

STRUCTURED CURRICULUM LESSON PLAN

Day: 025

Subject: Science

Grade Level: 8

Correlations (SG,CAS,CFS): 11B5; 12E1,2,8

ITBS/TAP:

Atmosphere and weather

ISAT:

Apply fundamental concepts and laws of science to physical and biological systems

Unit Focus/Foci

Atmosphere and Weather

Instructional Focus/Foci

Describing air currents

Materials

Water Cycle drawing (attached), one copy for each student

2 thermometers

Large, clear glass bowl

Small vial (like a film canister)

Blue food coloring

Very cold water

Hot water

9" x 13" clear glass dish

Cold milk

Science notebooks

Masking tape

Educational Strategies/Instructional Procedures

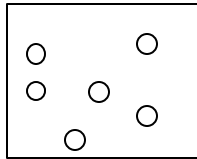
Before class, distribute a picture of the water cycle to each student. (See diagram.)

Ask students where the warmest part of the classroom is. (ceiling) *Where is the coolest place?* (floor) If your school has more than one level, ask the same questions about the school. Ask students why this is true.

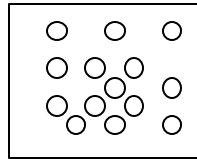
Help students to understand that warm air rises and cold air sinks due to its more condensed, heavier nature. Tell students that they are going to verify this by placing one thermometer near the ceiling and one near the floor. Tape one thermometer close to the ceiling (or tape the thermometer to the end of a meter stick to get it closer). Place the other on the floor. Continue the discussion and check the thermometers in five minutes.

Ask students to think about what happens to the air at the ceiling. Ask: *Does it stay hot or cool off? What happens when it cools?* Students should respond that it cools. Ask students where it goes when it cools. Help students to understand that air circulates in this manner. This is called *convection currents*.

* Draw this air model on the chalkboard to represent the density of air.



Hot air
less dense



Cold air
more dense

Demo #1: To demonstrate *convection currents*, pour the very cold water into the large bowl. Pour the hot water and a drop or two of blue food coloring into the film canister. Place your thumb over the top of the canister so that no water can escape. Place the canister into the bowl of water. Release your thumb. The hot water will rise to the top of the bowl and swirl in currents. Ask students questions to help them to understand that the hot water is less dense and cold water is more dense.

Have students draw a picture of the demonstration in their science notebooks. While they do this, get the next demo ready.

Demo #2: Place hot water into the 9" x 13" dish. Ask the students to write a hypothesis about what will happen when you add the cold milk. They should write their hypothesis in their science notebooks. Pour the milk carefully into the dish at one end. It will swirl and billow along like a cloud. Help students to understand that this is the same principal at work.

Distribute the *Water Cycle* pictures. Ask students if they can write an explanation about how the water cycle works. Remind them about the changes of state for water that they did two days ago.

Integration with Core Subject(s)

LA: Use correct punctuation, capitalization, and spelling
Demonstrate control of Standard English grammar, usage, and syntax in planned and impromptu oral communications

Connection(s)

Enrichment: Have students collect the daily weather page from their local newspaper each day for a week. At the end of a week, have them look at the frontal movement and write about what occurred.

Fine Arts:

Home: Have students ask their parents how the daily weather affects their lives. Have students write a paragraph explaining their parents' responses in their science notebooks.

Remediation: Request that students listen to a weather forecast and tell the class about the cloud cover and visibility factors mentioned.

Technology: Encourage students to access the Internet to visit the University of Illinois' online hydrology cycle site at [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/hyd/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/hyd/home.rxml) .

Assessment

For informal assessment purposes, evaluate the quality of student's responses during class discussion.

Homework

Have students write about the effects a frontal mass had on a geographic region's weather for the previous five days.

Teacher Notes

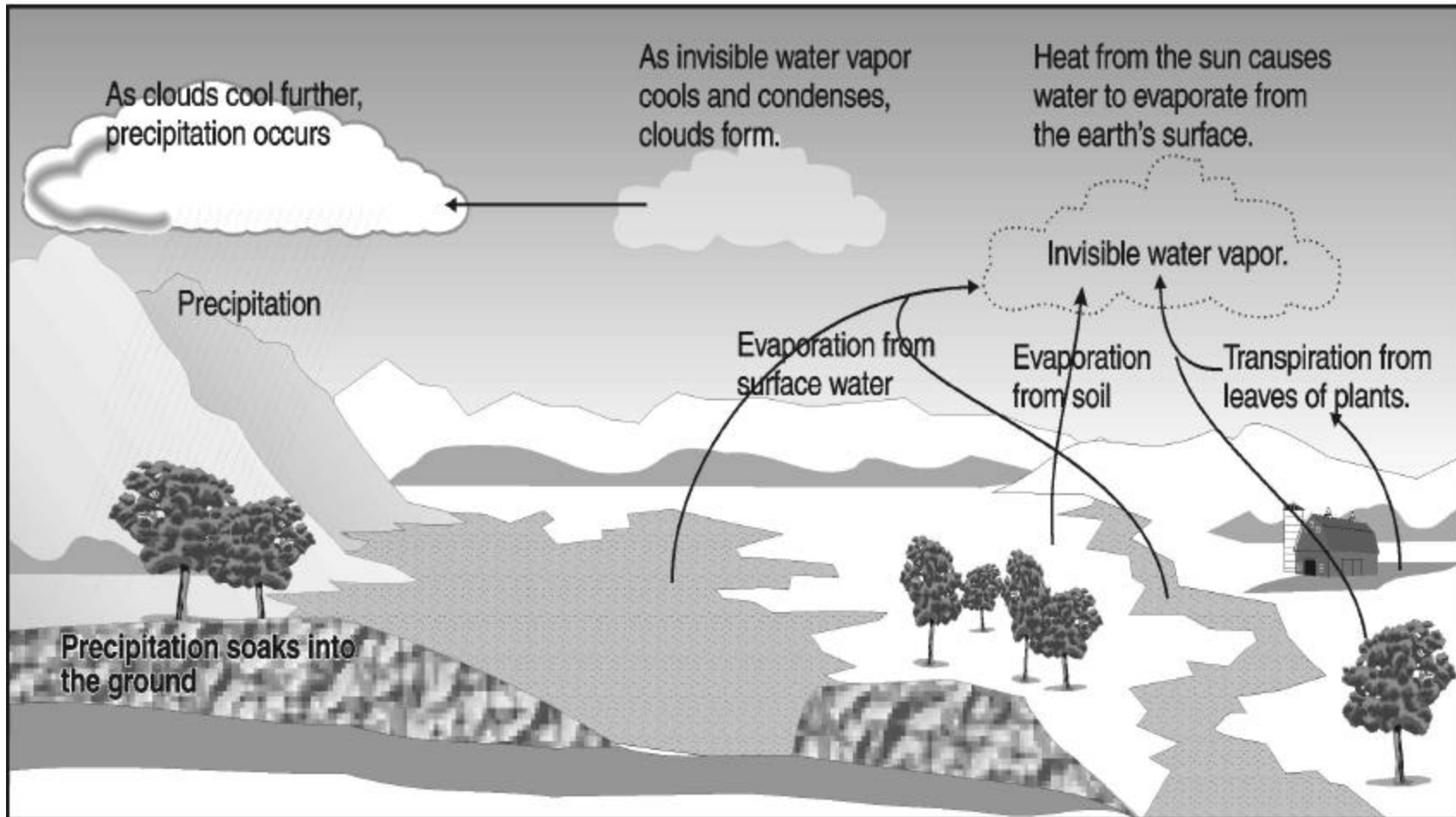
Collect pictures and information from newspapers and magazines about hurricanes and El Niño for later lessons.

Review final lessons of unit for materials needed for the *Global Warming Game*.

Weather Vocabulary

air mass
cold front
warm front
stationary front
weather
climate

The Water Cycle



STRUCTURED CURRICULUM LESSON PLAN

Day 026

Subject: Science

Grade Level: 8

Correlations (SG,CAS,CFS): 11B4-6; 12E1,2,8

ITBS/TAP:

Atmosphere and weather

ISAT:

Know and apply scientific methods and processes

Interpret data from graphs and tables

Unit Focus/Foci

Atmosphere and Weather

Instructional Focus/Foci

Describing the characteristics of the air in given air masses

Materials

Homework activity sheet (attached)

Science notebooks

Scissors

Large construction paper 12" x 18"

Daily weather pages (a week's worth) for each group

Transparency sheets (one per group)

Glue

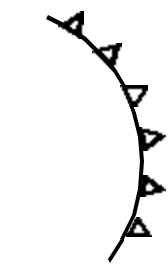
Tape

Markers

Educational Strategies/Instructional Procedures

This activity involves having the students track frontal systems.

Begin by drawing a cold front, warm front, and a stationary front on the chalkboard.



Blue
Cold Front



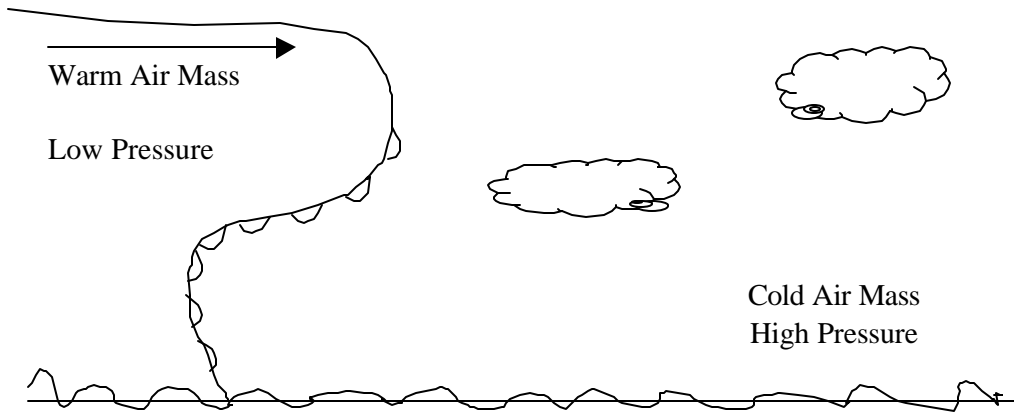
Red
Warm Front



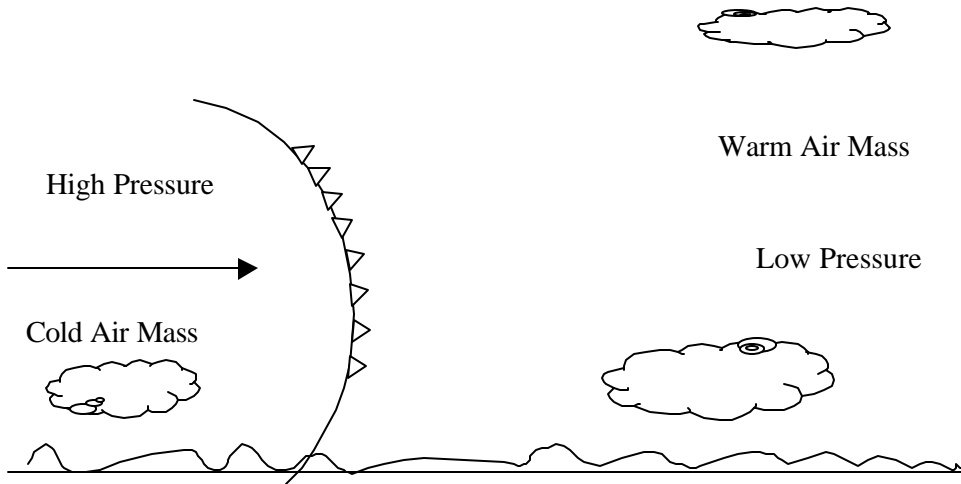
Blue & Red
Stationary Front

Have the students draw the diagrams in their science notebooks. Explain that the triangles or half circles point in the direction that the front is moving. Explain that cold fronts are more dense and have more push or strength. Warm fronts are less dense and have less strength.

Draw how fronts move on the chalkboard.



Cold air mass stays in place, and the warm air mass moves over it. Current weather conditions will continue.



Dense cold air mass moves the lighter warm air mass up and out of the way. Weather conditions change (usually brings rain).

Have students draw fronts and write the notes in their science notebooks.

Distribute a week's worth of weather pages, two sheets of construction paper, glue, scissors, markers, and a transparency sheet to each group.

Tell the students that they should cut out just the rectangle of the weather map from the weather page. Have them glue the five weather pages to the construction paper. Tell the students that they are going to use the transparency sheet to track a front.

Make sure the students line up the transparency sheet in the exact place for all five days. They choose just one front to track. Tell students to use the appropriate color marker to draw the front. By the end of the fifth weather map, students should have five copies of the same frontal line as it moved during the five days.

You will need to continue this activity tomorrow.

Integration with Core Subject(s)

LA: Use correct punctuation, capitalization, and spelling

MA: Understand and apply principles of probability

Connection(s)

Enrichment: Challenge students to collect weather maps and complete another set of frontal tracking.

Fine Arts: Have students graph results using different colors to identify frontal travels.

Home: Encourage students to watch the nightly weather with their parents.

Remediation: Work with a small group of students to reinforce the fact that cold fronts are active and warm fronts are passive.

Technology: Have students access Franklin's Forecast website at <http://www.fi.edu/weather/> .

Assessment

Informally assess each student's involvement in the class activity.

Homework

Have students choose either newspaper or television and follow local weather forecasts for a week. Have them record the weather forecast data on the activity sheet provided at the end of this lesson. Ask: *What elements of weather are included in the forecasts? How are forecasters (meteorologists) able to make predictions about future weather?*

Teacher Notes

Have students keep the weather information from the homework assignment in their science notebooks.

Inform students of the upcoming quiz covering air masses and fronts in the next lesson.

Copy and distribute the *Weather Forecast* data sheets, which accompany this lesson.

Weather Forecast

Date	Weather Conditions (Actual)	Forecast (Predicted)	Forecast Accuracy

STRUCTURED CURRICULUM LESSON PLAN

Day: 027

Subject: Science

Grade Level: 8

Correlations (SG,CAS,CFS): 11A4-6; 12E1,2,8

ITBS/TAP:

Atmosphere and weather

ISAT:

Interpret data from graphs and tables

Unit Focus/Foci

Atmosphere and Weather

Instructional Focus/Foci

Interpreting weather maps in terms of moving fronts

Materials

Quiz questions (teacher prepared)

Paper

Weather-tracking activity materials from yesterday

Science notebooks

Educational Strategies/Instructional Procedures

Administer a short quiz at the beginning of class. Complete the previous day's activity.

When the students have finished, have them answer the following questions in their science notebooks:

- 1) What did you track?
- 2) From which direction did the front come?
- 3) How fast did it move?
- 4) How many days did it take to get to Chicago?

Integration with Core Subject(s)

LA: Use correct punctuation, capitalization, and spelling

MA: Analyze and interpret data

Connection(s)

Enrichment: Challenge students to research ways in which animals and insects can sense changing weather. Have them research the changing behavior of bees, ants and birds.

Fine Arts:

Home: Suggest that students discuss weather fluctuations with family members.

Remediation: Allow students with special needs additional time to complete the activity.

Technology: Encourage students to search the Internet for weather-related sites such as [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/fcst/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/fcst/home.rxml) .

Assessment

Use the quiz results to assess students' progress.

Homework

Have students complete assignments from the day's lesson. In addition, have students ask parents or family members if they feel that they can predict the weather and the reason(s) why.

Teacher Notes

Continue to search for pictures, books and other materials about ancient Egyptian boats.

Remind students to fill in their weather forecasting sheets each day.

Weather Education Web Sites

<http://www.nws.noaa.gov/>

<http://www.weather.com/education/>

<http://weather.about.com/newsissues/weather/>

<http://www.dir.ucar.edu/iss/learn/>

Locate informational material about the trade winds for tomorrow's lesson. Copy the information for each student.

Create a scoring rubric for students' presentations two days from now. Include input from students to be included as part of the rubric.

Encourage students to submit two questions and answers at the end of the week to be used at random for end of concept test.

STRUCTURED CURRICULUM LESSON PLAN

Day: 028

Subject: Science

Grade Level: 8

Correlations (SG,CAS,CFS): 11A1,3; 11B3-5; 12E1,2,8; 13B1

ITBS/TAP:

Atmosphere and weather

ISAT:

Interpret data from graphs and tables

Unit Focus/Foci

Atmosphere and Weather

Instructional Focus/Foci

Describing movement in the Northern and Southern Hemispheres

Materials

Trade winds information sheet (attached), one copy per student

Trade wind diagram (copies or drawn on chalkboard)

Science notebooks

Educational Strategies/Instructional Procedures

Introduce new terms: *Coriolis effect, doldrums, horse latitudes*. Have the students write the definitions in their science notebooks.

Have students work in groups of four to prepare a presentation that explains the cause of the trade winds and the Gulf Stream. Instruct students to include illustrations. Inform students that the reports will be presented tomorrow.

Integration with Core Subject(s)

LA: Use correct punctuation, capitalization, and spelling

MA: Analyze and interpret data

Connection(s)

Enrichment: Encourage students to call or fax the following for more information about job skills or career training: a meteorologist, an oceanographer, the United States Navy and/or the United States Coast Guard.

Fine Arts: The groups' illustrations which accompany the reports of trade winds constitute a fine arts activity.

Home:

Remediation: Have students illustrate the path of the Gulf Stream.

Technology: Have students use the Internet to, explore cultural myths about winds, such as Aeolus, Zephyrus, Notus, Eurus, and Boreas in Greek mythology.

Assessment**Homework**

Have students answer and complete the following: *What winds would Columbus have used to sail from Spain to the Caribbean? Which winds were needed to return to Europe?* On a map, have students trace a possible path Columbus could have taken.

Teacher Notes

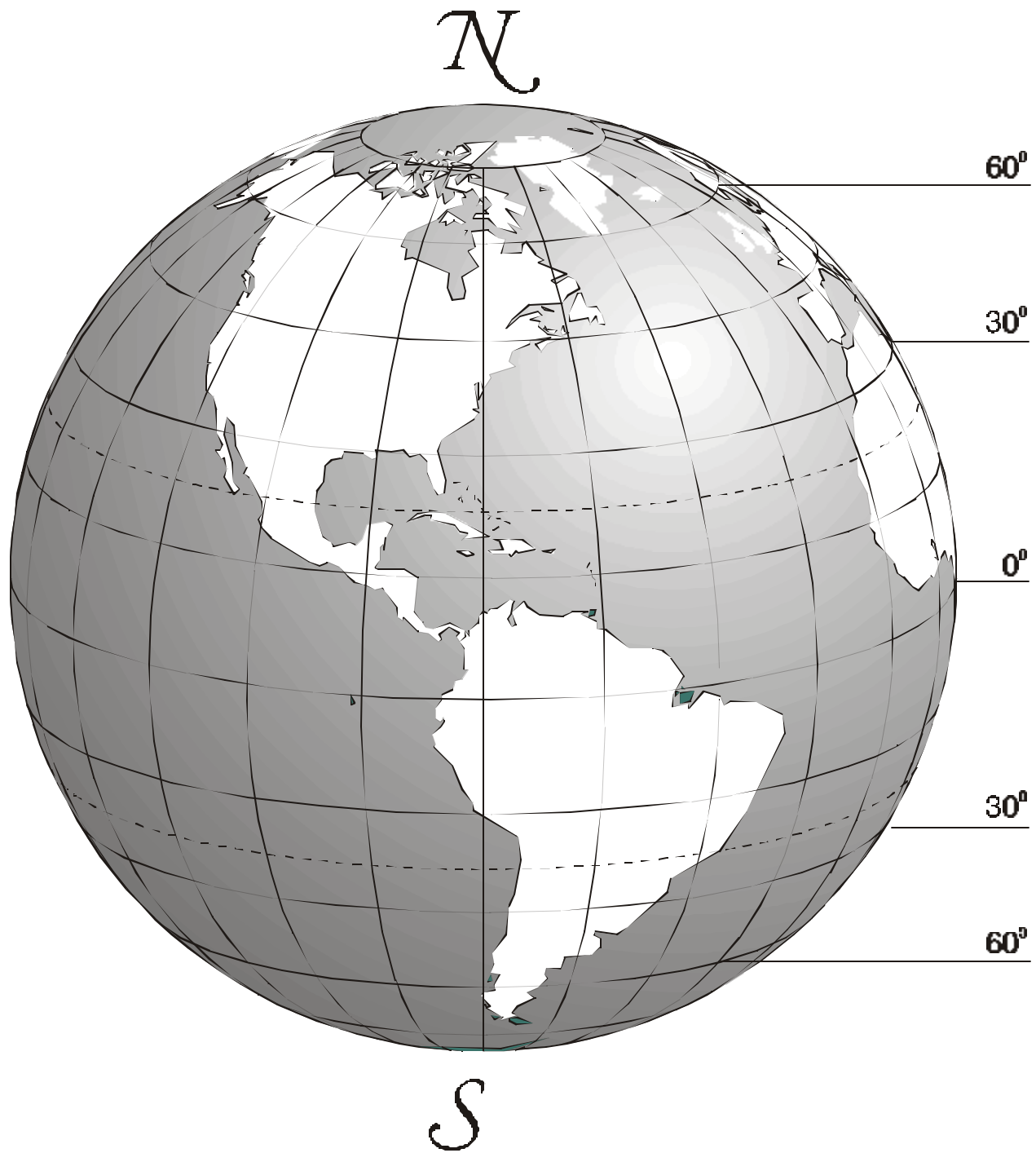
Share the scoring rubric for the group presentations so students know the expectations of the assignment.

Trade Winds

The region of the earth receiving the Sun's most direct rays is the equator. Air is heated causing it to rise and leave an area of low pressure underneath. About 30° latitude north and south of the equator, this warm air finally cools and sinks. Most of this cooling, sinking air moves back toward the area of low pressure around the equator. Air movements toward the equator are called *tradewinds* – warm, steady breezes that blow almost continuously. The *Coriolis effect* makes the tradewinds appear to be curving west because of the earth's rotation. The trade winds coming from the north and south that converge at the equator produce upward winds as the air is heated, but no steady surface winds. This area of calm is called the *doldrums*.

Beyond 30° latitude, air flows toward the poles. Between 30° and 60° latitude, the winds curve to the east. Because winds are named for the direction from which they originate, they are called the *prevailing westerlies*. At about 60° latitude, the prevailing westerlies join the polar easterlies, which are formed when air over the poles cool. This cold air sinks and spreads over the surface, turned west by the rotational Coriolis force.

Trade Winds Diagram



Draw arrows to represent wind movement. Be sure to indicate changes in wind direction at certain latitudes. Label the winds

STRUCTURED CURRICULUM LESSON PLAN

Day: 029

Subject: Science

Grade Level: 8

Correlations (SG,CAS,CFS): 11B4-6; 12B1; 12E1,2,8

ITBS/TAP:

Atmosphere and weather

ISAT:

Know and apply scientific methods and processes

Unit Focus/Foci

Atmosphere and Weather

Instructional Focus/Foci

Explaining the cause of the trade winds and Gulf Stream

Materials

Rubric

Pictures, books, resource materials about ancient Egyptian boats

Tape recorder

Educational Strategies/Instructional Procedures

Have student groups give their presentations on the trade winds and Gulf Stream.

Grade students on the completeness of the information presented, clarity, individual participation, and use of illustrations.

After all the groups have given their presentations, have students rate their group's presentation. Have them list the strengths and weaknesses of the presentation.

Explain to the class that the early Egyptians were the first culture to think of using air currents to their advantage to improve waterway transportation. Have the students use the resource materials to study the ways the Egyptians built boats to navigate the Nile River. Tell them to write a short report about the efficiency of the early boats. Instruct students to include sails, masts, weight of boats, engineering design of boats, weight of cargo carried, type of cargo, etc. Have a few of the students share their research with the class.

Integration with Core Subject(s)

LA: Use correct punctuation, capitalization, and spelling

Demonstrate control of Standard English grammar, usage, and syntax in planned and impromptu oral communications

SS: Interactions of people with environment

Connection(s)

Enrichment:

Fine Arts: Have students draw illustrations of the engineering feats of the Egyptian ancient boats.

Home: Encourage students and parents to share information about Egyptian maritime engineering.

Remediation: Allow students to tape record what they learned about early travel on the Nile.

Technology: Have students search the Internet to identify the effect improvements in weather-predicting technology has had on improving transportation. Wind related links can be accessed at <http://www.nrel.gov/wind/database.html> .

Assessment

Presentations designed to show understanding of trade winds and Gulf Stream and research about ancient Egyptian boats can serve as assessment tools.

Homework

Have students explain early Egyptian boats to a family member.

Teacher Notes

Oral presentation rubric:

4. The presentation was well organized and demonstrated clarity of thought. Well-done graphics were included to enhance understanding. Students used appropriate terminology. All members were able to respond to questions and exhibited exceptional stage presence. Audience interest was maintained throughout.
3. The presentation was well organized and demonstrated clarity of thought. Graphics were not used as were unclear. Students used appropriate terminology. Some members were able to adequately respond to questions and exhibited good stage presence. Audience interest was maintained adequately during most of the presentation.
2. The presentation demonstrated minimal organization and understanding of the task. Graphics were not used or unclear. Questions were not adequately answered and stage presence was fair. The presentation was inconsistent and audience interest was low.

1. The presentation lacked organization and demonstrated little clarity of thought. Students did not use appropriate terminology. Students were unable to answer questions and stage presence was poor. The presentation was confusing and audience interest was low.

STRUCTURED CURRICULUM LESSON PLAN

Day: 030

Subject: Science

Grade Level: 8

Correlations (SG,CAS,CFS): 11A3,4; 11B4,6; 12B1; 12E1,2,8

ITBS/TAP:

Atmosphere and weather

ISAT:

Know and apply scientific methods and processes

Unit Focus/Foci

Atmosphere and Weather

Instructional Focus/Foci

Illustrating the Coriolis effect

Materials

Posterboard, cut into 12 cm squares
Compasses
Pencils, sharpened
Hole punch (try to get more than one)
Scissors
Eye droppers
Small cups with water
Science notebooks

Educational Strategies/Instructional Procedures

Explain to the students that they are going to construct a poster-board model which represents Earth.

Distribute the materials to the students. Have the students use the compass to draw a 10cm diameter circle, then cut the circle out. Have students use the hole-punch to punch a hole in the exact center of the circle (Figure 1) on the glossy side. Tell students to write *North Pole*, and write *South Pole* on the other side.

Next have students gently push the pencil through the hole with the North Pole side facing up until the circle is in the center of the pencil. (Figure 2)

Figure 1

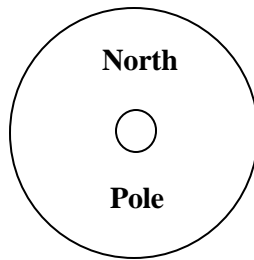
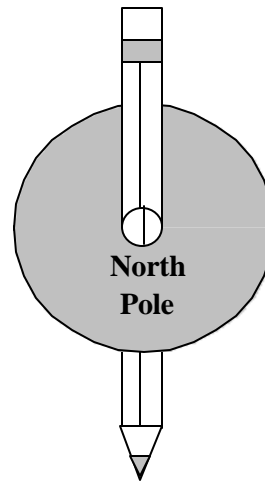


Figure 2



Tell the students that the disc represents Earth. Have the students slowly spin the pencil in a counter clockwise direction between the palms of their hands. Tell them that is a view of Earth as if they were in a spacecraft above the North Pole. The Earth would appear to rotate counter-clockwise. Then have a partner look at the South Pole side as the disc is turned counter-clockwise. The South Pole side should appear to move in a clockwise direction.

Have the students draw the model in their science notebooks.

Tell the students that they will simulate the Coriolis effect with their Earth model. Have them make a prediction about what they think will happen to a drop of water that is dropped at the center of the disc as it rotates. Have students write their hypotheses in their science notebooks.

Working in pairs, have one student slowly rotate the model counter-clockwise, while the second student drops a drop of water near the center of the disc. Have students wipe off discs. Then reverse roles and repeat. Have students record observations in their science notebooks.

Discuss the results/observations with the class. Students should have observed the drop of water moving outward in a semi-circular direction.

Explain to the students that Earth's rotation has a similar effect on the winds and ocean currents. Currents in the Northern Hemisphere move in a clockwise motion because of the winds. Southern Hemisphere currents move in a counter-clockwise direction.

Ask the students to make a prediction about what would happen if they had the South Pole facing up and rotated it clockwise. Have them write their predictions in their science notebooks, and perform the experiment.

Remind students that their weather forecast sheets are due in one day. Ask if they have any questions about the assignment.

Integration with Core Subject(s)

LA: Use correct punctuation, capitalization, and spelling

MA: Understand and apply principles of probability

Connection(s)

Enrichment: Suggest that students use a turntable and a circle of cardboard the same size as the turntable to demonstrate the Coriolis effect. Have them attempt to draw a straight line while the turntable is moving.

Fine Arts:

Home: Remind students to continue to watch the daily weather forecasts with family members.

Remediation: Have a diagram available that shows the Coriolis effect.

Technology: Encourage students to browse the Internet to find articles about the Coriolis effect, trade winds, currents, and the effects of el Niño and la Niña. Have students access the University Of Illinois' Meteorology website to view an animation of the Coriolis Effect at [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/fw/crls.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/fw/crls.rxml) .

Assessment

To assess students' progress, use the groups' activity results.

Homework

Teacher Notes

Collect articles from newspapers and magazines about *global warming* and the *greenhouse effect* for an upcoming lesson.

STRUCTURED CURRICULUM LESSON PLAN

Day: 031

Subject: Science

Grade Level: 8

Correlations (SG,CAS,CFS): 12E1

ITBS/TAP:

Atmosphere and weather

ISAT:

Interpret data from graphs and tables

Unit Focus/Foci

Atmosphere and Weather

Instructional Focus/Foci

Explaining world winds

Materials

Trade wind diagram

Science notebooks

Overhead projector

Educational Strategies/Instructional Procedures

Draw the *trade wind* diagram on the chalkboard. (Fig. #1, attached)

Remind the students about what they learned in the earlier lessons about the movement of dense and less dense air. Warm air is less dense and rises. Cold air is more dense and sinks.

Use the diagram to explain to the students how the air above Earth is warmed, rises, cools, and falls. This occurs in a circular motion. (Fig. #2, attached.) Draw Fig #2 on the chalkboard or overhead projector.

Ask the students what effect they think the rotation of Earth has on the trade winds. Elicit responses.

Draw Fig. #3 (attached) on the chalkboard or overhead projector. Explain how the rotation causes the trade winds to move on a diagonal. Have students draw Fig. #3 in their science notebooks.

Add the circular lines to the diagram to show the circular movement of the air.

Ask the students what they think happens in the areas of low pressure. Discuss students' responses.

Explain that, in these areas, there is very little wind. Ask students what they think the sailors had to do when they used sails to propel their boats. Students should respond with the fact that their ships wouldn't move.

Integration with Core Subject(s)

LA: Demonstrate control of Standard English grammar, usage, and syntax in planned and impromptu oral communications
Identify author's viewpoint

Connection(s)

Enrichment: Have students research the contributions of Galileo (1593), Evangelista Torricelli (1643), and Edmund Halley (1686) to weather forecasting.

Fine Arts:

Home:

Remediation: Encourage students to research how hurricanes form.

Technology: Have students research on the Internet the history of the National Weather Service at <http://www.nws.noaa.gov/>.

Assessment

Are students able to identify world winds?

Homework

Remind students to continue to work on their Science Fair projects.

Teacher Notes

Collect pictures of hurricanes for an upcoming lesson.

Fig. 1

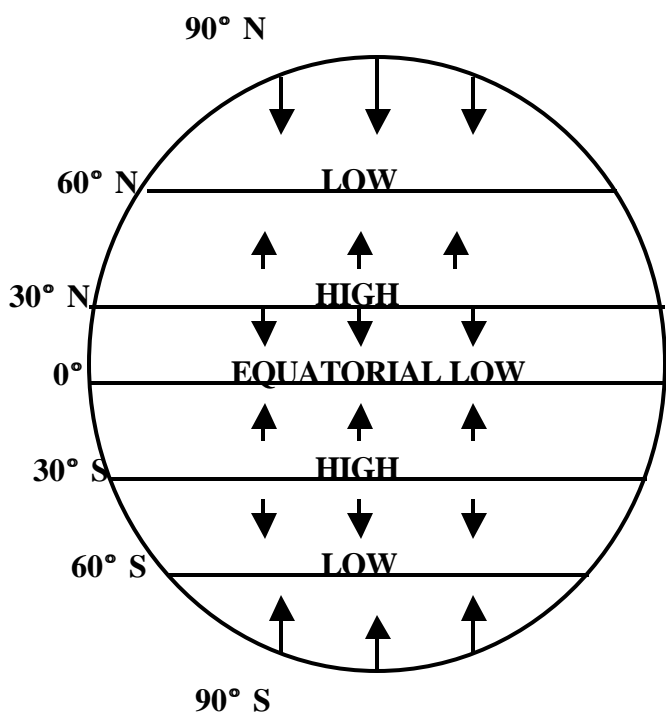


Fig. 2

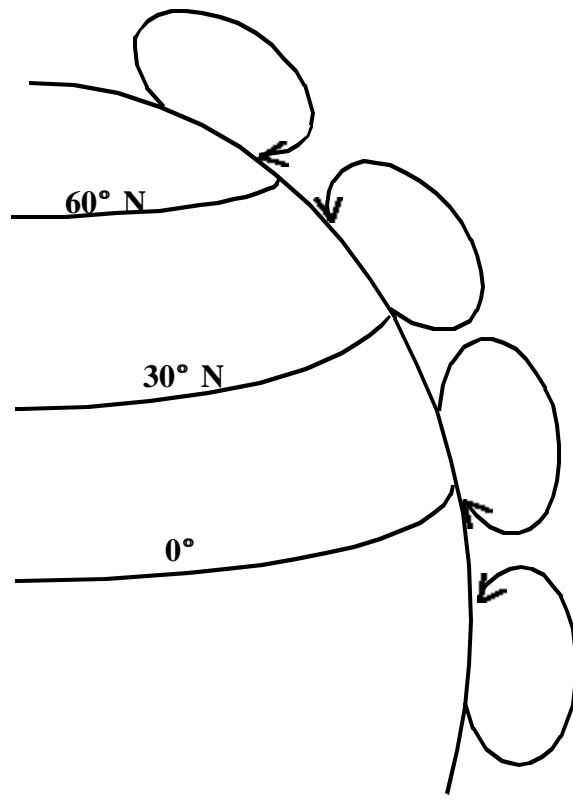
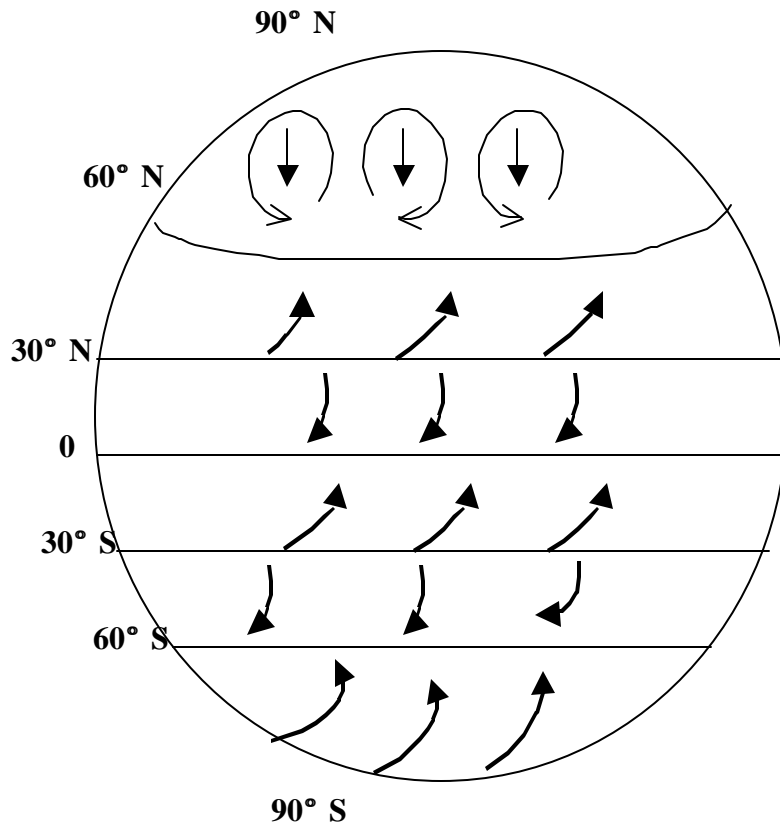


Fig. 3



STRUCTURED CURRICULUM LESSON PLAN

Day: 032

Subject: Science

Grade Level: 8

Correlations (SG,CAS,CFS): 12E1

ITBS/TAP:

Atmosphere and weather

ISAT:

Interpret data from graphs and tables

Unit Focus/Foci

Atmosphere and Weather

Instructional Focus/Foci

Explaining winds

Materials

Beaufort Scale, (attached) copies for students

Large size drawing paper

Crayons, colored pen, etc.

Science notebooks

Educational Strategies/Instructional Procedures

Distribute the *Beaufort Scale* to the students. Explain to the students that winds are currents in the earth's atmosphere.

Explain that people use a scale to determine what type of wind is present. Discuss the Beaufort Scale with the students.

Tell the students that they are going to create an illustration of the scale. Have students divide drawing/construction paper into equal squares. Instruct students to write one number from the scale and its corresponding information in each square. Next, have students draw a picture to illustrate the strength of the wind. Encourage students to be creative when drawing their illustrations.

Monitor students as they work. Have students share their illustrations when they are done.

Integration with Core Subject(s)

LA: Demonstrate control of Standard English grammar, usage, and syntax in planned and impromptu oral communications

Connection(s)

Enrichment: Challenge the students to keep a record in their science notebooks of the wind speed for the next two weeks and make long range predictions. Have them apply the Beaufort Scale to the wind speed each day.

Fine Arts: The students' Beaufort Scale illustrations constitute a fine arts activity.

Home:

Remediation: Illustrating the wind speed is a good remedial activity for students who need extra help.

Technology: Have students access the NOAA website to view photographs of seas in various Beaufort scale conditions at <http://classroomatsea.noaa.gov/shipops/beauscale.html> .

Assessment

Are students able to correctly show the strength of the wind in their illustrations?

Homework

Allow students to finish their pictures at home.

Remind students to continue to work on their Science Fair projects.

Teacher Notes

You could display the students' illustrations in the classroom or hallway.

BEAUFORT SCALE

Number	Description	M.p.h.	Km/p/h
0	<i>Calm</i> , smoke rises straight up	00	00
1	<i>Light Air</i> , smoke drifts gently	1-3	1-5
2	<i>Light Breeze</i> , leaves rustle	4-7	6-11
3	<i>Gentle Breeze</i> , flags flutter	8-12	12-19
4	<i>Moderate Wind</i> , twigs move	13-18	20-29
5	<i>Fresh Wind</i> , small trees sway	19-24	30-39
6	<i>Strong Wind</i> , large branches move	25-30	40-50
7	<i>Near Gale</i> , whole trees sway	32-38	51-61
8	<i>Gale</i> , difficult to walk in wind	39-46	62-74
9	<i>Severe Wind</i> , slates and branches break	47-54	75-87
10	<i>Storm</i> , houses damaged, trees blown down	55-63	88-102
11	<i>Severe Storm</i> , buildings seriously damaged	64-74	103-119
12	<i>Hurricane</i> , devastating damage	75 +	102 +
13	<i>Tornado</i> , devastating damage	300 +	503 +