTIVITY 9: AIR HAS WEIGHT

Explain to students that the atmosphere (air) pushes down on the surface of the earth. The weight of the atmosphere pushing down on the earth is called **ATMOSPHERIC PRESSURE** or air pressure. The weight pushes down on water, land, people, houses, and even our desk. At the same time some air pushes upward (from beneath objects), and some pushes from-the sides.

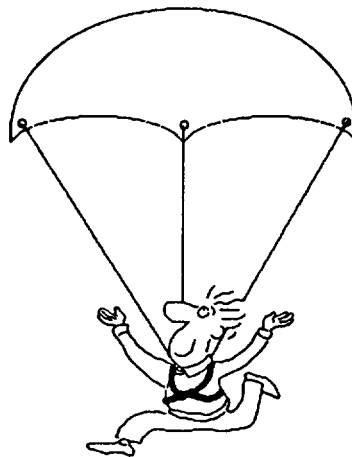
Distribute two identical balloons to each student. Ask students to blow up and tie a knot in the end of one balloon. Place the full balloon on one end of a balance scale and the empty one on the other end. Ask students questions such as the following:

1. Which balloon is heavier?
2. Why is it heavier?



Extended Activity

- Distribute squares of cloth, string, and a small toy. Punch a hole in each corner of the fabric square. Tie a string to each corner. Attach all four strings to a toy. Throw into the air and observe the descent. Ask students to evaluate the value of the parachute and to explain what slowed the fall of the parachute.



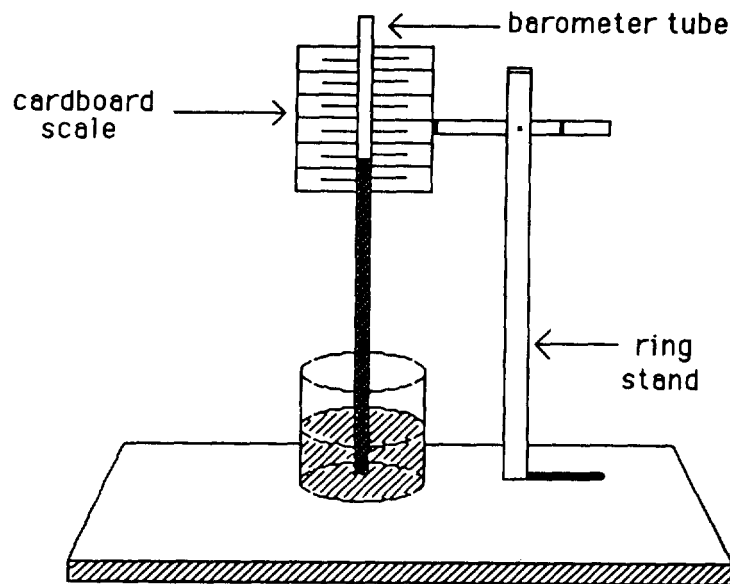
Air pushing upward slows the fall of the parachute.

ACTIVITY 10: BAROMETER

Point out to students that the pressure of the air pushing down on the surface of the earth changes daily and sometimes during the day. Air pressure can be measured with a BAROMETER which means weight meter.

Divide class into groups of five or six. Distribute materials. Demonstrate how to construct a barometer, using the following steps:

1. Fill barometer tube completely with mercury.
2. Fill small jar half full of mercury.
3. Place a finger over the open end of the tube and lower open end into jar of mercury. Remove finger from end of tube.
4. Clamp the tube to a ring stand with a clamp.
5. Make a scale in one half inch increments on cardboard. Label the scale from 24 to 26 inches. Measure the height of the mercury in the tube. Tape the cardboard to the barometer tube at the exact 24" to 26" point.
6. Record the daily barometer reading on Student Handout 13.



Caution: This demonstration should be conducted by the teacher. Do not allow mercury to come in contact with jewelry.

ACTIVITY 10 (Continued)

Ask students to examine their barometer readings each week for a month. Lead students to make conclusions about weather conditions related to low pressure days and high pressure days.

Low pressure: low clouds, poor visibility, rain, snow, fog, gusty winds, and turbulence

High pressure: few clouds, good visibility, light winds, and less severe turbulence

Lead students to predict the type of air pressure system that would provide more favorable flying conditions. Discuss reasons to support their prediction.

Extended Activity

- Compare daily classroom air pressure reports with reports from the radio, TV, and newspaper.

ACTIVITY 11: THERMOMETER

Guide students' thoughts to the air around us. Stimulate an interest in the temperature of the air by asking questions such as:

1. What is temperature?
2. What part does the sun play in heating the air around us?
3. What part does the earth play in heating the air around us?
4. What are some ways we can detect or measure the temperature of the air?

Point out that the sun warms the surface of the earth. The surface of the earth radiates heat to warm 85% of the air around us. The degree of hotness or coldness of the air is called **TEMPERATURE**.

Place a thermometer in the shade and one in the full sun. Ask students to make daily recordings for each thermometer on Student Handout 14. Ask students to justify reasons why the temperature reading was always lower in the shade.

Extended Activities

- Compare daily classroom temperature recordings with those from radio, TV, or newspaper.
- Record Topic 4 vocabulary words in the Fantastic Flight Dictionary.

TOPIC 5: WEATHER FRONTS

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

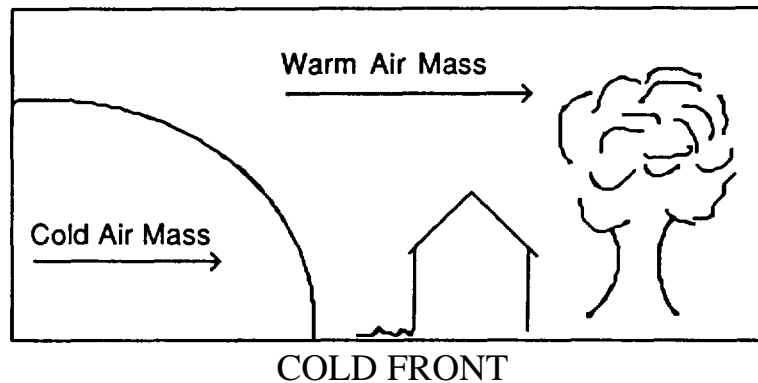
<u>ACTIVITY</u>	<u>MATERIALS NEEDED</u>	<u>GRADE LEVEL</u> <u>SUBJECT</u>
12. Air Masses and Fronts	Student Handout 15 Student Handout 16 newspaper, weather maps and reports video of TV weather report weather instruments (thermometer, windsock, and barometer) Student Handout 17 Fantastic Flight Dictionary	Grades 2-3 science

ACTIVITY 12: AIR MASSES AND FRONTS

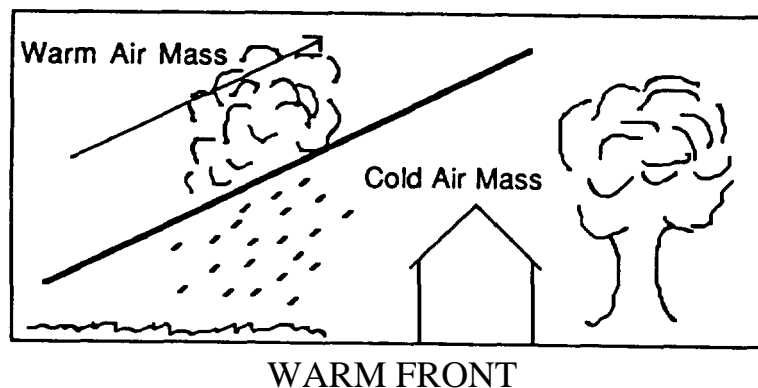
Tell students that an air mass is a large body of air that has approximately the same temperature and moisture content. Explain that each air mass has a different temperature and moisture content. When two different air masses meet, they do not mix easily. When two air masses collide, they form a **front**. Point out that fronts are of-great importance to pilots because they present dangerous weather hazards to aviation activities.

Distribute Student Handout 15. Discuss the cold front, warm front, and occluded front as pictured on the handout.

A **COLD FRONT** is a cold air mass advancing toward a warm air mass. The cold air attempts to push under and lift the warm air.

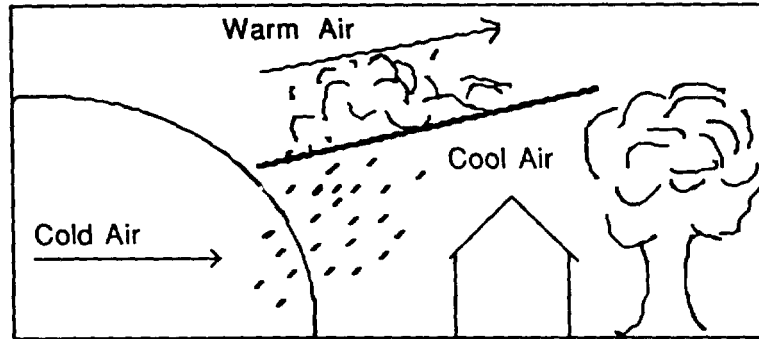


A **WARM FRONT** is a warm air mass advancing toward a cold air mass. The warm air pushes up over the cold air.



ACTIVITY 12 (Continued)

An **OCCLUDED FRONT** occurs when a complex storm system consists briefly of a warm front followed by a cold front.



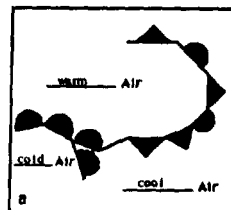
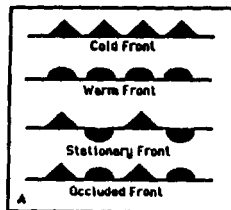
OCCLUDED FRONT

A **STATIONARY FRONT** occurs when the boundary between two air masses does not move.

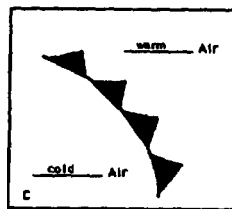
Point out that weather fronts are shown on weather maps with symbols.

Distribute Student Handout 16. Analyze and discuss the symbols in box A that represent each of the four weather fronts. Identify the air masses in box B, C and D. Name each front.

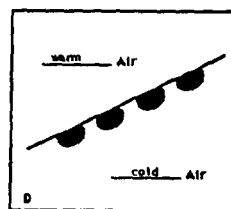
Student Handout 16 Answer key



occluded Front



cold Front



warm Front

ACTIVITY 12 (Continued)

Extended Activities

- Compile a list of places where weather information can be found.
- Invite a meteorologist from the local television station or nearest Flight Service Station to speak to the class. Ask students to prepare a list of questions they want answered concerning weather. In addition, ask students to seek information about jobs related to weather, requirements of those jobs, and the different people who depend on weather information.
- Take students on a field trip to the nearest television station's weather department or Flight (weather) Service Station. Have students make a list of questions to be answered during the trip. After the trip, discuss the highlights of the trip. Have students discuss answers to the list of questions. Make a class experience chart, or write a story for a class bulletin board.
- Explain that it takes many people to make a weather report happen on television. Have students name different workers they saw during the trip. List jobs on the board. List educational requirements for each job.
- Ask students to clip weather maps and reports from daily newspapers. Post clippings on a daily weather report bulletin board. Discuss and compare the different reports for kinds of information contained and consistency of information.
- Show students a video copy of a television weather report. Analyze each element of the report (fronts, cloud cover, temperature, and symbols used). Compile a list of the information found in the report. Compare the information found in this report with the information found in newspaper reports. Ask students to select the more thorough report and provide reasons to support the selection.

ACTIVITY 12 (Continued)

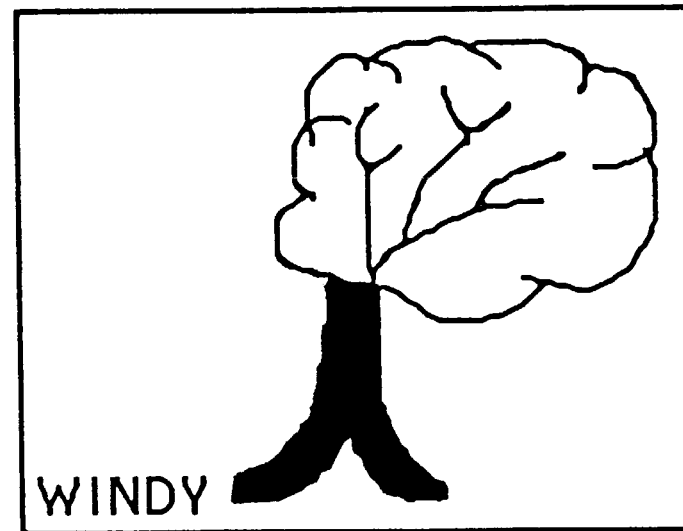
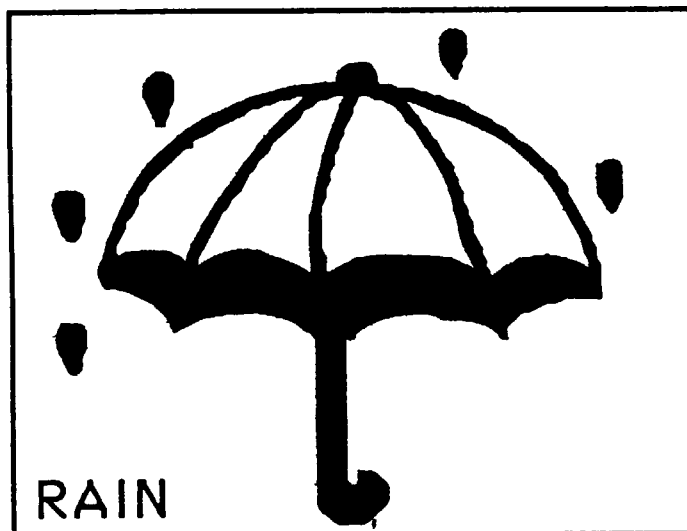
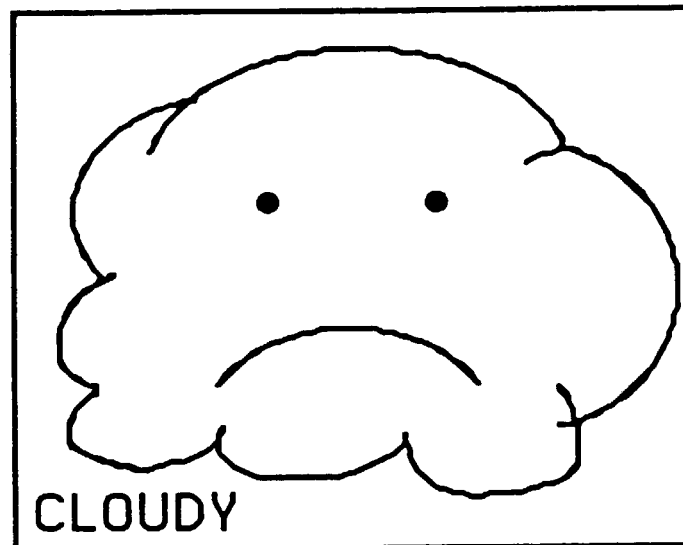
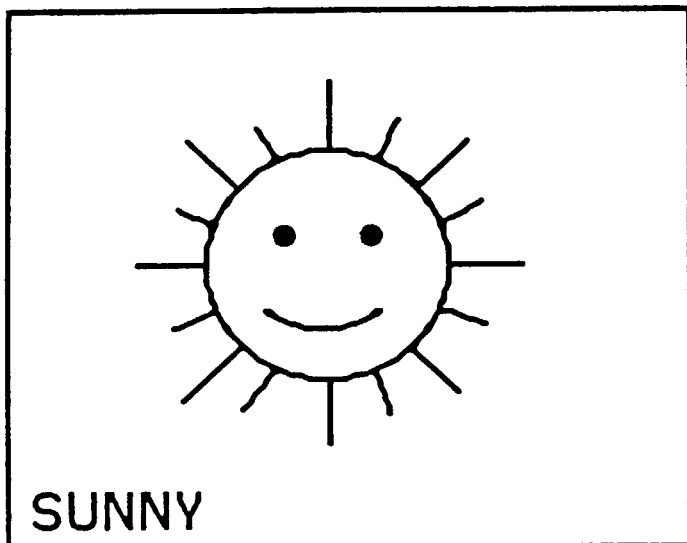
- Help students set up a simple school weather reporting station. Use student-made instruments (thermometer, windsock, and barometer) made in Unit 5 or instruments that are purchased to collect weather data. Ask students to record daily data on Student Handout 17. Select a student meteorologist for the week to report the daily weather to the entire school.
- Write Topic 5 vocabulary words in the Fantastic Flight Dictionary.
- Give each student two words from the list below. Ask students to find the meaning of each word; write a sentence with each word; and give a report to the class about each word.

WORD LIST

anemometer	atmosphere	barometer
ceiling	cirrus	cumulus
crosswind	front	hail
high pressure area	humidity	low pressure area
meteorology	moisture	precipitation
stratus	turbulence	velocity
visibility	weather	windsock
hygrometer	thermometer	

UNIT 5 ACTIVITY 1

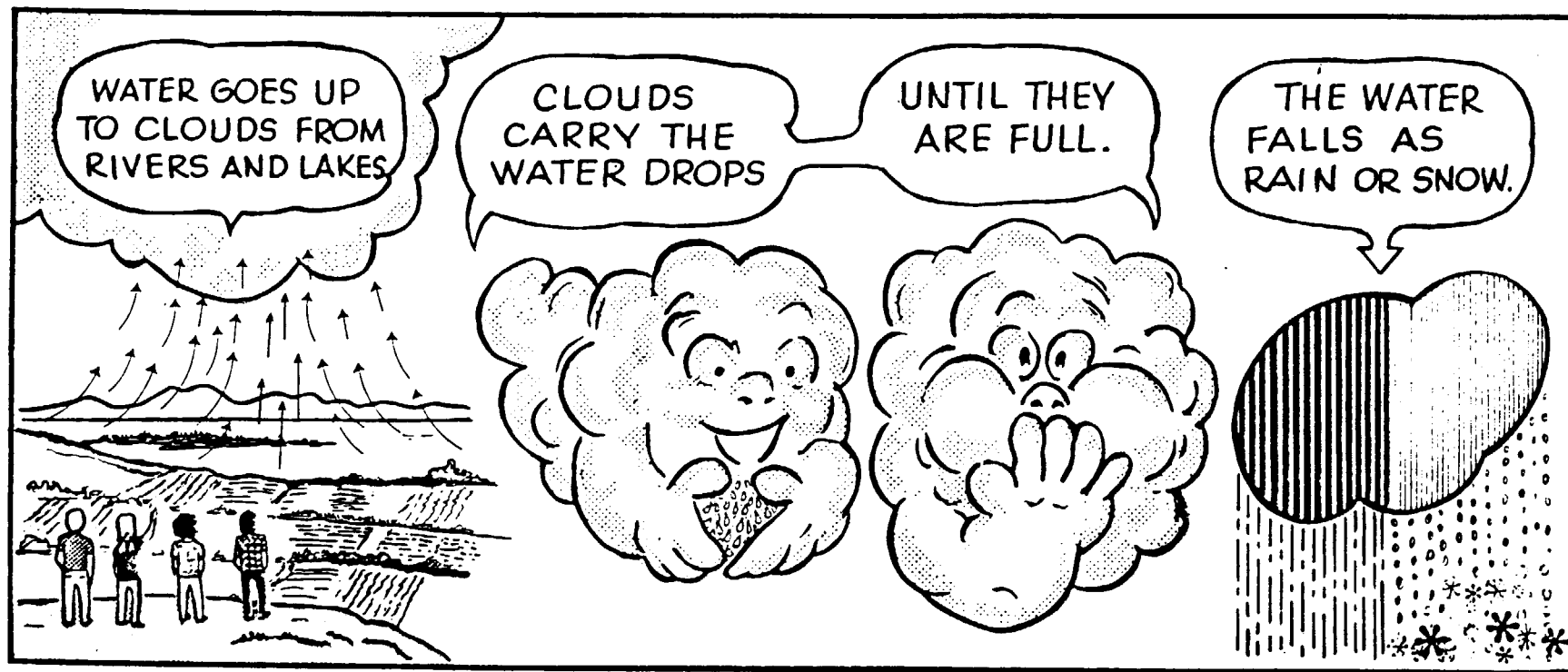
TEACHER RESOURCE SHEET 1



UNIT 5 ACTIVITY 3

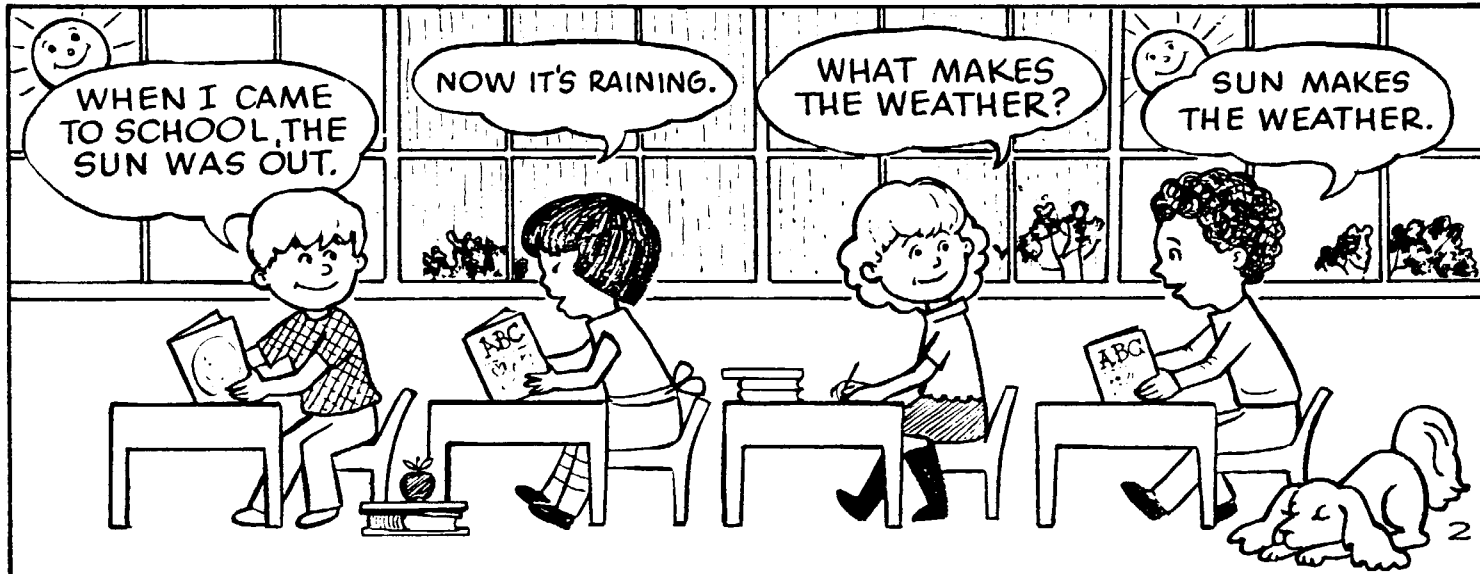
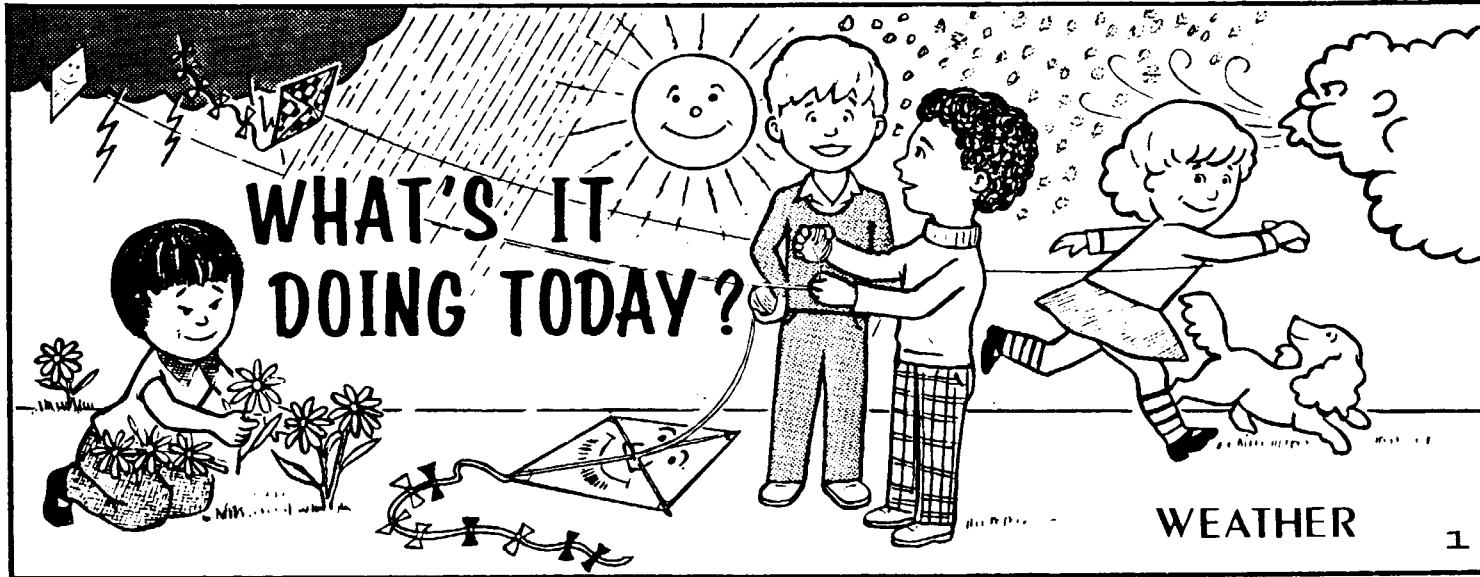
CLOUD CYCLE

TEACHER RESOURCE SHEET 2



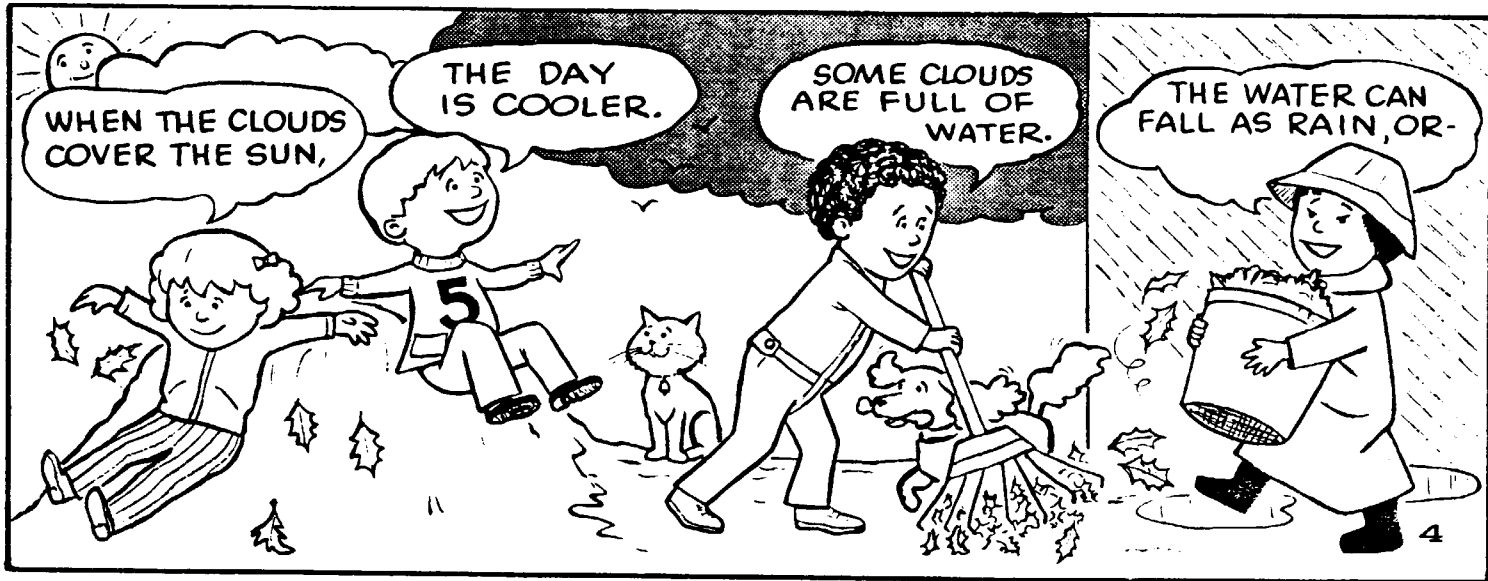
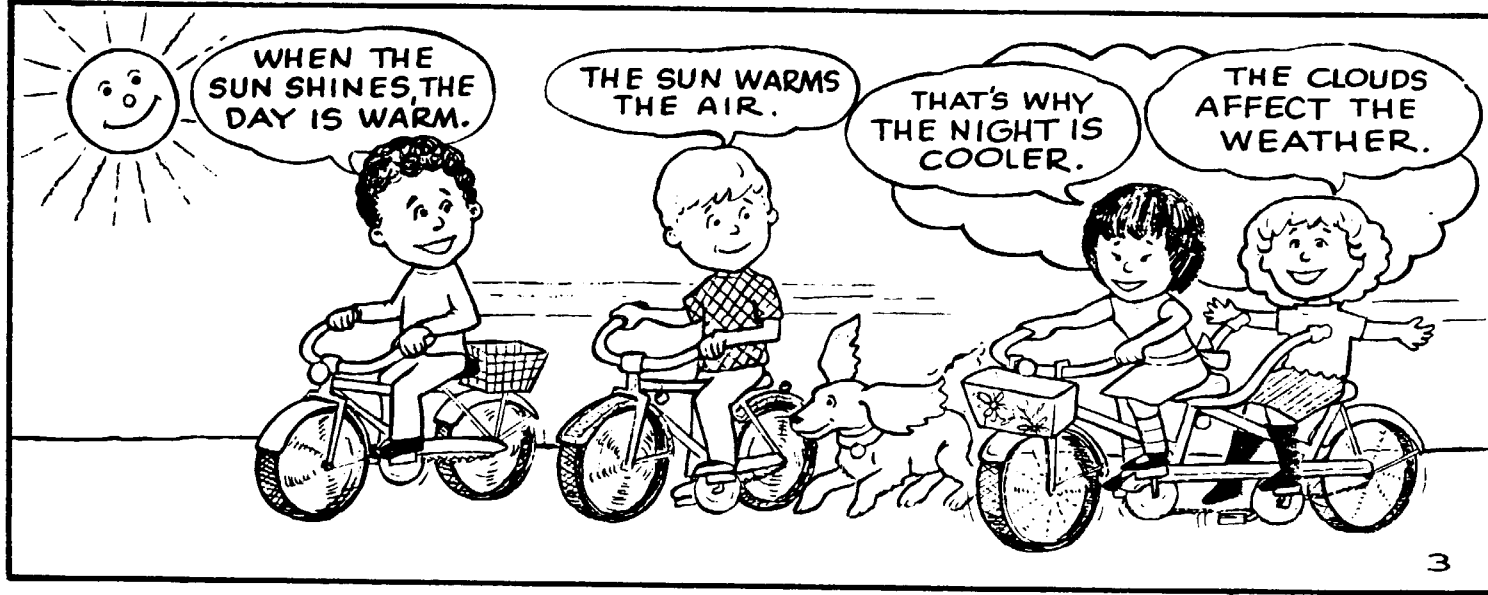
UNIT 5 ACTIVITY 1

STUDENT HANDOUT 1



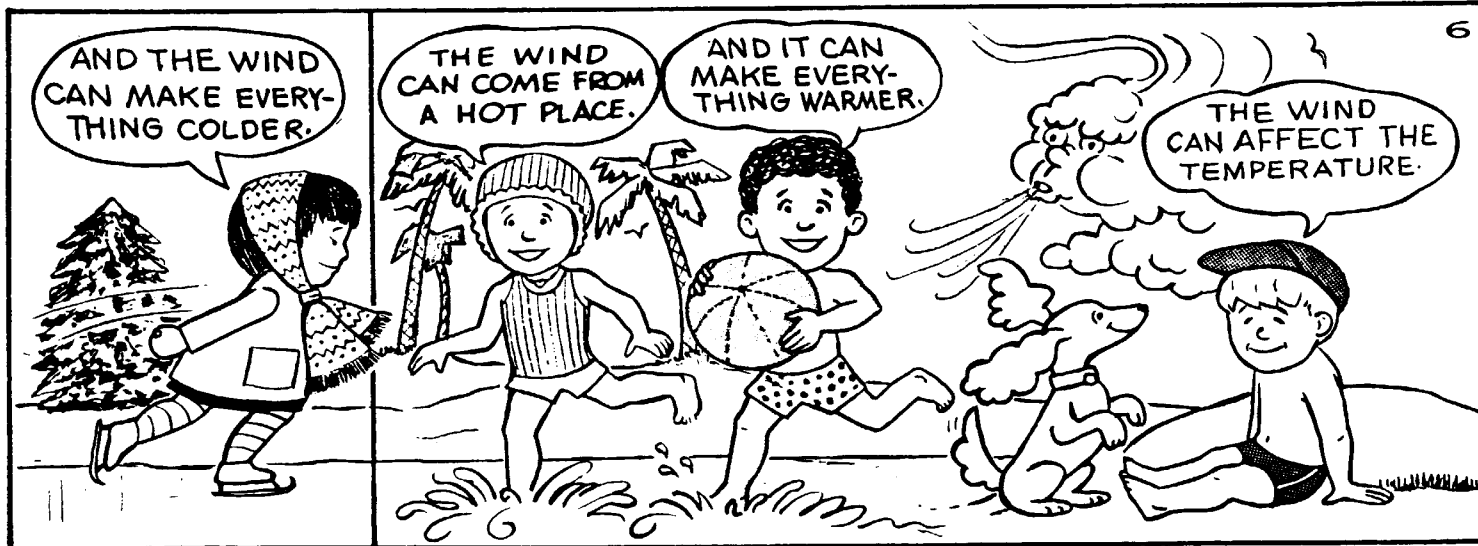
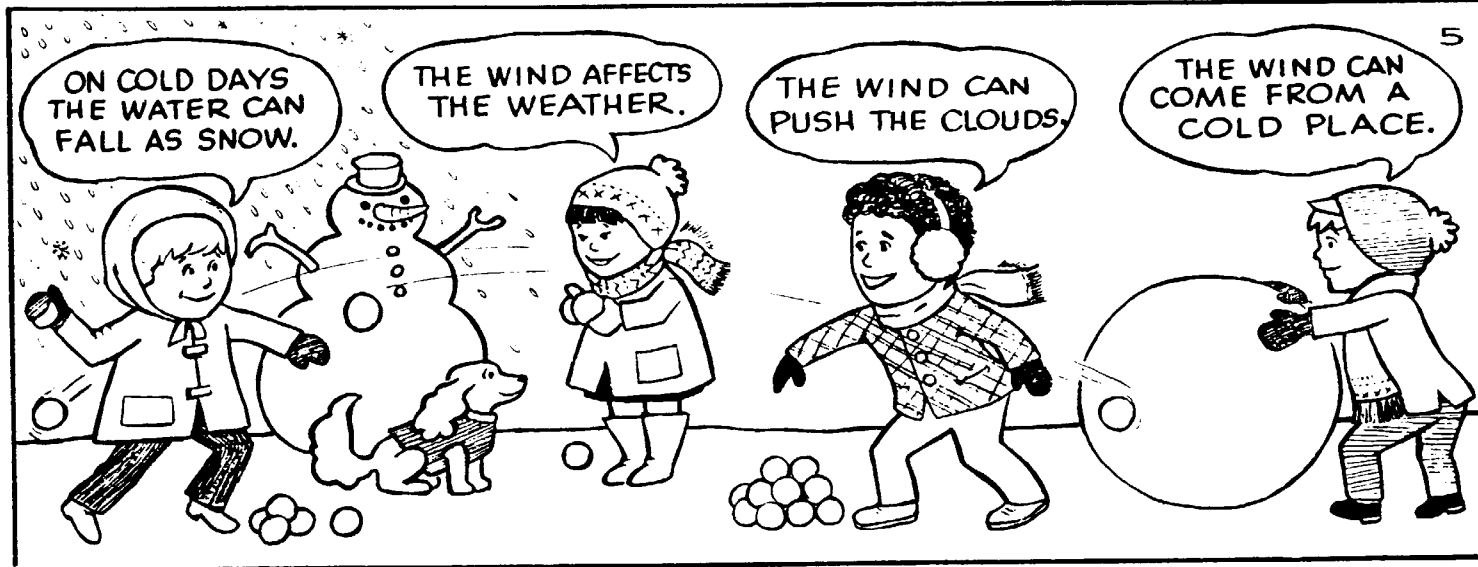
UNIT 5 ACTIVITY 1

STUDENT HANDOUT 2



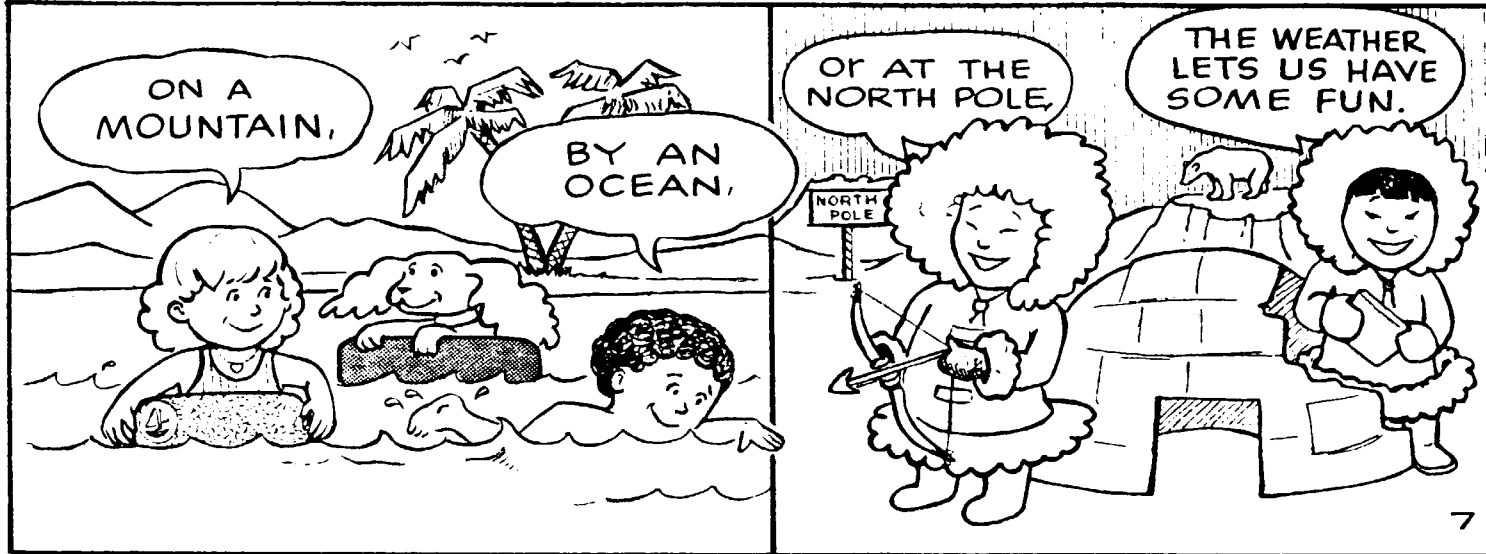
UNIT 5 ACTIVITY 1

STUDENT HANDOUT 3



UNIT 5 ACTIVITY 1

STUDENT HANDOUT 4



COME ON LETS SAIL A BOAT IN THIS PUDDLE.

EXPERIMENT

How much did it rain?

1. Get a jar or a glass.
2. Put a tape on its side.
3. Mark every $\frac{1}{2}$ inch and 1 inch.
4. Put outside away from trees.
5. After the rain is over, look to see how many inches it rained.

8

UNIT 5 ACTIVITY 2

CALENDAR

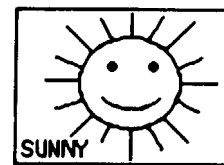
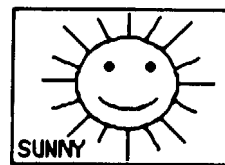
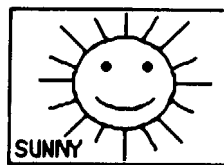
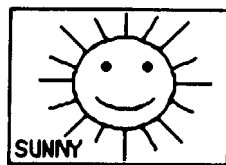
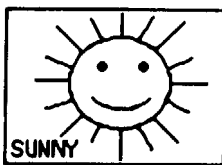
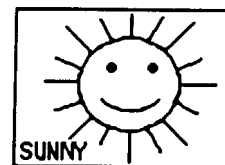
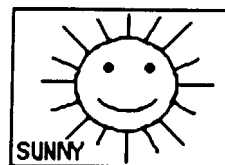
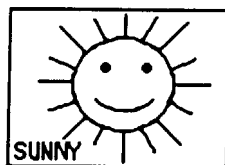
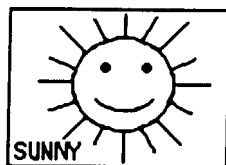
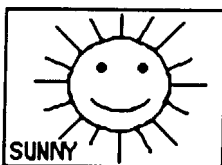
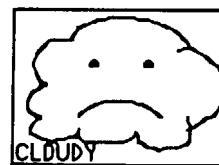
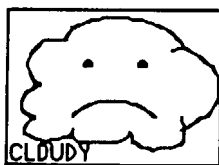
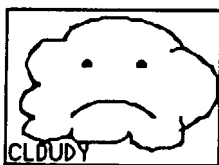
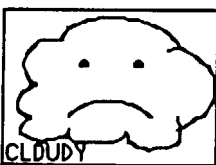
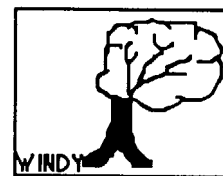
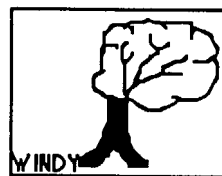
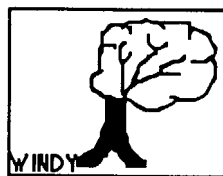
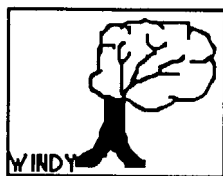
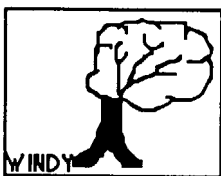
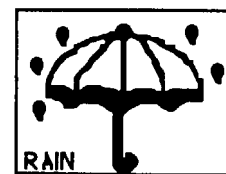
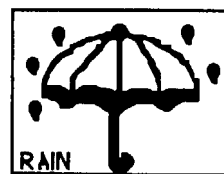
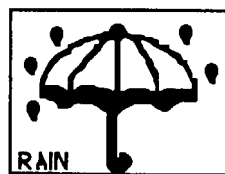
STUDENT HANDOUT 5

NAME _____				MONTH _____		
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

UNIT 5 ACTIVITY 2

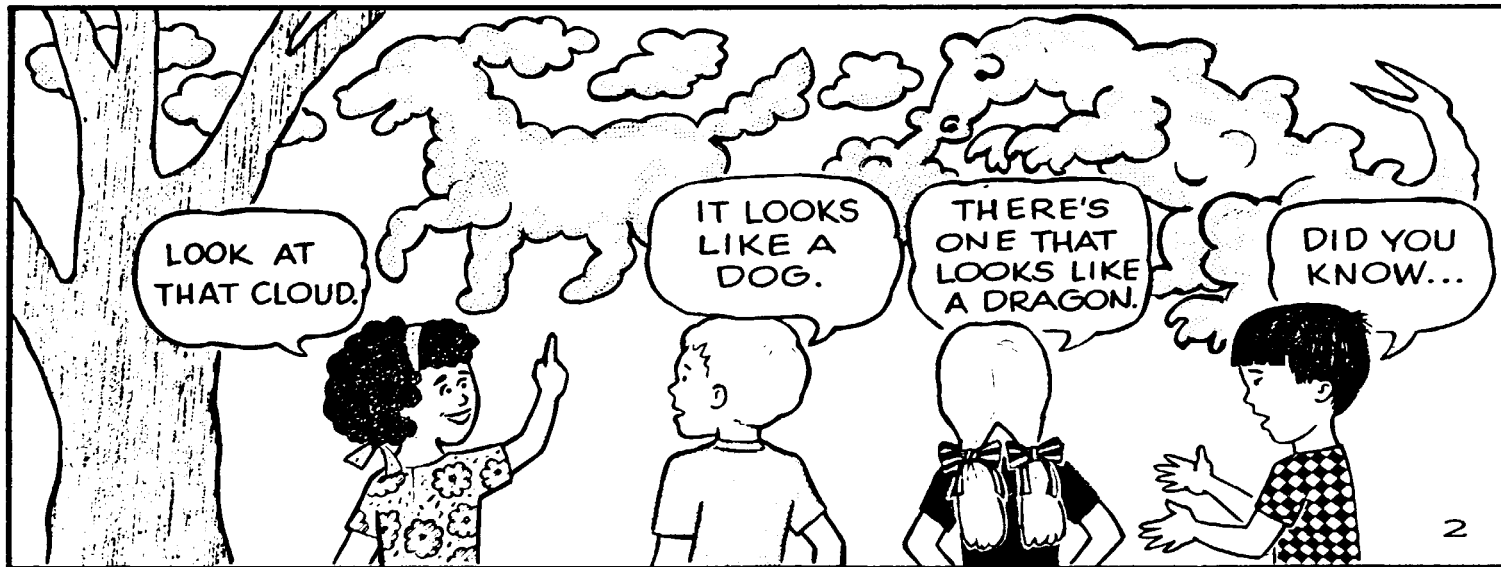
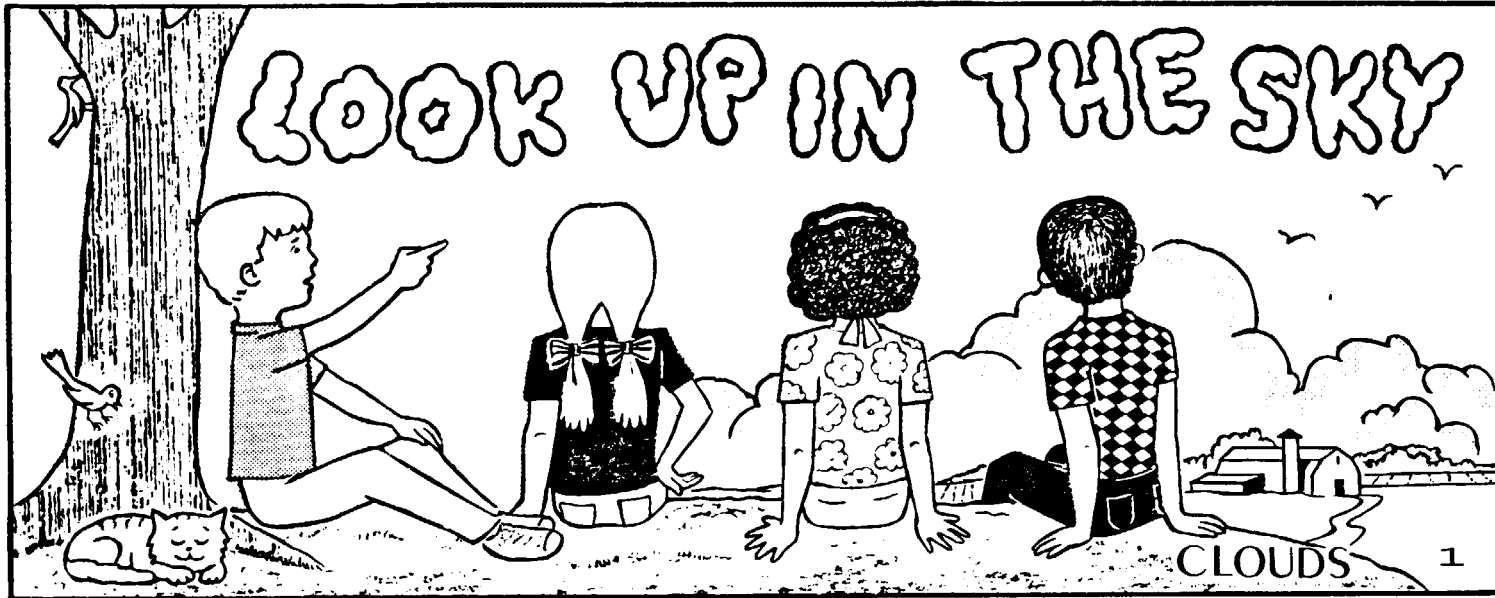
STUDENT HANDOUT 6

WEATHER SYMBOLS



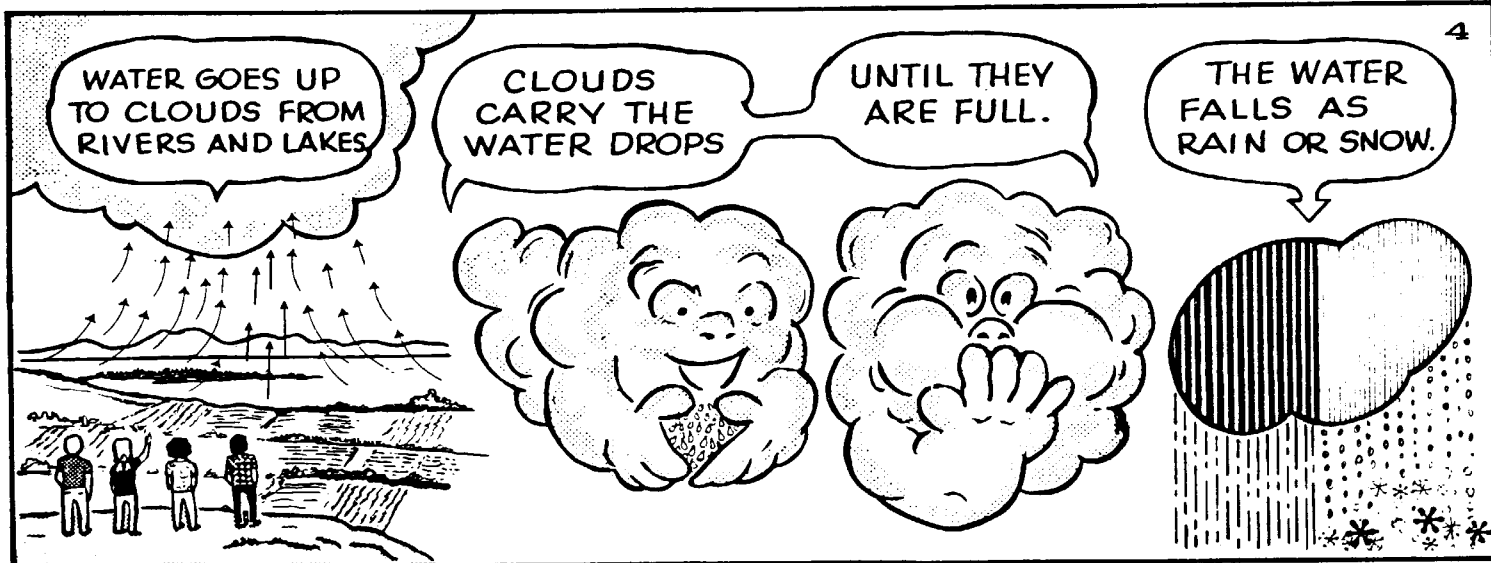
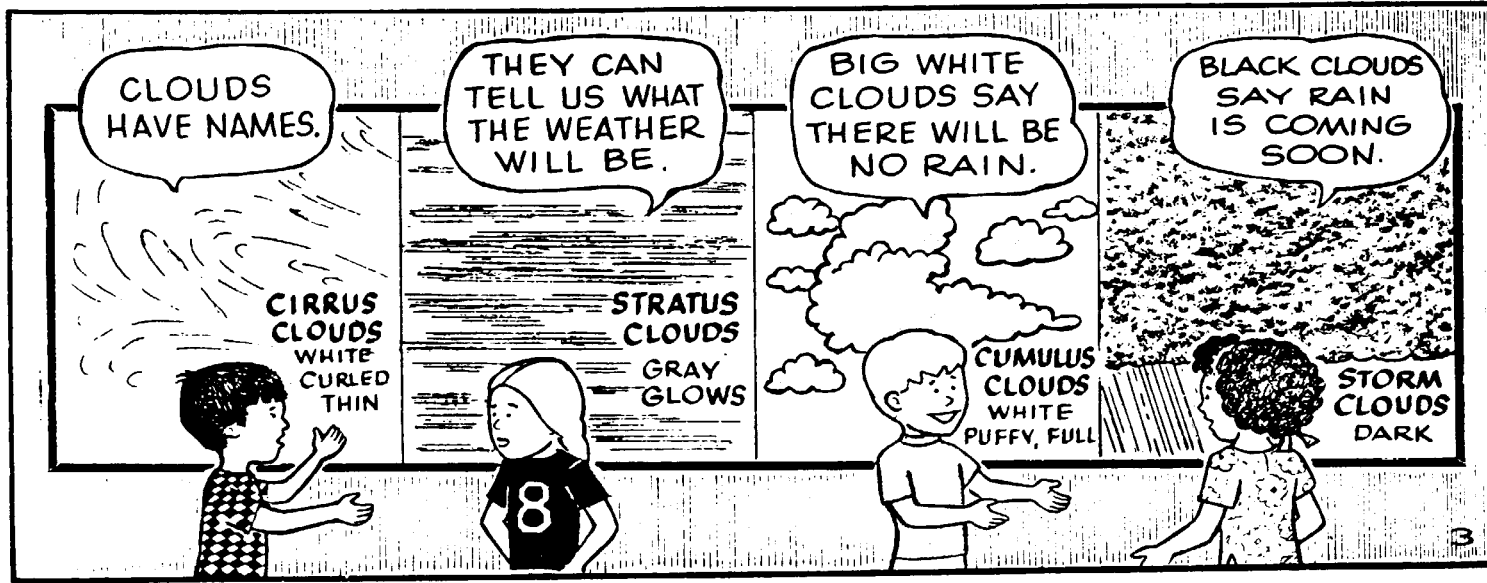
UNIT 5 ACTIVITY 2

STUDENT HANDOUT 7



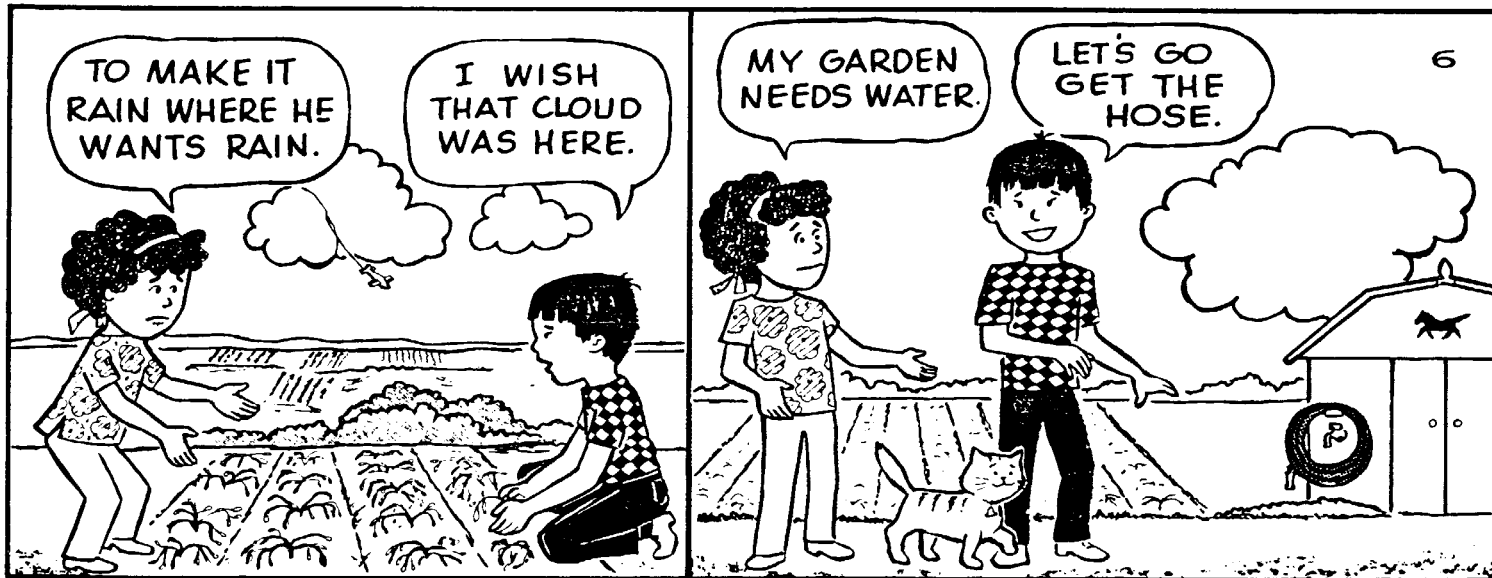
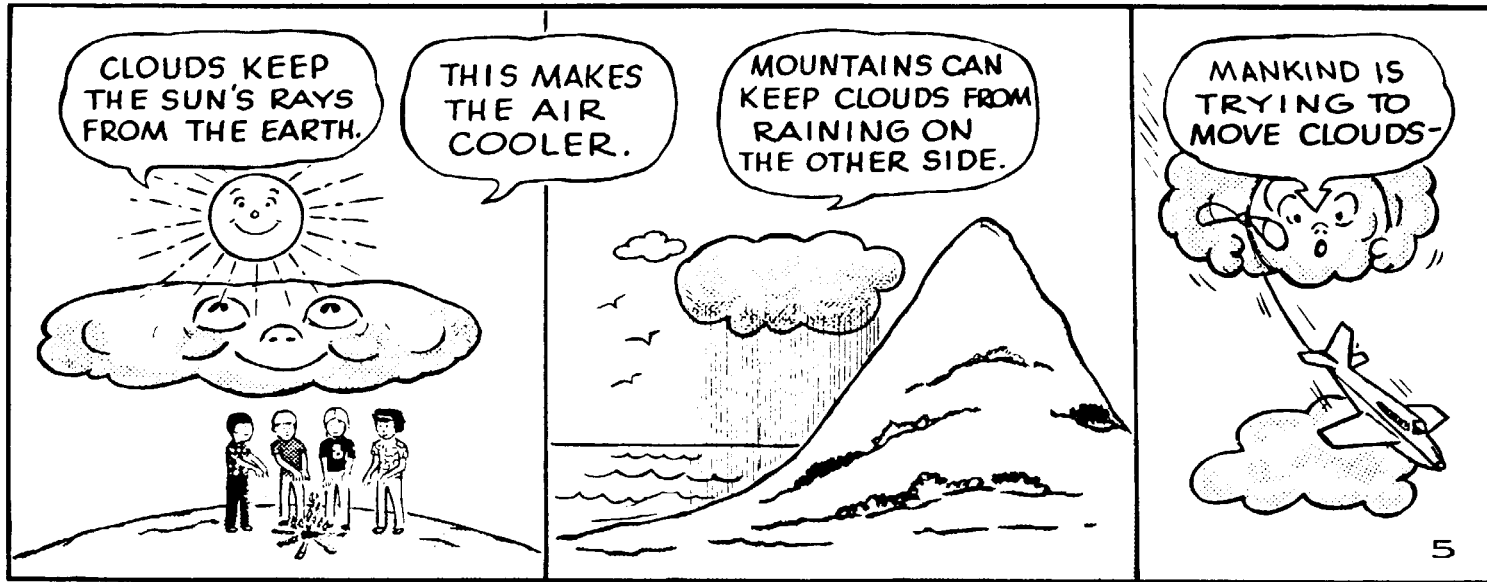
UNIT 5 ACTIVITY 2

STUDENT HANDOUT 8



UNIT 5 ACTIVITY 2

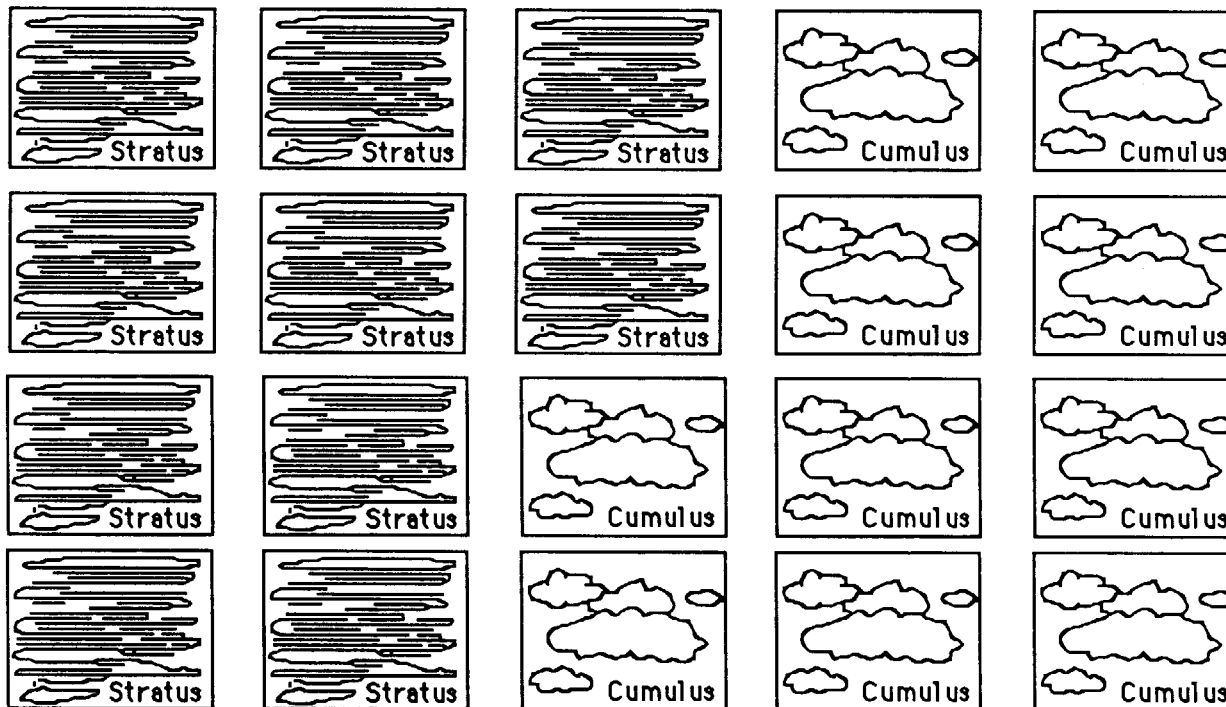
STUDENT HANDOUT 9



UNIT 5 ACTIVITY 4

STUDENT HANDOUT 10

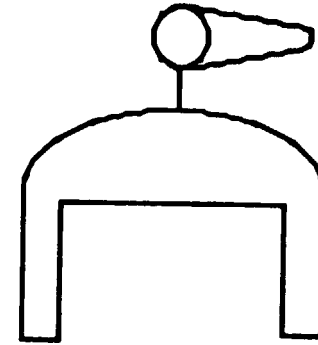
Directions: Select the correct cloud for the day. Cut and paste on the correct date. Leave box empty if the day is clear or sunny.



UNIT 5 ACTIVITY 6

STUDENT HANDOUT 11

Directions: Record daily wind direction: N, S, E, W, NE, SE, NW, and SW.
 Record daily wind speed: no wind, mild wind, or strong wind.



WIND DIRECTION AND SPEED

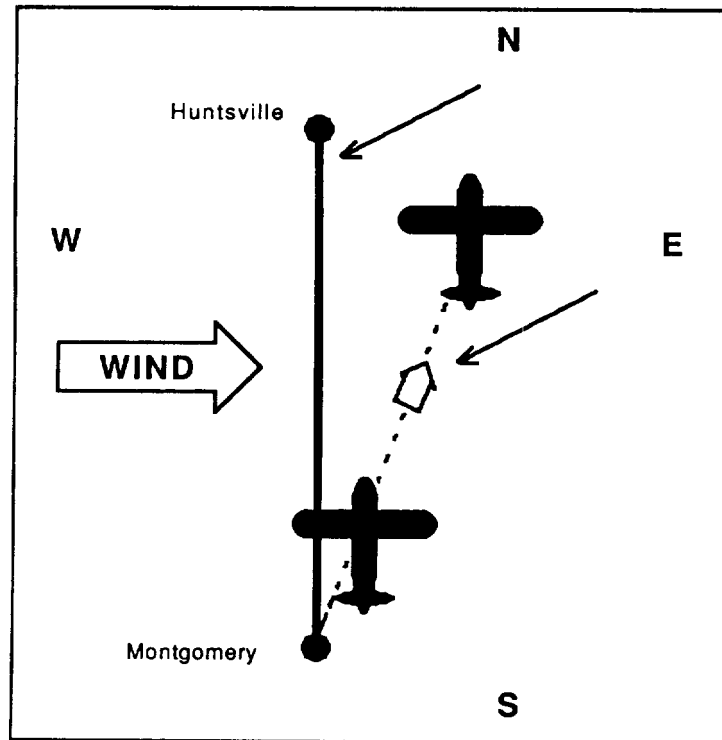
DATE						
Wind Direction	8 A. M.					
	12 P. M.					
	3 P. M.					
Wind Speed	8 A. M.					
	12 P. M.					
	3 P. M.					

UNIT 5 ACTIVITY 7

STUDENT HANDOUT 12

Directions: Answer the questions.

Airplanes, like the balloon, are affected by wind direction. Ships at sea are affected by wind in the same way.



Use this diagram to answer questions.

1. In what direction is the airplane headed? _____
2. Will the wind push the airplane to the east or west of Huntsville? _____
3. To get to Huntsville, should the pilot correct for the wind by turning the airplane a little to the east or west?

UNIT 5 ACTIVITY 10

STUDENT HANDOUT 13

Directions: Record daily barometer reading.
Circle daily prediction and actual weather.

DAY	AIR PRESSURE READING	PREDICTION	ACTUAL WEATHER
MONDAY		Low Pressure (Stormy Weather)	Poor Visibility Gusty Winds
		High Pressure (Fair Weather)	Good Visibility Light Winds
TUESDAY		Low Pressure (Stormy Weather)	Poor Visibility Gusty Winds
		High Pressure (Fair Weather)	Good Visibility Light Winds
WEDNESDAY		Low Pressure (Stormy Weather)	Poor Visibility Gusty Winds
		High Pressure (Fair Weather)	Good Visibility Light Winds
THURSDAY		Low Pressure (Stormy Weather)	Poor Visibility Gusty Winds
		High Pressure (Fair Weather)	Good Visibility Light Winds
FRIDAY		Low Pressure (Stormy Weather)	Poor Visibility Gusty Winds
		High Pressure (Fair Weather)	Good Visibility Light Winds

UNIT 5 ACTIVITY 11

STUDENT HANDOUT 14

Directions: Record the daily temperature in the shade and in the full sun.

TEMPERATURE CALENDAR

NAME _____

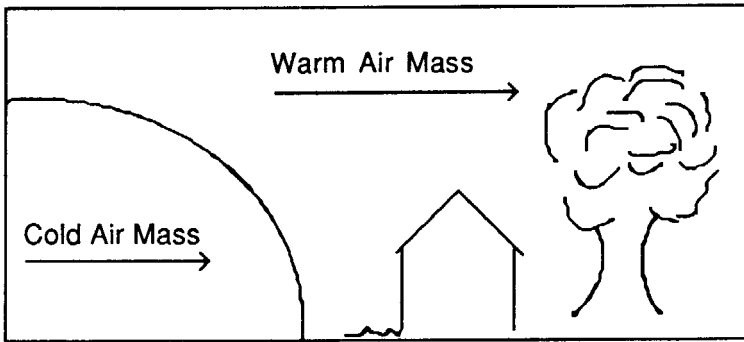
MONTH _____

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
TIME					
DATE					
SHADE					
FULL SUN					

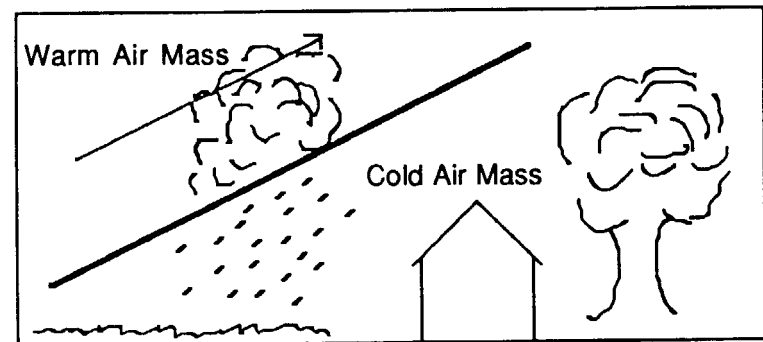
UNIT 5 ACTIVITY 12

STUDENT HANDOUT 15

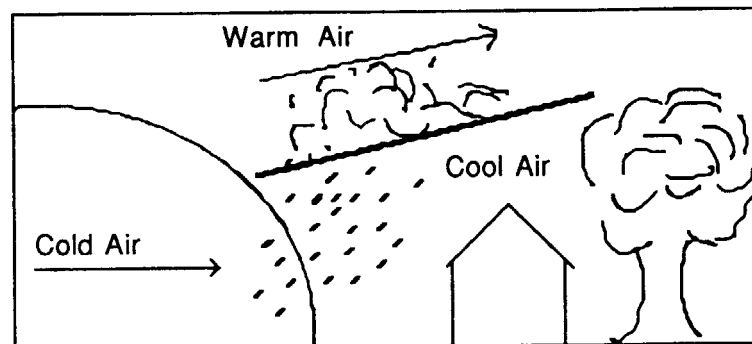
When air masses collide, they form a front.



COLD FRONT



WARM FRONT

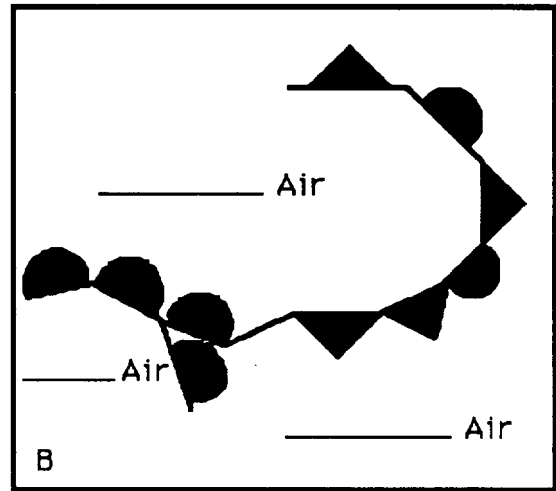
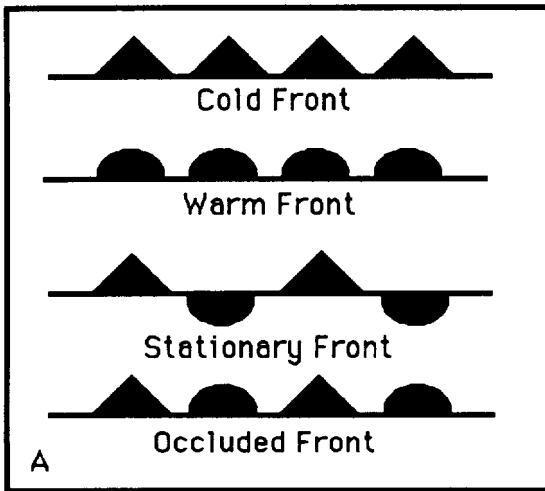


OCCLUDED FRONT

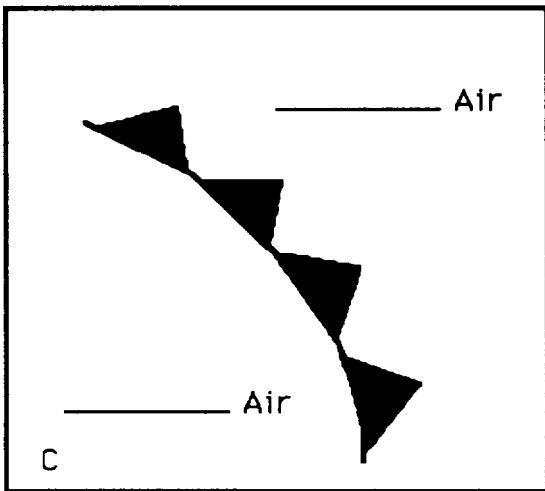
UNIT 5 ACTIVITY

STUDENT HANDOUT 16

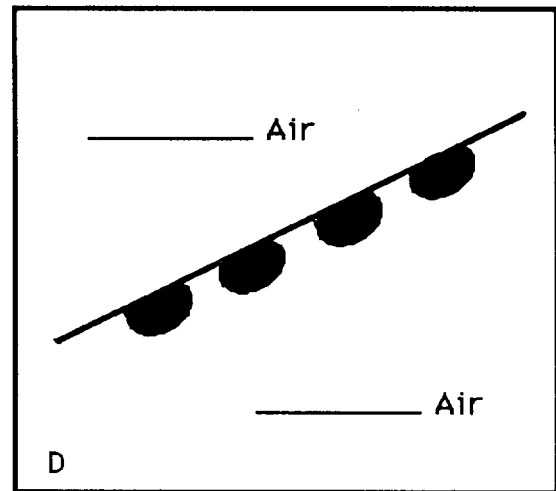
Directions: Study box A. Identify the air masses in box B, C, and D.
Name the front.



_____ Front



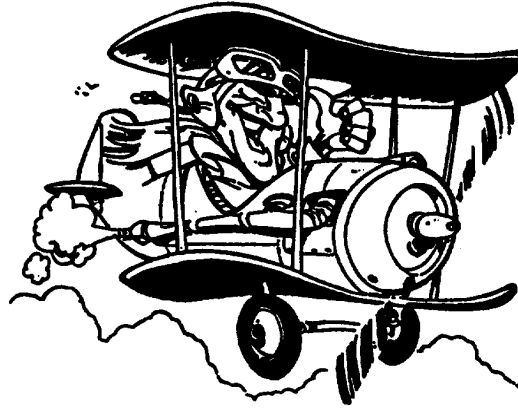
_____ Front



_____ Front

UNIT 5 ACTIVITY 13

STUDENT HANDOUT 17



WEEKLY WEATHER REPORT

DAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
TEMPERATURE					
WIND SPEED					
WIND DIRECTION					
AIR PRESSURE					
SKY CONDITION 1. clear 2. cloudy 3. foggy					

UNIT 6: INSTRUMENTS AND NAVIGATION

PURPOSE OF UNIT 6

The purpose of Unit 6 is to introduce students to the basic instruments and maps used by pilots for navigation. Specifically, students should:

1. recognize the importance of the basic flight instruments (airspeed indicator, altimeter, compass, and tachometer) to the pilot;
2. experience first hand the importance of the map and compass to navigation; and
3. develop an awareness of the importance of radio communications to the pilot.

MAJOR MESSAGES IN UNIT 6

- Instruments and maps are essential to navigation on land, at sea, and in the air.
- Accurate and prompt monitoring of instruments and maps is necessary for safe flight.

BACKGROUND INFORMATION FOR UNIT 6

Unit 6 consists of 2 topics:

TOPIC 1: BASIC FLIGHT INSTRUMENTS

TOPIC 2: NAVIGATION

Topic 1 emphasizes and explains the basic instruments necessary for safe flight.

Topic 2 stresses the importance of maps as an aid to navigation. Topic 2 also explores the use of radio equipment as an aid to navigation and safety in the sky.

VOCABULARY WORDS FOR UNIT 6

Topic 1

altimeter
airspeed
indicator
tachometer
instrument
navigation
compass
cardinal points
degree

Topic 2

map
sectional chart
legend
air traffic controller
radio

TOPIC 1: BASIC FLIGHT INSTRUMENTS

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

<u>ACTIVITY</u>	<u>MATERIALS NEEDED</u>	<u>GRADE LEVEL</u> <u>SUBJECT</u>
1. Basic Flight Instruments	Teacher Resource Sheets 1, 2, 3, and 4 Student Handout 1 white drawing paper Cessna Air Age education materials (See Teacher Resource Section for address.)	Grades 1-3 mathematics art
2. The Compass	Student Handouts 2, 3, and 4 airplane compass scout compass	Grades 2-3 mathematics social studies

ACTIVITY 1: BASIC FLIGHT INSTRUMENTS

Begin by directing the students' attention to the family car. Kindle an interest in the instruments on the dash by asking questions such as:

1. Why do you think instruments were put in a car?
2. Do you think cars today have more instruments than cars of long ago? Why?
3. What are some of the instruments in the family car?
4. What do these instruments do?

Point out that airplanes also have instruments. Stimulate an interest in aircraft instruments by asking question such as:

1. Do you think car instruments and airplane instruments are the same? Why?
2. What kind of instruments do you think would be found in an airplane?
3. How do you think these instruments would help the pilot?

Tell students that early airplanes had only a few simple instruments to help the pilot navigate (find his way) such as the following:

ALTIMETER--- tells how high the airplane is above
the ground (Teacher Resource Sheet 1)

AIRSPEED INDICATOR --- tells how fast the airplane
is traveling through the air (Teacher Resource Sheet 2)

TACHOMETER --- tells how fast the engine is turning
or running (Teacher Resource Sheet 3)

COMPASS --- tells the direction the airplane is
traveling (Teacher Resource Sheet 4)

Today, airplanes are larger, faster, and more complicated. Many instruments are needed to make them operate.

ACTIVITY 1 (Continued)

Distribute Student Handout 1. Review and complete per directions.

Extended Activities

- Give each student a sheet of white drawing paper. Instruct them to draw an instrument panel of an airplane (like the dash of a car). Ask them to select and arrange on the panel flight instruments that are essential to air navigation. When complete, have students tell the class about their drawings, giving reasons for the instruments used.
- Divide the class into groups. Allow students to use library resources and Cessna Air Age educational materials to research other types of flight instruments used in aircraft today. Have each group select a reporter to report the group's finding to the class. Encourage creative presentations through the use of drawings or simulated instrument panel displays.

ACTIVITY 2: THE COMPASS

Explain to students that the compass is an instrument of navigation on the ground, at sea, and in the air. Pilots use the compass to find their direction as they fly the imaginary highways in the sky.

Explain that a compass has the shape of a circle. Distribute Student Handout 2. Direct the students' attention to the **CARDINAL POINTS** --- N for North, S for South, E for East, and W for West. Show students the lines between the cardinal points. Explain that the distance between the lines is called a **DEGREE**. Tell students there are 360 degrees on a compass. To summarize, distribute Student Handout 3. Ask students to complete the activity using knowledge gained from class discussion and Student Handout 2.

Extended Activities

- Distribute Student Handout 4. Have students pretend they live in Birmingham. Explain the map of Alabama as pictured on the front of the compass. Ask students to visualize trips as described under the compass. Tell students to name each city and give the direction that must be flown to reach the city from Birmingham.
- Borrow a used aircraft compass from the nearest local airport. Secure a compass used for land navigation from a local scout. Examine and compare the two. If possible, ask an aircraft mechanic to talk to the class about the compass. Ask him to take the compass apart to illustrate its function.
- Give the students a scout compass. Instruct them to locate and walk in a specific direction.
- Allow students to use library resources to research information on the history of the compass.

ACTIVITY 2 (Continued)

- Write Unit 1 vocabulary words on the board. Ask students to do exercises such as the following:
 1. Write the words in alphabetical order.
 2. Write the words in the Fantastic Flight Dictionary.
 3. Write a sentence with each word.

TOPIC 2: NAVIGATION

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

	<u>ACTIVITY</u>	<u>MATERIALS NEEDED</u>	<u>GRADE LEVEL</u> <u>SUBJECT</u>
3.	Kind of Maps	floor plan of house city and state map United States map world map globe relief map white drawing paper	Grades K-3 social studies
4.	Aerial Maps	pilot's sectional charts Student Handouts 5 and 6 pilot's sectional chart Alabama road map	Grades 1-3 social studies
5.	Radio Navigation and Communication	Student Handouts 7, 8, and 9	Grades K-3 language arts social studies

ACTIVITY 3: KINDS OF MAPS

Direct students' attention to travel. Stimulate an interest in how one navigates from one place to another by asking questions such as:

1. Have you ever gone on a long trip?
2. How did you find the way?
3. Did you ever get lost?
4. Why did you get lost?

Allow students ample time to share travel experiences with the class. Lead them to the discovery of maps as an aid to navigation.

Explain that maps can be drawn for buildings, parts of a city, an entire city, a state, a country, or the world. Display and discuss a variety of maps such as:

1. floor plan of a house
2. city map
3. state map
4. United States map
5. world map
6. relief map
7. globe

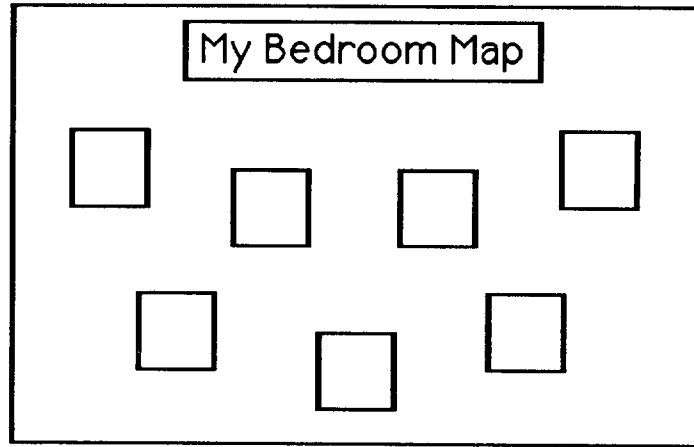
Guide students' discussion by asking questions about each map such as the following:

1. What does this map tell us?
2. Who may want to use this map?

Demonstrate how to make a classroom map by drawing a map of the classroom on the board. Once walls are drawn, allow students to take turns drawing furniture, windows, and doors.

ACTIVITY 3 (Continued)

Make a bedroom map bulletin board. Make a title card as shown below.



Distribute white drawing paper. Ask students to draw maps of their bedrooms. Have students share their maps with the class, then display them on the bulletin board.

Extended Activities

- Ask students to draw maps of their school or home.
- Make a "Kinds of Maps" bulletin board. Instruct students to collect different kinds of maps, including those found in newspapers and magazines. Ask students to share their findings with the class, then display them on the bulletin board.
- Ask students to draw maps showing the school and their homes. Ask each student to give directions on how to locate his/her home.

ACTIVITY 4: AERIAL MAPS

Tell students that the pilot of an aircraft uses maps to help him find his way just as a motorist uses road maps. Pilots that fly slow and medium speed aircraft use maps called **SECTIONAL CHARTS**. Sectional charts show things on the ground that can be seen visually from the air, such as cities, roads, tall towers, and airports.

Secure two new or used sectional charts from a local pilot or airport. Display one chart on a classroom wall. Point out that blue designates water. Point out the meaning of the different colorations that designate land. Cut the other chart into pieces along the fold lines. This makes 22 pieces. Give each student a piece of the sectional chart.

Distribute Student Handout 5. Discuss the symbols that represent items found on a sectional chart. Using Student Handout 5 as a guide, help students locate symbols on their piece of the sectional chart such as the following:

- airports
- towers
- roads
- water
- rivers
- airport runways
- large and small cities (yellow)
- power lines
- railroad tracks
- mountains (dark green to orange)

Once students have had ample time to study their pieces of the sectional chart, ask them to formulate answers to the following:

1. In your opinion, why would a pilot need to know where towers and mountains are located?
2. Point out reasons why pilots need airports to be shown in the map.
3. Suggest ways lakes, rivers, roads, power lines, and railroads could help the pilot navigate.

ACTIVITY 4 (Continued)

Distribute Student Handout 6.

Instruct students to examine the sectional chart, to determine answers for questions to the left of the chart.

Extended Activities

- Divide the class into small groups. Give each group an Alabama road map and a pilot's sectional chart. Ask the students to list and compare information found on the maps.
- Divide the class into small groups. Give each group a pilot's sectional chart. Explain that the term "legend" is the explanatory caption accompanying a map. Ask students to locate the legend and make a list of items found on the legend. When finished, allow each group to select a reporter to report to the class. Write the list on the board as each group reports.

ACTIVITY 5: RADIO NAVIGATION AND COMMUNICATION

Arouse an interest in traffic control by asking questions such as:

1. Where do we find policemen directing traffic?
2. How does the policeman communicate with the driver in each vehicle?
3. Does the driver of each vehicle communicate with the policeman?
4. Why do we need policemen to direct traffic?

Point out that the air around airports is full of airplanes. The air traffic controller is like a policeman. He directs air traffic from a control tower located on the airport. Emphasize that the radio is essential to the safety of the pilot, his passengers, and other aircraft in the nearby vicinity. The air traffic controller talks to each pilot by radio, giving him information such as:

1. how high to fly;
2. what direction to fly;
3. other aircraft in the nearby vicinity;
4. what speed to fly;
5. when to take off or land;
6. which runway to use for take off or landing; and
7. weather information

Stimulate an interest in air traffic control by asking questions such as:

1. What is an air traffic controller?
2. Where do we find air traffic controllers?
3. How does the air traffic controller communicate with the pilot?
4. What kinds of information does the air traffic controller give the pilot?
5. Why is the air traffic controller important to the pilot?

Allow students time to develop answers to the questions through discussion.