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HOW AND WHY:

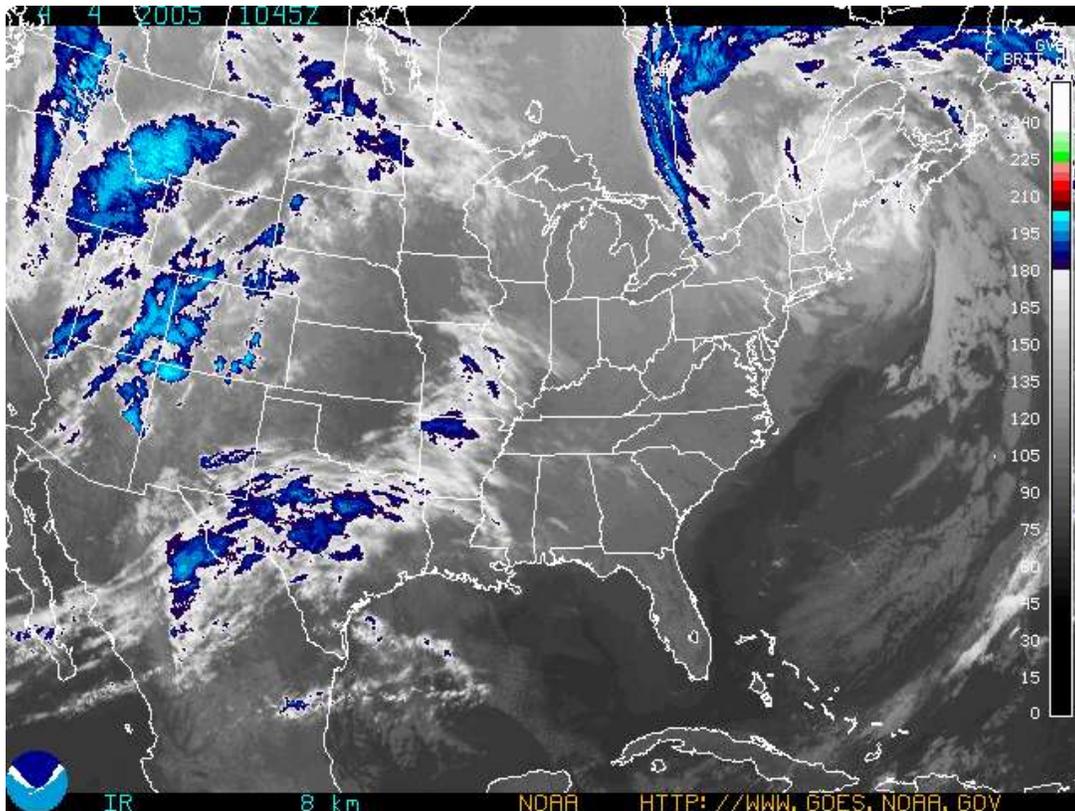
VOLUME 3—WEATHER

MEDIA PRO, 2003

Grade Level: 4-8

17 Minutes

1 Instructional Graphic Included



CAPTIONED MEDIA PROGRAM RELATED RESOURCES

[#2692 UNDERSTANDING WEATHER: STORMS](#)

[#3479 HURRICANE](#)

[#3672 TORNADO](#)

[#8697 DETAILS OF WEATHER & CLIMATE](#)

[#8950 WEATHER: A FIRST LOOK](#)

[#10713 CLOUDS: A PAWS SCIENCE ADVENTURE](#)

HOW AND WHY EPISODE GUIDE

Table of Contents

Individual Episode Summaries and Activities:

Volume 1: Planet Earth - takes an exciting journey around the world and presents the unique characteristics of the Blue Planet including the continents, and a trip to the inner center of the Earth.

Volume 2: Volcanoes - follows the eruption of a volcano, from its birth right through to the aftereffects of such a magnificent natural phenomenon.

Volume 3: Weather - explains how the weather forms, the importance of the sun, air and water, and how weather forecasts originate from the observations of meteorological stations all over the world.

Volume 4: The Moon and the Universe - journeys through space and time towards the Moon and into the infinite depths of the Universe to discover the possible origins of our Universe, the landing on the Moon and plans for colonizing other planets.

Volume 5: Trees - describes the various tree forms on Earth and explains how trees grow, how they have evolved over millions of years and how the forest supplies nourishment and life giving oxygen to both man and animals.

Volume 6: Dinosaurs - explains what time period dinosaurs lived and how they conquered Earth, and became fossils. Also highlighted is how a dinosaur skeleton finding is prepared for its exhibition.

Volume 7: Planets and Space Travel - follows the journey of a space shuttle into space to encounter the different phenomena of the Universe. Also included is an overview of astronaut training and what it is like to live on a space station as well as a history of space flight.

Volume 8: Aviation - explores the flight of an airplane from take off to landing as well as addressing how planes are constructed, the principles of flight, and the pioneers of air navigation.

Volume 9: Automobiles - shows the development of cars beginning with the invention of the first engine powered vehicles right through to the automobile of the future. Includes how a car is built, how an engine functions and the testing of a new model.

Volume 10: Computers and Robots - describes the evolution of the computer: starting from the first huge calculators that filled an entire room to the tiny intelligent computers of today. Also highlighted is how robots have continually developed and in which environments they are used today.

Vocabulary Journal Sample Page
Additional "How and Why" Web resources
MediaPro Career Corner section

MediaPro's "How and Why" EPISODE GUIDE FOR:Weather

Goal /Objective: At the completion of this lesson, students will be aware of the unique conditions present on Earth that are responsible for our weather and why they exist. They will come to realize the value of weather prediction, how it is accomplished and the benefits it provides mankind.

Episode Summary:Volume 3: Weather

Weather affects all of us no matter where we are around the world. There will always be the sun, wind and rain. Weather changes only exist because the sun shines on our planet and heats the air and water. We feel the results every day. Forces of nature including rain, snow, temperature changes from heat spells to freezing cold, icy winds, hurricanes over the oceans that make landfall and tornadoes can instantly destroy our livelihood. Meteorologists, scientists who study the weather, make predictions on weather changes. Weather forecasts are vital for all kinds of people. Farmers need to know when to plant their crops and when to harvest, loggers need to know when best to chop their trees, fisherman need to know when they can safely go out to sea, and all of us need to know when inclement weather is approaching and to seek shelter. Over 10,000 weather stations are set up throughout the world in strategic locations to monitor and observe the development of the weather. In addition, there are ships, weather balloons, and airplanes that collect data about the weather every day as well as satellites circling the Earth with huge cameras monitoring developments. Meteorologists take this information and enter the data into computers aided by complex programs and calculate the course of weather for the next hours and days.

Our weather only exists because the Earth is covered by a mantle of air called the atmosphere. From outer space the atmosphere looks like a bluish shell and reaches about 600 miles into space and consists of air. Air is a substance like rock or water, only it is light, has no shape, odor or taste. We only notice it when it moves or changes temperature. The sun is the major influence on our atmosphere. The sun's rays heat up the air, the land and the water to different degrees, creating changes in the weather. Without the sun, water, and air, there would be no rain, wind, clouds or life. As the sun heats up the air it moves and we have wind. Wind forms air masses in the atmosphere creating weather fronts of warm or cold temperature conditions. The mantle of air around the Earth is constantly in motion with light and heavy winds blowing as it moves creating low and high pressure areas. These pressure areas cause different weather conditions - low pressure displays cloudy, rainy or snowy conditions, and high pressure displays clear and fair conditions. Clouds reveal what the weather will be like and if rain or is on the way. They act like airy water bags filled with countless swirling drops of water. The sun's warmth causes water to evaporate from the oceans, lakes, rivers,

streams, swimming pools, bathtubs, moist towels, plants, and from the skin and fill the air around us. A warm air rises it takes tiny droplets of water along. When they have risen into cooler air, they turn into liquid again. This is the process of condensation. Clouds are formed from the moisture. The water that has risen with the clouds returns to Earth as precipitation. Precipitation refers to snow, sleet, hail or rain. The temperature in the atmosphere determines which will fall. Through this process water, like the air, is in constant motion on Earth. Clouds can form positive and negative charges causing lightening and thunder to occur during storms. If lightening touches the ground it develops intense heat and can start fires and even kill people and animals.

The destructive force of nature is also visible in heavy storms, such as hurricanes and tornadoes. Tornadoes forming over land whirl around at more than 250 miles per hour and can pack winds over 100 miles an hour sucking up everything in their path. Hurricanes forming over water reach speeds of up to well over 200 miles an hour. Observation teams fly into the middle of these storms to send back information on their severity and if and when landfall might occur.

No matter where, the weather is a result of the interaction between the same components: the atmosphere, the sun and water. The sun is the motor of our weather here on Earth as it keeps the air and water in constant motion. Thanks to meteorologists, we know today what tomorrow's weather will be like.

Key Vocabulary:

Meteorologists - individuals that study the science dealing with the atmosphere and atmospheric phenomena, especially with the weather and the climate

Hurricane - a violent tropical cyclone with winds of 73 or more miles per hour blowing around a moving center - will be reported by category severity 1 to 5 depending upon estimated damage potential

Satellite - a device launched into orbit around Earth, the Moon, etc.

Atmosphere - the entire mass of air, made up of oxygen, nitrogen, and other gases, surrounding the Earth

Atmospheric pressure - the pressure exerted in every direction upon a body by the weight of the atmosphere at sea level equal to 14.69 lbs. per square inch categorized as "low" or "high" pressure

Equator - an imaginary circle around the Earth, midway between the North Pole and the South Pole where the rays of the Sun are felt the strongest

Cloud - a mass of visible vapor, or barely visible droplets of moisture suspended in the air as mist or steam, in the atmosphere of the Earth

Evaporation - to change into vapor or barely visible droplets of moisture suspended in the air as mist or stream

Precipitation - moisture in the atmosphere that condenses and forms rain, sleet or snow as it falls to the Earth's surface

Lightning - a discharge of atmospheric electricity seen as a flash of light in the sky

Tornados - a violent whirlwind meteorologist will measure by using the Fujita scale of 0 to 5 to indicate the severity of the storm and the potential damage it might cause.

*** Students are encouraged to keep a journal of their vocabulary words. Each page should be set up in the same way in an organized manner and can include the following:

- the word at the top of the page
- the sentence the student read the word in or heard the word used
- what they think the word means and why
- the dictionary definition of the word
- a new sentence using the word
- a graphic model of the word such as a picture representation of the word if applicable or a word web, etc. (Antonyms and/or synonyms and related words can be included here as well)

Follow-up topics for classroom discussion:

Describe why our weather exists.

Answer: Our weather exists because the Earth is covered by a mantle of air, the atmosphere resembling a blue shell surrounding our planet.

How far does our atmosphere reach out into space?

Answer: about 600 miles into space

When do we notice the air around us?

Answer: when it moves, gets warmer or colder, takes on an odor, or when we experience a lack of air or oxygen.

Describe why the sun is the major influence on our atmosphere.

Answer: The sun's rays heat up the air, the land and the water to various temperatures creating the changes we recognize in the weather, without the sun, water and air there would be no rain, no wind, no clouds and no life

What is created by the constant motion of the mantle of air around the Earth?

Answer: Light and heavy winds are created by the constant motion of the mantle of air around the Earth.

How are low and high pressure areas created and what effect do they have on the weather?

Answer: Where the air rises as low pressure area is created because the pressure drops where there is less air. On a weather map it is represented by an "L". High pressure areas are marked with an "H" and represent areas where air masses have dropped and thereby raise the air pressure. In low pressure areas it is often cloudy and might rain or snow. In high pressure areas the sky is usually clear and the weather is fair.

How are clouds formed in the sky?

Answer: Clouds are made up of water. The warmth of the sun causes water from the oceans, lakes, rivers, steams, plants, puddles, moist towers and even out skin, to

evaporate into the air. The lighter warm air rises up into the atmosphere taking tiny drops of water along with it without us seeing them. When they have risen into cooler air, the vapor turns liquid again. This is known as condensation. As the water becomes visible, clouds are formed and take shape.

What is precipitation?

Answer: It refers to anything that is released by clouds: rain, sleet, hail, or snow.

What are the benefits of satellites images and radar to the meteorologist?

Answer: Both allow the meteorologist to track storms such as hurricanes and tornados, as well as weather fronts therefore allowing them to predict weather conditions and alert area residents.

Explain how lightning and thunder occur.

Answer: As Cumulus clouds form, their inner workings are turbulent. The air swirls around violently, and water drops and ice crystals collide, building electric charges. The positive charge builds on the upper side of the clouds, and the negative charge builds on the underside. When and if there is an electric discharge between the positive and negative side, we see lightening. Lightning bolts heat up the air around them to 50,000 degrees Fahrenheit. The air expands rapidly, often faster than sound, and breaks the sound barrier making it heard to us as thunder. Even though this happens at the same time, we see the lightning first, because light is faster than sound. Our eyes see the flash before we hear the thunder.

Assignments:

****Cloud in a Bottle -**

Grade level: range 4-5

Curriculum connections: Earth and Space science

Materials needed: 1 two liter empty soda bottle, matches, 1 spray water bottle, and water

Goal/Objective of the lesson:

This simple demonstration will show students how a cloud is formed.

Lesson Activity:

Spray some water into the soda bottle so that it forms a coating on the inside. Light a match, blow it out and throw it into the bottle. Put the cap back on the bottle tightly. Press down on the bottle firmly for a minute and then ease up on the pressure. When a cloud forms open the bottle and squeeze.

Explain to the students what has happened: The smoke from the match acts as a sort of condensation nucleus which means that the water inside the bottle will be able to cling to the particles to help form the cloud. By squeezing the bottle, you compress the molecules on the inside and in turn heat up the temperature in the bottle. By letting go of the bottle, the temperature is allowed to go down and the water molecules appear as water vapor and a cloud is formed.

Another version of the same experiment:Appropriate for grade levels: 4-7+Curriculum connections: Earth science and MeteorologyMaterials needed: wide mouth, clear, gallon jar, heavy duty clear plastic bag, rubber bands or masking tapeGoal/Objective of the lesson:

Students will be able to see a demonstration of the principles of cloud formation and apply this information in the future to weather maps to predict cloud formation and clearing.

Lesson Activities:

Place 20 ml of water in the wide mouthed jar. Place a lit match into the jar. Quickly place a heavy duty clear plastic bag over the jar and seal it firmly by placing a rubber band or masking tape around the top of the jar. Push the bag into the jar quickly, and then pull the bag out. Look for the cloud to form.

Explain to the students what has happened and why. This demonstration illustrated how humidity and air pressure have an effect on cloud formations. The water produces a high humidity level in the jar and the smoke introduced by the match provides nuclei (a central mass around which matter grows) on which the water vapor can condense. When the bag is pushed into the jar, the pressure and temperature inside the jar increase causing the jar to clear. Upon pulling the bag out, the pressure and temperature decrease allowing water vapor to condense and produce a cloud inside the jar.

**Making a Rain Gauge:Grade level: range 5-6Curriculum connections: Earth science and MeteorologyMaterials needed: marbles or small stones, ruler, plastic bottle, scissors, tape, water, graph paper, paper, pencil/penGoal/Objective of the lesson:

Students will be able to construct a rain gauge and learn how to calculate the amount of rain fall in one month.

Lesson Activities:

Begin by questioning students on how much rain they think falls in a light shower? How much falls in a heavy downpour?

Continue by giving directions on how to make a rain gauge:

Have students work in small groups or pairs. Have them cut the top off the plastic bottle at the level where the width is the same as at the base.

Attach thin strips of tape on the side of the bottle measuring off various amounts for example; $\frac{1}{2}$ inch, $\frac{1}{4}$ inch, $\frac{3}{4}$ inch, etc. Colored tape will make this easier to differentiate.

Put marbles or small stones in the bottom of the bottle for stability. Turn the top upside down and tape it inside the bottle. This will act as a funnel for the rain.

Pour water into the bottle until it reaches the bottom strip on the scale the student has measured off. This is his/her rain gauge.

Have them put the rain gauge outside before a storm. (It is preferable to plan this activity during a rainy season in the area.) After the rain stops, see how high the water has risen. Have each group record the information in a journal or chart.

Have the class construct a class graph reflecting the rain level recorded during a set length of time, i.e. 2 week period or a month, etc. by each group. Compare and discuss each group's findings.

*** Students can visit the following helpful Web site to read about another type of rain gauge that can be easily made,

www.ecokids.ca/dev/eco_info/topics/climate/weather/page4.cfm

*Advanced students may want to expand their research into measuring precipitation by using Internet resources to answer the following questions:

List three methods in which rain, snow and wind can be measured.

Explain two reasons why the sun index is so important and its effect on our weather.

**Tornado Project:

Grade level: range 4-7+

Curriculum connections: Earth science, Language Arts

Materials needed: computer with Internet access, paper, pen/pencil, and map of the U.S. or an atlas

Goal/Objective of the lesson:

Students will become familiar with: the Fujita Scale of classifying tornados and what the descriptions indicate about a storm, what safety procedures to take for storm conditions in various locations, and how to access current information on impending storms.

Lesson Activities:

Have students work in pairs or small groups. They will have to use a computer with an Internet connection. Go to the following Web site, www.tornadoproject.com to complete the following activities.

- Click on the left hand column link, "Tornado Safety" and read about information pertaining to where to go and what to do during an impending storm. Have the groups answer the following questions while they read:

What is the difference between a tornado "watch" and a "warning"?

Name three things people who have experienced a tornado have described about their encounter.

What are the items recommended on a Red Cross "Disaster Supplies List"?

Describe where to go and what to do in various locations if a tornado "watch" or tornado "warning" has been issued. Locations to consider are: in homes or small buildings, schools, when out in the open as in walking outside, on a bike or in a car, in a high rise building, in a mobile home, or in a shopping center, hospital or factory.

When these activities have been completed, have students click on the "Tornado Safety Crossword Puzzle" link at the bottom of the page, print it out and complete it and then check their answers by returning to the site and clicking on the "Solution" link.

- Have the pairs continue to explore this site by clicking on "The Fujita Scale" link on the left hand side of the home page. As they read along have them answer the following questions:

What is the Fujita Scale and is it based on the size of the funnel or the damage the storm causes? (As a system of measurement of tornado/storms, it is based on the damage the storm causes not the approximate size of the funnel.)

*Students should make a chart of the Scale categories and what type of tornados they represent.

Is the size of the tornado an indication of its intensity? (No)

According to the Fujita Scale, during the past 44 years, have more tornados in the U.S. been classified as weak, strong, or violent? (weak) *Have students include the % listed for each classification in their answers.

- Have pairs click on "Tornados 2002" in the left hand column of the home page. How many storms have been listed in the "U.S. Killer Tornados of 2002"? (23) Continue by clicking on "Daily Reports" to see a listing of the tornados that have touched down in the last 24 hours - check the map locations and compare them to the class map(s) and or an individual atlas. Have students indicate the states, and/or communities that are effected by the storm. Go back and click on "National Warnings Area" link to view the current weather conditions throughout the U.S. including tornados, hurricanes, flash floods, floods, coastal floods, winter storms, etc.
- Students wanting to continue investigating the topic of tornados can return to the home page of www.tornadoproject.com to click on the link to "Tornado

Myths" in the left hand column and continue researching information about tornados.

****The Earth's Atmosphere:**

Grade level: range 4-7

Curriculum connections: Earth science

Materials needed: computer(s) with Internet access, paper, pen/pencil

Goal/Objective of the lesson:

Students will be able to identify how the Earth's atmosphere was formed, what it is composed of, its importance to the planet and its inhabitants, and what layers it is divided into.

Lesson Activities:

Have students work in pairs. They will have to use a computer with an Internet connection. Assign one student to be the note taker and the other to navigate the Internet. Go to the following Web site,

www.enchantedlearning.com/subjects/astronomy/planets/earth/ and have them click on "The Atmosphere". Scroll down while reading the information, answering the following questions:

- What is the Earth's atmosphere comprised of, and what function does it serve?
- How was the atmosphere formed?
- What are the layers of the atmosphere and where are they located in relation to each other?
- What layer of the atmosphere has the ozone layer and what does it do?
- What layer of the atmosphere is where our weather occurs?
- Explain what the relationship is between altitude and temperature in the Troposphere?

*When the students have completed the above questions, have them click on the entry at the bottom of the page "Label the layers of the Earth's atmosphere - a printout". They should print out 2 copies of the worksheet and each student should complete their own page. (They can check their answers by clicking "Answers" at the top left hand corner of the worksheet page online, if desired)

****Clouds:**

Grade level: range 4-7

Curriculum connections: Earth science, Meteorology

Materials needed: computer(s) with Internet access, paper, pen/pencil

Goal/Objective of the lesson:

Students will learn how clouds are formed, identify different types of clouds by their appearance, and what type of weather may be associated with them.

Lesson Activities:

Have students work in pairs. They will have to use a computer with an Internet connection. Assign one student to be the note taker and the other to navigate the Internet. Go to the following Web site, www.enchantedlearning.com/subjects/astronomy/planets/earth/, and click on "Clouds". Scroll down while reading the information, answering the following questions and completing the activities:

- Have the note taker fold and/or divide a large piece of paper into 11 sections. Fill in each section with one of the types of clouds. Include its name, an illustration of the cloud and indicating key information describing its appearance.
- What type of cloud is most often associated with precipitation and appears low and flat in the atmosphere?
- What are clouds called that can cause heavy, violent storms with thunderheads?
- What kind of cloud is fog?
- Name the two types of clouds that are found around mountain ranges?
- What is a contrail?

*The teacher can print out either of the "Cloud Activities" at the bottom of the page. Depending upon the ability level of the students, pass out the appropriate worksheet for completion as a review. Answers are available if needed.

**El Nino:

Grade level: range 5-7+

Curriculum connections: Earth science, Meteorology

Materials needed: computer(s) with Internet access, paper, pen/pencil

Goal/Objective of the lesson:

Students will acquire an understanding of what the phenomenon of El Nino is, and what effects it has on the globe including weather conditions and economic impact.

Lesson Activities:

Have students work in pairs. They will have to use a computer with an Internet connection. Assign one student to be the note taker and the other to navigate the Internet. Go to the following Web site, www.cloudman.com and click on "Favorite Links". Then click on, [http://ww2010.atmos.uiuc.edu/\(Gh\)/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/home.rxml), then click on "Program Features" and finally click on El Nino. Students are to navigate the site and highlighted features to research the answers to the following questions:

- What is El Nino and how does it contrast La Nina?
- How is marine life affected by El Nino?
- What influence does El Nino have on worldwide weather conditions?
- Does El Nino have an economic impact on the world and if so how?

- How do meteorologists detect and predict an El Nino year?
- What was the most devastating El Nino in history?

****Hurricanes:**

Grade level: range 4-7+

Curriculum connections: Earth science, Meteorology

Materials needed: computer(s) with Internet access, paper, pen/pencil

Goal/Objective of the lesson:

Students will acquire a knowledge base of many aspects of the nature of hurricanes which will provide a foundation for a research paper.

Lesson Activities:

Have students work in pairs. They will have to use a computer with an Internet connection. Assign one student to be the note taker and the other to navigate the Internet. Go to the following Web site,

www.cloudman.com and click on "Favorite Links". Then click on,

[http://ww2010.atmos.uiuc.edu/\(Gh\)/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/home.rxml), then click on "Program Features" and

finally click on Hurricanes. Students are to navigate the site and highlighted features to research the answers to the following questions:

- What are hurricanes and how are they formed?
- How do hurricanes move from tropical depressions to hurricanes?
- What are the different parts of a hurricane?
- What is the influence of global winds on the movement of hurricanes?
- What is the difference between a "hurricane watch" and a "hurricane warning"?
- What should you consider doing if threatened by a hurricane? What precautions should you take?
- How are hurricanes named?
- What is the interaction between hurricanes with El Nino?
- * Check out the "Hurricane Tracks" link for fun!
- * Visit the Web site, www.themeter.net/ciclone_e.htm to see a list of tropical cyclone/hurricane severity categories.

****Predicting the Weather:**

Grade level: range 6-7

Curriculum connections: Earth science, Meteorology, Math

Materials needed: thermometer, barometer, weather vane, anemometer, weather charts, hygrometer, paper and pencil/pen

Goal/Objective of the lesson:

Students will gain an understanding of how to forecast and predict the weather in their area for 24 to 48 hours. They will read various instruments used in weather recording and prediction, and understand cloud formations and how they relate to the weather.

Lesson Activities:

Students should have a basic understanding of some weather related concepts such as: fronts, pressure areas, use of meteorological instruments, how clouds are formed and what the 11+ types of clouds are before beginning this lesson. *Familiarizing them with local TV weather reports, newspaper coverage of the weather, and viewing the National Weather Service reports on-line daily will help build this knowledge base.

Have students form small groups. Each day, for two to three weeks, have them use a thermometer, barometer, wind vane, anemometer, and hygrometer to take measurements of the current weather conditions in the area of the school community. Take this information and make a current weather map each day. Using their weather maps and view of the clouds, have each group predict the weather for the next one to two days. Have each group do this for one week and check their accuracy after each two day period. Have them track high and low temperatures for one week. They then can graph the temperatures and figure the average for the week. Rainfall can also be recorded and graphed as well. Information on rainfall can be checked by referencing local newspaper weather report data.

Conclude the lesson by discussing as a class the value in knowing the weather in advance. Record the answers generated for all to view.

(Photocopy, "white-out" key for master)

Name:

FACT SHEET

Weather

As you watch the video, fill in the blanks to make the statements true.

1. _____ is the science of studying and predicting weather.
(Meteorology)
2. Weather stations throughout the world use tools such as: _____,
_____, _____, and _____ to
help them monitor weather conditions. (ships, weather balloons, satellites and
airplanes)
3. Our weather exists because the Earth is covered by a mantle of air, the
_____, which reaches about _____ miles into outer space.
(atmosphere) (600)
4. In _____ pressure areas it is often _____ and might _____ or
_____. (cloudy, rain or snow)
5. In _____ pressure areas the sky is usually _____. (clear)
6. Precipitation refers to everything released by clouds such as _____,
_____, _____, and _____. (rain, sleet, snow and hail)
7. The sun causes water to evaporate and rise into the atmosphere forming
_____. (clouds)
8. Lightening occurs because of _____ charges building in the Cumulus clouds.
(electric)
9. The _____ is the _____ for our weather. (sun, motor)

HOW AND WHY: WEB RESOURCES

www.worldbook.com

<http://earthwater-stencils.com/>

www.nwf.org/schoolyardhabitats/

www.enchantedlearning.com/subjects/astronomy/planets/earth

www.enchantedlearning.com/subjects/astronomy/planets/earth/Continents

www.nationalgeographic.com/xpeditions/atlas/usofam-bwl.gif

www.usgs.gov/themes/maps2.html

www.usgs.gov/themesmaps1.html

www.census.gov/population/www/cen2000/atlas.html

www.earthday.net

<http://earthobservatory.nasa.gov>

<http://pds.jpl.nasa.gov/planets/welcome/earth.htm>

www.exploratorium.edu/faultline/

<http://volcano.und.edu.nodak.edu/vw.html>

www.oink.demon.co.uk/topics/volcano.htm

www.nationalgeographic.com/eye/earthquakes/earthquakes.html

www.nationalgeographic.com/eye/volcanoes/volcanoes.html

www.nationalgeographic.com/ngkids/0106/volcano/volcano_q1.html

www.enchantedlearning.com/subjects/volcano

www.ecokids.ca/dev/eco_info/topics/climate/weather/page4.cfm

www.tornadoproject.com

www.cloudman.com

www.themeter.net/ciclone_e.htm

<http://stardate.org/nightsky/moon>

www.enchantedlearning.com/subjects/astronomy/moon/Map.shtml

http://skyandtelescope.com/mm_images/1115.jpg

www.seds.org/billa/tnp/luna.html

http://aa.usno.navy.mil/data/docs/RS_OneDay.html

<http://nssdc.gsfc.nasa.gov/planetary/planets/moonpage.html>

<http://image.gsfc.nasa.gov/poetry/ask/ymoonm.html>

<http://cass.jsc.nasa.gov/moon.html>

www.oarval.org/MoonMapen.htm

<http://stardate.org/resources/ssguide/moons.html>

www.ncforestry.org/docs/Trees/PartsOfTree

www.freenetwork.org/kids/fun_facts.html

<http://vathena.arc.nasa.gov/curric/land/global/treestel.html>

<http://ncnatural.com/wildflwr/fall/idguide.html>

www.arborday.org

www.stateforesters.org

www.nps.gov

www.smokeybear.com

www.fs.fed.us/
<http://wood.oregonstate.edu/teachers.html#common>
http://wood.oregonstate.edu/forest_products.pdf
www.safenet.org
www.freenetwork.org/kids/comes_from_trees.htm
www.epa.gov/airmarkets/acidrain.index.html
www.enchantedlearning.com/subjects/rainforest/
<http://print.factmonster.com/ipka/A0772968.html>
www.ucmp.berkeley.edu/history/cuvier.html
www.ZoomSchool.com/subjects/dinosaurs
www.dinohunters.com
www.enchantedlearning.com/subjects/dinosaurs
www.nationalgeographic.com/maps/
www.projectexploration.org/jobaria
www.dinoheart.org
www.fmnh.org/sue/default.htm
<http://pubs.usgs.gov/gip/dinosaurs/>
www.newscientist.com/news/news.jsp?id=ns99993298
www.usatoday.com/news/nation/2003-01-22-dino-usat_x.htm
www.washingtonpost.com/wp-dyn/articles/A30096-2003Jan22.html
www.msnbc.com/news/862757.asp?vts=012220031345
<http://stardate.org/resources/ssguide>
www.hq.nasa.gov/office/pao/History/timeline.html
www.historychannel.com/exhibits/moonshots/timeline.html
www.jsc.nasa.gov/
www.nationalgeographic.com/mars/mapmachine/index.html
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** Visit this interesting Encarta sponsored site at <http://encarta.msn.com/quiz> for online quick "Quizzes" on various topics including:

- Do You Know Dinos?
- Eye of the Storm - A Hurricane Quiz
- Space: How Out of It Are You
- Name that Star

MediaPro Career Corner

A NOTE TO THE TEACHER/FACILITATOR...

While the "How and Why" video episodes focus on a variety of topics, they also feature both men and women performing occupations related to the world of science. Students are able to view adults actively working in real life settings utilizing skills in science, math, language arts, and history.

As an extension of the *How and Why* curriculum we have offered the teacher/facilitator the availability of our *Career Corner* section to use with their students. Here students can explore career clusters that are grouped by common characteristics. They can further discover their own interests by accessing the ICPAC web site at <http://icpac.indiana.edu>. Here by completing the *Career Interest Checklist*, students can research the groups of careers that incorporate the same interests and skills they share. Career profiles are also available. These profiles include information on salary, work environment, skills needed, required educational training, as well as other aspects of the careers.

The career clusters include fourteen different and varied headings:

1. Agriculture and Natural Resources
2. Art, Media, and Communications
3. Engineering, Science, and Technologies
4. Manufacturing and Processing
5. Mechanical Repair and Precision Crafts
6. Business, Management, and Finance
7. Building and Construction
8. Educational Services
9. Health Services
10. Personal and Commercial Services
11. Legal, Social, and Recreational Services
12. Protective Services
13. Marketing, Sales, and Promotion
14. Transportation

* View other career programs available through MediaPro at www.mediakids.com or by calling us at 1-888-661-8104.

MediaPro Career Corner

The ultimate primary, upper elementary and middle school career awareness and exploration handbook!

MEDIAPRO CAREER CORNER - The ultimate in career exploration! You may go to the ICPAC Website <http://icpac.indiana.edu/> or you may go directly to the expanded career clusters at

<http://icpac.indiana.edu/careers/clusters/index.xml>

For each related occupation in a cluster, the information presented includes: *WORKER CHARACTERISTICS, PHYSICAL DEMANDS, WORK SETTING, WAGES, OUTLOOK, PREPARATION, LICENSING, RELATED OCCUPATIONS, MILITARY SPECIALTIES, AND EDUCATION/TRAINING.*

| | | | | | |
|---------------------------|------------------------|----------------------|--------------------|--------------|-------------|
| Worker Characteristics | Physical Demands | Work Setting | Wages | Outlook | Preparation |
| Licensing | Related Occupations | Military Specialties | Education/Training | Job Openings | |

Additionally, you may print the career profile for a hard copy.

EXPANDED CAREER CLUSTERS

➤ 01- Agriculture and Natural Resources

Agricultural occupations include farm workers, veterinarians, retail sales and service workers, food processing engineers and marketers, and timber harvesters.

Many job openings are expected in the area of agricultural services and supplies with some opportunities in the food processing and timber harvesting industries. Even greater opportunities may exist in swine and feeds management.

One third of the industry's full-time employees work 50 hours or more per week. Many jobs are outdoors, both in rural and suburban settings.

The amount of training and skills needed differ widely by occupation. Most entry-level jobs such as farm laborer, lawn service worker, and nursery worker require little or no previous training. For professional, managerial, sales, or supervisory jobs such as veterinarian, grounds manager, or agricultural sales and service, postsecondary training and some licensing are usually required.

➤ 02 - Art, Media, and Communications

This career pathway includes a wide variety of occupations such as practicing artists in the visual and performing arts, designers, people who work in broadcasting, and the information collection work of librarians.

Visual artists include people who draw, paint, or work with ceramics or sculpture. They often apply their skills in the printing, advertising, or design industry. Performance artists, such as dancers and musicians, look for opportunities in theater or the music industry.

Keen competition exists in the art, media, and communication occupations. It is usually difficult to find regular, full-time employment as a practicing artist. Many artists find teaching a good way to support their creative activities.

➤ 03 - Engineering, Science, and Technologies

Manufacturing and service companies rely on engineers and technicians to improve product design and efficiency. Civil engineers and other technical specialists help to improve roads, bridges, water and pollution control systems as well as other public facilities.

The engineering, science, and technologies pathway includes computer programmers, systems analysts and other computer related occupations.

Engineering technicians are in high demand in the nation's communications, manufacturing, chemical processing, and pharmaceutical industries.

Firms may provide on-site, job-related training to upgrade the skills of technicians and engineers.

Growing opportunities may be found in water quality and wastewater treatment occupations.

➤ 04 - Manufacturing and Processing

Most manufacturing plants in the plastics and metalworking industries in the nation employ fabricators, welders, and machine operators, setters, and tenders. Companies also employ many business managers, engineers, drafters, engineering technicians, and computer programmers.

This career area also includes a number of technical jobs in the printing and publications industry such as press operators and precision photographic processors. Workers entering manufacturing and processing occupations have a variety of educational backgrounds but in general must have strong mathematical and communication skills.

➤ 05 - Mechanical Repair and Precision Crafts

Workers in mechanical repair and precision crafts install, service, and repair machines and engines as well as the computers that monitor and control them. They may work on industrial machinery, diesel engines, automobiles, aircraft or marine equipment.

In the nation's motor vehicle and equipment manufacturing industry, 2 out of 10 workers are employed in precision crafts and mechanical repair.

Apprenticeships programs prepare workers for careers in this industry. These programs may last up to 5 years and include courses in mechanical drawing, reading specifications, tool design and programming, hydraulics, and electronics. Courses in mathematics such as algebra and trigonometry may also be necessary.

Continuing education and training are critical for advancement in the field. This training often combines classroom study and on-the-job instruction under the guidance of more experienced workers.

Successful workers in this career area possess highly developed technical and problem solving skills. They also need to work well with others on team projects.

➤ 06 - Business, Management, and Finance

Business, Management, and Finance Business, management, and finance occupations include office workers of many types. Middle managers, insurance agents, real estate brokers, financial planners, accountants, small business owners, executive secretaries, and clerical workers dominate the new "office economy".

People employed in finance manage the budgets, accounts, and assets of both businesses and individuals. All managerial and nearly one-half of all supervisory occupations are involved in the coordinating the day-to-day activities of industries that produce goods and services.

The outlook for employment in business occupations in the nation continues to be strong. Academic training, the ability to work well on a team, and a continual updating of skills are key factors in succeeding in this area. The ability to use and manage technology is becoming an increasingly important skill as well.

➤ 07 - Building and Construction

The construction industry is divided into three major segments: general building construction, heavy construction, and special trade contracting. General construction workers build residential and commercial structures. Workers employed by heavy construction contractor's work on highways, bridges, and tunnels. Special trade contractors are responsible for carpentry, painting, plumbing, and electrical work. Almost 6 out of 10 jobs in the nation were with special trade contractors - mainly in plumbing, electrical, and masonry contracting. Many workers enter the construction trade without formal training. Skilled workers such as carpenters, bricklayers, and plumbers need several years of on-the-job or apprenticeship training. Workers who continue to update their skills and knowledge through continuing education may advance to supervisory positions more quickly. In general, construction businesses tend to be small, usually under 10 workers. They are mostly located in industrialized and highly populated areas. Construction workers need the physical stamina to work outside or in partially enclosed structures in all types of weather. They may work long hours, often over 40 hours a week, to complete projects.

residential care facilities, job training centers, community food banks and kitchens, and non-profit organizations such as the American Red Cross.

Many employers prefer social service workers with some college work in human services or social work. Others may be looking for workers with a 4-year college degree. More specialized occupations may require master's degrees and/or other professional certification.

➤ 12 - Protective Services

Protective services occupations include law enforcement officers, firefighters, park rangers, fish and game wardens, and security guards.

Law enforcement officers are expected to understand and follow the law. They study constitutional law, civil rights, state and local laws, and accident investigation techniques.

Most protective services workers are employees of either local, state, or the federal government.

There is a rising demand for law enforcement officers and firefighters across the nation. Most positions will be in smaller communities with expanding populations.

Firefighters must have a high school education as well as pass rigorous tests of physical stamina. Experience as a volunteer firefighter or training in firefighting techniques in the military, along with completion of technical college courses in fire science, improve an applicant's chances for appointment.

➤ 13 - Marketing, Sales, and Promotion

Marketing and promotions firms prepare advertising for other companies and organizations. They may place advertising in print, broadcast, and other media. These firms may also sell space for publications, radio, and television. Managers and executives, professionals, sales workers, and administrative support workers account for 9 out of every 10 jobs in this career cluster. Marketing and advertising jobs are expected to grow. Most positions are located in larger cities where competition for the best jobs is intense. Sales representatives, wholesale and retail buyers and food marketing positions should be among those jobs in most demand in the nation.

➤ 14 - Transportation

The transportation industry involves the movement of goods and people over land, sea, or through the air. Workers in the trucking industry are employed as drivers, dispatchers, and transportation managers or supervisors.

The courier service industry, which delivers letters, parcels and small packages, is growing as businesses and individuals use "just-in-time" shipping more frequently.

Opportunities in the trucking and warehousing industry are expected to be good for qualified drivers and mechanics.

Drivers involved in long distance delivery are usually well paid but they often work long hours and spend long periods away from home.

HOLLAND CODE ADDENDUM

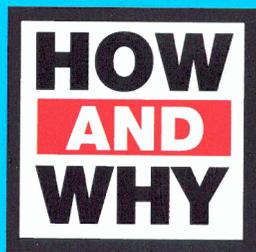
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Discovering careers that fit you!

Help students place their interests into groups.

<http://icpac.indiana.edu/careers/inventories/Interest-Checklist.xml>

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- Volume 2: VOLCANOES TRT: 18:17
- Volume 3: WEATHER TRT: 17:40
- Volume 4: THE MOON AND THE UNIVERSE TRT: 19:52
- Volume 5: TREES TRT: 15:58
- Volume 6: DINOSAURS TRT: 16:06
- Volume 7: PLANETS AND SPACE TRAVEL TRT: 17:35
- Volume 8: AVIATION TRT: 20:04
- Volume 9: AUTOMOBILES TRT: 19:22
- Volume 10: COMPUTERS AND ROBOTS TRT: 14:07



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Facilitator's Guide
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