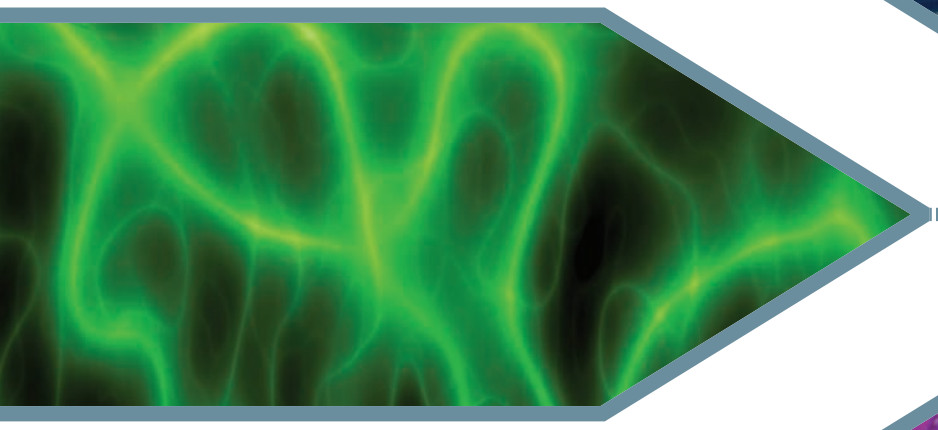
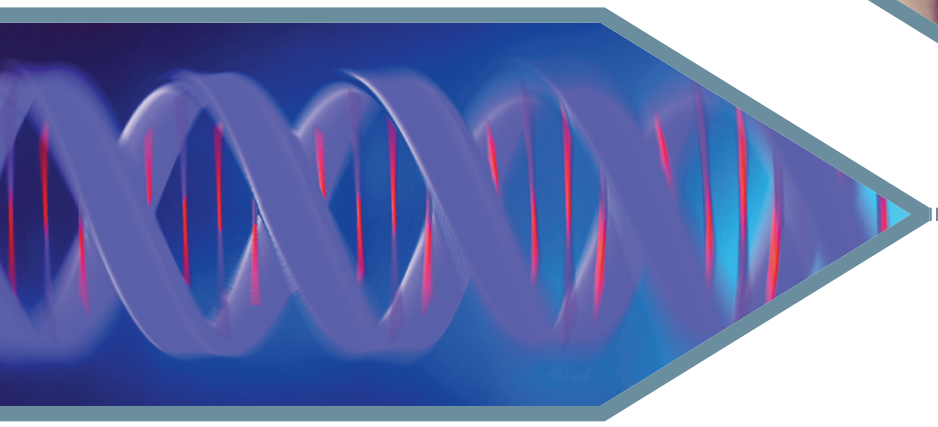
Centered on SCIENCE

Earth Sciences



Physical Sciences

Investigation & Experimentation



Life Sciences

Los Angeles Times
IN EDUCATION

Centered on SCIENCE

Developed by
Los Angeles Times in Education

Written by
Judith Martin,
Los Angeles Unified School District

Edited by
Vienna Flores,
Los Angeles Times in Education

Los Angeles Times
IN EDUCATION

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Centered on SCIENCE Table of Contents

Centered on SCIENCE Introduction to the Teacher

Centered on Science is designed to help students make everyday connection with science concepts. The newspaper-based lessons and activities are intended for grades 3-8, and support the California state curriculum standards for science.

The lessons are organized into six sections. Centering on Science in The Times provides a few introductory lessons that will familiarize your students with the organization and content of the Los Angeles Times, while helping students to focus on science in everyday life.

The next sections reinforce the science standards with an emphasis on Physical Sciences, Life Sciences, Earth Sciences and Investigation and Experimentation. Finally, there is a lesson on careers in science and a teacher resource section.

With these lessons, The Times will help your students see and apply science everywhere. Most of the lessons can be used with any daily section of The Times and work equally well with the Los Angeles Times print edition, and The Times daily eEdition, a digital replica of the printed paper. The lessons can be used in any order and can be easily adapted to the individual needs and skill levels of your students.

Some parts of The Times will apply more directly than other. All are filled with data, maps, graphs, charts, and the latest developments in science and technology as they relate to world and local news, sports, weather, the environment, health and many other topics.

We hope you find these resources useful in your classroom and we encourage you to let us know your thoughts and suggestions about integrating the newspaper into your science curriculum. Please take a few moments to share your comments about this or other Times in Education programs:

ONLINE – nieonline.com/latimes
FAX – (213) 237-5916
PHONE – (213) 237-4930
MAIL – Los Angeles Times in Education
201 West First Street, 6th Floor
Los Angeles, CA 90012

SCIENCE CAPSULE

OBJECTIVE:

Students will use the newspaper to identify scientific issues and applications of various areas of science in everyday life.

MATERIALS:

Classroom set of The Times or The Times eEdition, Science Capsule worksheet.

PROCEDURES:

1. Distribute copies of The Times, or direct students to log on to The Times eEdition. Introduce students to the various sections and content of the newspaper.
2. Have students skim the newspaper and scan news headlines and features to identify issues related to science and examples of science at work. There is science in virtually every section of The Times and the weather page that appears daily.
3. Direct students to select one news article or feature to include in a "Science Capsule," using the accompanying worksheet. Students should read the article and complete the worksheet.
4. Lead students in a discussion of their findings and ask them to predict how these particular science ideas or issues may change a year from now, ten years from now, or one hundred years in the future.
5. Repeat this activity on different days, for a period of time, allowing students to collect a number of different examples for their "Science Capsule."

EXTENSION:

Have students conduct research on scientific discoveries or issues of the past and write a news story that could have appeared in a newspaper of that time. Include maps, graphs, or charts to present data related to the story.

SCIENCE CAPSULE WORKSHEET

NAME: **DATE:**

DIRECTIONS: Skim various sections of The Times to identify three issues related to science "at work" today. Record your findings below. Select one of the examples you found and read the story or feature. Then answer the questions below.

	HEADLINE	SECTION	PG. #
1.			
2.			
3.			

What kind of science is discussed in the article? (Life science, physical science, earth science, etc.)

What possible problems does this science issue address?

What solutions have been found or are being researched?

Make a prediction about this scientific issue:

In one year:

In ten years:

In 100 years:

SCIENCE SEARCH

OBJECTIVE:

Students will identify scientific terms and science connections with everyday life in The Times.

MATERIALS:

Classroom set of The Times or The Times eEdition, Science Search worksheet.

PROCEDURES:

1. Preview today's newspaper for scientific terms or examples of science connections with everyday life. Select one example to demonstrate to students how science connects with their lives every day.
2. Distribute copies of The Times, or direct students to log on to The Times eEdition. Distribute worksheets to teams or small groups of students.
3. Assign students a time limit to locate examples of science connections listed on the worksheet. Younger students can cut and paste items on the worksheet. If using the eEdition, students will need to print items and then cut them out.
4. Following their search through the newspaper, ask students to report on their findings.
5. Ask students to classify their findings into categories — physical science, life science, or earth science.

EXTENSION:

Have students select one item for more investigation. Collect more data from the newspaper and other sources for a possible research project or experiment.

Make your own Science Search using The Times for a specific science unit for your class.

Have your students keep a "science log" identifying scientific terms, concepts, or issues. Categories might include nutrition, energy, the environment, weather, health, astronomy, etc.

SCIENCE SEARCH WORKSHEET

NAME: **DATE:**

DIRECTIONS: Look through the various sections of The Times to find the following science items or terms, which demonstrate science connections in your daily life and will help you to get Centered on Science.

ITEM	SECTION	PG. #
A form of **energy.** Identify what kind of energy:		
A **structure.** Describe it:		
A **natural resource.** What is the resource? Is it renewable?		
A chart showing **air quality.** Describe the air quality yesterday:		
Data for a **scientific experiment.** Describe the experiment:		
A **health issue** and possible solutions:		
An example of **velocity.** Describe the object and source of its speed:		
A **transportation method.** Describe the vehicle and its fuel:		
An example of **light.** Describe the source of light:		
A **living organism.** Describe it:		
An **adaptation.** Describe it:		
A **solid,** a **liquid** and a **gas:**		
A **biome** (tundra, desert, ocean, forest, grassland, wetlands, etc.). Describe it:		

STRUCTURES IN THE ENVIRONMENT

OBJECTIVE:

Students will find different kinds of structures in The Times and evaluate their effectiveness in location, climate, area and space.

MATERIALS:

Classroom set of The Times or The Times eEdition, Structures in the Environment worksheet.

PROCEDURES:

1. Explain how a structure is appropriate for weather conditions, geological areas, and specific uses for living things.
2. Demonstrate with a photograph or picture from today's newspaper.
3. Ask students to explain how this structure is well-suited to the place where it is located. Have students consider potential problems or concerns with the structure including climate, natural disasters, area and space available, and specific requirements of the structure.
4. Discuss possible solutions or improvements to address these concerns.
5. Ask students to identify different kinds of structures (examples: buildings, housing, bridges, freeways, roads, dams, etc.).
6. Distribute copies of The Times, or direct students to log on to The Times eEdition. Have students look through the newspaper to locate examples of different structures found in photographs, illustrations, or written descriptions. Students will complete the attached worksheet by explaining how well-suited a structure is for its location, considering the effects of climate, natural disasters, area and space, ad specific requirements.
7. Ask students to share their observations and findings with the class.

EXTENSION:

Have students suggest an adaptation to the structure as a solution to or prevention of an identified problem. Students may write a description and draw a picture of their recommended changes or adjustments to the structure.

Have students identify different structures in their neighborhood, at home or at school, and investigate potential concerns about the environment surrounding the structure. Research possible adaptations to improve the structure or the surrounding environment.

STRUCTURES IN THE ENVIRONMENT WORKSHEET

NAME: **DATE:**

DIRECTIONS: Look through the The Times to find an example of a structure. Consider buildings, housing, bridges, freeways, roads, dams or towers. Cut out and attach your example (a photograph, illustration, or written description) in the space below. If using the eEdition, you will need to print your item and then cut it out. Explain how well-suited the structure is to its location, considering the effects of climate, natural disasters, area and space, and specific requirements.

Write a paragraph about the structure. How does it "fit" its locations? What are potential problems involving climate, natural disasters, or available area and space? How can the structure or its environment be improved to correct or avoid these potential problems?

SOURCES OF ENERGY

OBJECTIVE:

Students will be introduced to different forms of energy and will identify various uses for these sources of energy in the newspaper and in their homes.

MATERIALS:

Classroom set of The Times or The Times eEdition, Energy Sources page from the Resource section of this guide, Sources of Energy worksheet.

PROCEDURES:

1. Discuss with students various sources of energy and how sources of stored energy take various forms such as food, fuel and batteries.
2. Have students give examples of energy sources they are already familiar with at home, at school and in the community. Share with students different kinds of energy, such as those included on the Energy Sources resource page in this guide.
3. Distribute newspapers or direct students to log on to The Times eEdition. Direct students to find examples of the energy sources discussed in class.
4. Ask students to identify which of these energy examples are more likely to be used in homes.
5. Using the worksheet, have students scan The Times to find examples of energy used in their homes and items that require this energy.

EXTENSION:

Students can conduct an energy survey of their homes, listing various items at home that require energy and identifying which energy source is used for each. Remind students to think large and small, including everything from calculators with solar batteries to transportation vehicles, heating sources, air conditioners, major appliances, kitchen gadgets, garden equipment, and outdoor lighting.

Similar surveys can be made for the school and the community. Students can research alternative forms of energy which are being used in their community. Students can investigate costs, waste, pollution, efficiency, and alternatives for various energy sources.

Food is an energy source for our bodies, and physical exertion expends energy. Students can keep an "energy log" to record various energy sources and expenditures and to evaluate the "efficiency" of different fuels.

SOURCES OF ENERGY WORKSHEET

NAME: **DATE:**

DIRECTIONS: Use The Times to find examples of energy sources used at home and items that require the various kinds of energy. Examples can be large or small. After you have found several examples, identify the kind of fuel each item requires.

HEADLINE	SECTION / PG. #	ENERGY SOURCE

ADAPTING OUR ENVIRONMENT

OBJECTIVE:

Students will use news articles from The Times to understand changes in physical structure or action, noting that these changes may be beneficial, detrimental, or neutral.

MATERIALS:

Classroom set of The Times or The Times eEdition, Adapting Our Environment worksheet.

PROCEDURES:

1. Preview The Times and select an article or feature that reports an adjustment to make a situation safer for people or animals, such as installation of a guard rail at a train crossing to prevent accidents, or testing and adjustment of passenger airbags in a car to accommodate children.
2. Distribute newspapers, or direct students to log on to The Times eEdition. Distribute worksheets.
3. Direct students to read through the newspaper and find a news story about a recent change to a physical structure or in a person's action for the purpose of survival or safety.
4. Have students identify the problem that created the need for change, the process toward the change, and the outcomes or results.
5. Have students identify a safety issue at school, at home, or in their neighborhood. They should investigate causes and evaluate possible adjustments or changes in action to increase safety.
6. Have students use their worksheets to complete their investigations.

EXTENSION:

Have students make a poster promoting a change in structure or action they recommend to make a safer environment.

Have students write a letter to a local school or city official about their findings and recommendations. Students may also invite officials to the class to make presentations or write letters to the editor about the needed changes they have researched.

Have students write letters of appreciation to those responsible for identifying and bringing about a positive change in the community for a safer environment.

ADAPTING OUR ENVIRONMENT WORKSHEET

NAME: **DATE:**

DIRECTIONS: Read through The Times to find a news story about a recent change to a physical structure or in a person's behavior for the purpose of survival or safety. Identify the problem or situation that needs to change, the process towards change, and the results or outcomes.

ITEM: SECTION: PG. #:

Describe the unsafe situation or behavior that needed adapting:

Outline the process for making this change:

What was the expected outcome?

What additional information is needed to evaluate the results?

Were the results beneficial, harmful, or neutral?

List potential situations at home, at school, or in your neighborhood that you consider harmful:

Select one unsafe situation and investigate it using the scientific method:

BIOMES — DIVERSITY IN LIFE

OBJECTIVE:

Students will identify diverse life forms in different environments using examples found in The Times, then list and classify the biomes with characteristics of each.

MATERIALS:

Classroom set of The Times or The Times eEdition, poster board, scissor and glue.

PROCEDURES:

1. Explain to students that the different environments that support diverse life forms on earth are know as "biomes." These environments include oceans, deserts, tundra, forest, grasslands, and wetlands. Discuss characteristics of each.
2. Group students into teams. Distribute newspapers, or direct students to log on to The Times eEdition. Distribute poster supplies to each team.
3. Direct students to find examples of one or more biomes in The Times, and create a collage illustrating their findings. If using The Times eEdition, students will need to print items for their collages and then cut them out. Have students include examples or descriptions of various life forms in each environment. Examples may be found in pictures, advertisements, comics, headlines, weather data and travel items.
4. Have students share their collages with the class. Discuss the concept of biodiversity and its importance.

EXTENSION:

Using a map of California, the United States, or North America, have students locate different biomes and find news and other items in the newspaper that relate to these locations. Discuss how various environments affect the content or subject of the news items from that area.

Have students identify biotic and abiotic components of various biomes. Data on the weather page may be helpful.

Using material from The Times, create a different habitat on you school grounds. Gardening articles and ads may be useful. Various animals and plants can be introduced.

Have students write "real estate" ads describing homes wanted by animals and plants existing in specific neighborhoods or habitats.

A BALANCED PLATE

OBJECTIVE:

Students will complete the different sections of the food guide plate with words and pictures of appropriate food items they find in The Times, then use those items to plan a balanced diet for a day.

MATERIALS:

Classroom set of The Times or The Times eEdition, attached A Balanced Plate worksheet, scissors and glue.

PROCEDURES:

1. Ask students what they had for breakfast or lunch. Ask if they had a "balanced meal." Ask for suggestions from the class about what constitutes a balanced meal.
2. Draw a plate on the board like the one shown. Explain that the plate can help show the varieties and quantities of different foods we need each day as a source of energy for our bodies. We need more of the foods in the larger sections of the plate, and less of each food type in the smaller sections. With prompting as needed, have the class help you fill in the food groups and quantities of foods that make up the plate.
3. Look through The Times or turn to the food ads found in the newspaper. Point to pictures of different food items and have students tell you which category of the plate they belong in. Repeat several times.
4. Distribute newspapers, or direct students to log on to The Times eEdition. Distribute worksheets and supplies. Have students complete their worksheets by looking through the newspaper and finding pictures or words of the right food items for each section of the food plate, then pasting their items in the appropriate spaces of the plate. If using the eEdition, students will need to print items and then cut them out.

EXTENSION:

Students can plan a balanced diet for a day (three balanced meals using pictures of food items from the newspaper). The meals do not have to be appetizing, but students should try to use the right portion of each type of food as shown on the plate.

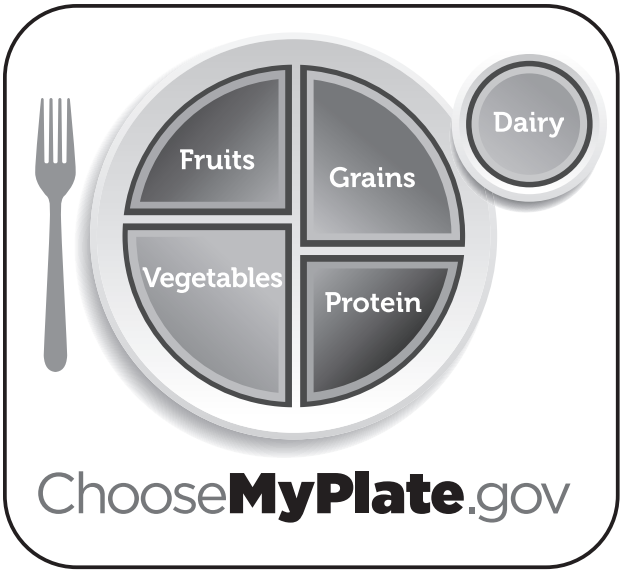
Using the food plate as a guide, have students create a "Kids' Health Column" for a newspaper. Students can review school menus and their nutritional value. Students can write a "food advice" question and answer column for kids or teens.

Have students collect school menus and inventory other food items available to students on the school campus. Have students evaluate the nutritional value of these food items, identify gaps in the food plate and recommend changes or additions to the selection of items for more healthy or balanced choices.

Have students select a comic character and create a strip or poster with suggestions for improving nutrition or health.

NOTE TO TEACHERS:

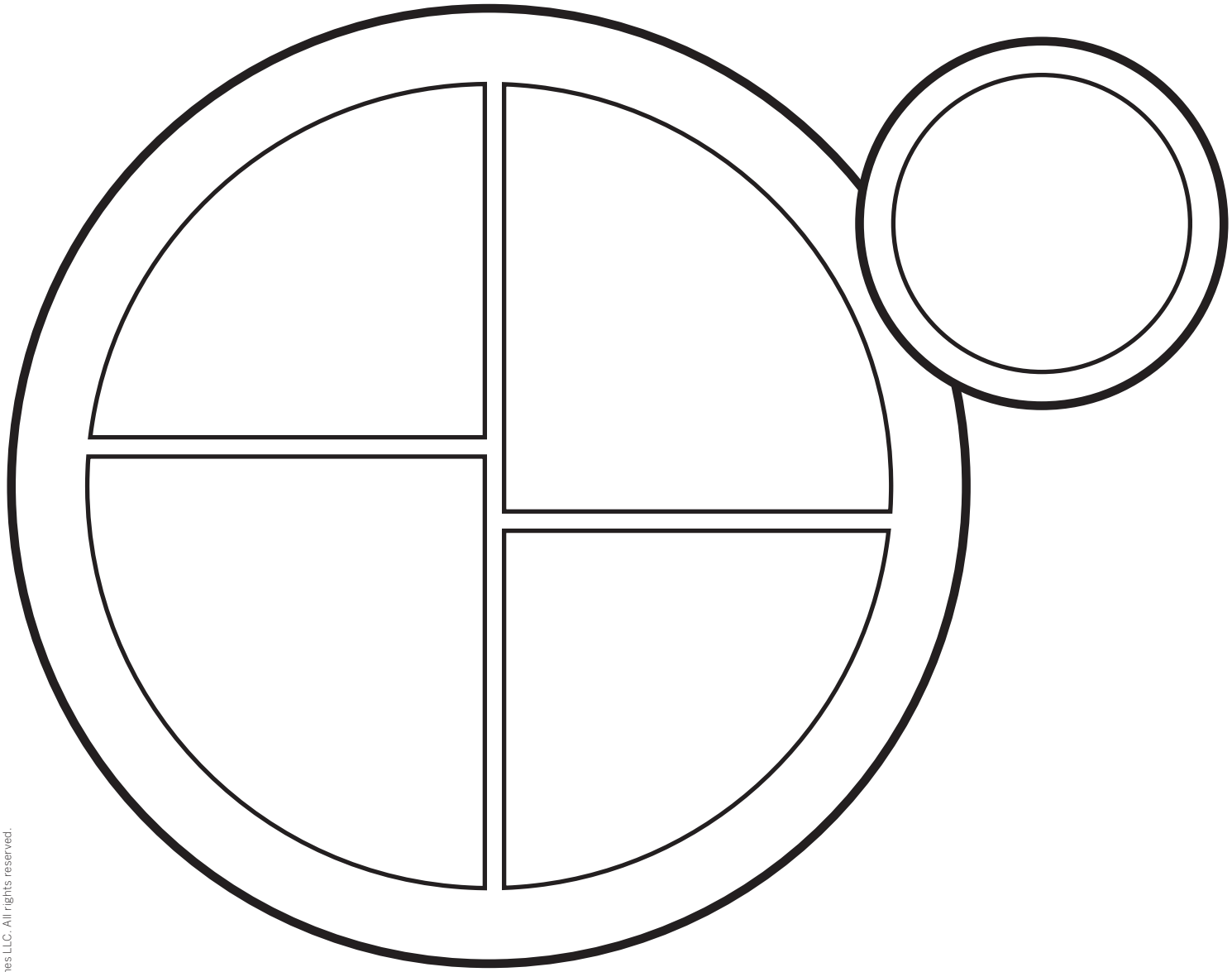
Go to **choosemyplate.gov** for additional resources and to help students personalize meal plans.



A BALANCED PLATE WORKSHEET

NAME: **DATE:**

DIRECTIONS: Look through The Times to find examples of foods in each part of the plate. Find examples to represent the suggested food group for each section. Then paste your examples on the plate below. If using The Times eEdition, you will need to print items and then cut them out.



RECOGNIZING CAUSE AND EFFECT

OBJECTIVE:

Students will select an environmental issue reported on in The Times to demonstrate cause and effect relationships.

MATERIALS:

Classroom set of The Times or The Times eEdition, attached Recognizing Cause and Effect worksheet.

PROCEDURES:

1. Discuss with the class how every day we choose what we will do or not do. Each choice is an action (cause) that brings about another action or event (effect). Each effect may cause other effects, making a chain if events. There may be both short-term and long-term effects. For example, if you decide to study before a test you might do well on the test (short-term), earn a good grade in the class (medium-term), and be promoted to the next grade level (long-term). Ask students to think of other examples.
2. Relate the discussion and the examples to the environment. Look for similar cause and effect relationships. Discuss the effects of a single action related to the environment. For example, if you dispose of used motor oil in the storm drain, this might cause effect 1, which might then lead to effects 2 and 3, etc.
3. Distribute copies of The Times or direct students to log on to The Time eEdition. Ask students to look for and read an article about the environment that contains cause and effect relationships.
4. Have students complete their worksheets using the articles they have found.
5. Ask students to share their findings with the class.

EXTENSION:

Select one or two issues addressed in articles identified by the class. Have students debate the issues using cause and effect arguments.

Have students predict or recommend changes in behavior that they, fellow students, or members of the community can make to improve the environment.

Have students write editorials about the issues they have identified and the pros and cons of possible solutions.

RECOGNIZING CAUSE AND EFFECT WORKSHEET

NAME: **DATE:**

DIRECTIONS: Select an article from The Times about an environmental issue and use that article to illustrate cause and effect. Complete the following items:

HEADLINE:

BYLINE: DATE: SECTION: PG. #:

What problem is discussed in the article?

Identify possible causes. What are some short-term and long-term effects?

What solution is suggested? Describe short- and long-term solutions:

Who is quoted in the article? What is his or her opinion?

What changes in individual behavior might improve the situation?

What actions by government might improve the situation?

Where might you find additional information that might help you to recommend a solution to the problem?

Who might be affected by this problem or possible solutions? How?

THE BIG BLUE PLANET

OBJECTIVE:

Students will find examples of the water cycle and its effect on life on Earth.

MATERIALS:

Classroom set of The Times or The Times eEdition, paper and folders for a clip file, scissors and glue.

PROCEDURES:

1. Ask students to examine a globe or a world map. Explain that about three-fourths of the Earth's surface is covered by water. The continuous natural process by which evaporation from bodies of water collects in the atmosphere as water vapor, condenses in clouds, falls to earth as precipitation and then evaporates again is called the "water cycle," and it affects all life on the planet.
2. Distribute copies of The Times, or direct students to log on to The Times eEdition. Have students scan the newspaper for several days.
3. Direct students to find and clip as many articles, feature stories, and editorials related to the water cycle as they can. These items can include weather reports and articles about the weather, the ocean, lakes, rivers, flood control and storm drains, runoff and erosion, acid rain, etc. If using the eEdition, students will need to print items and then clip them.
4. Discuss with the class how each of these stories demonstrates a point in the water cycle. Create a water cycle diagram on the board and ask students to place each news item in the appropriate place on the diagram.
5. Ask students to note various points in the water cycle where these situations might be influenced by humans.

EXTENSION:

Ask students to imagine what our future planet would be like if water sources are not protected or if the water cycle is interrupted or altered. Where would we find water to drink? How would crops grow? How would animal habitats be affected? Compare and contrast and examine cause and effect. Ask students to write a short story about a day in such an environment.

PREDICTING THE WEATHER

OBJECTIVE:

Students will collect weather data from The Times, predict weather patterns, and graph weather information for a determined period of time.

MATERIALS:

Classroom set of The Times or The Times eEdition, attached Predicting the Weather worksheet, scissors and glue, graph paper.

PROCEDURES:

1. Ask students what they think the weather will be like today. On what data did they base their "forecasts?"
2. Distribute newspapers, or direct students to log on to The Times eEdition. Ask students to turn to the Weather page. Demonstrate how to locate and interpret information on the weather map of the United States. Identify weather reports and forecasts.
3. Explain the symbols on the map for cold and warm fronts, high and low pressure areas and the jet stream. Explain the difference between a weather "report" and a weather "forecast." Give students an opportunity to practice and master these items before moving in. Ask the class questions about the data and have students point to where they find the answer. Help students who are having problems.
4. Distribute worksheets. Direct students to record data and cut out the weather map. If using the eEdition, students will need to print the Weather page and then cut out the map.
5. The next day, have students collect the same kind of data and compare it to the previously collected data. Then ask students to make a weather prediction for the third day.
6. On the third day, have students compare their prediction to the weather reported on the Weather page in The Times.
7. Continue to collect and record data for a specified period of time. Students can graph their predictions and subsequent reports.
8. Have students write a paragraph discussing any differences between their predictions and the weather reports they observed and suggesting ways in which their forecasts could be improved.

EXTENSION:

A similar project can be done using the high and low tide data reported in The Times. Students can record data on a graph with the X axis as time of day and the Y axis as height of the tide. After a period of time, ask students to identify patterns in the graphs and predict when the next high and low tides will occur. Students can check their predictions by looking at the following day's tide report in The Times.

PREDICTING THE WEATHER WORKSHEET

NAME: **DATE:**

DIRECTIONS: On day 1, turn to the Weather page in The Times. Cut out the weather map and paste it to this worksheet. If using The Times eEdition, you will need to print the map and then cut it out. Then date the map and complete the chart below.

On Day 2, copy the chart on a separate sheet of paper, cut out and paste the weather map for a different day, and complete the chart again. At the bottom of the page, make a weather prediction for the following day.

On Day 3, repeat the steps for Day 2. Then check your weather prediction against the weather reported in The Times.

On a sheet of graph paper, begin to graph the weather data and your predictions. Continue to graph the weather over a period of time.

DATE	HIGH TEMP.	LOW TEMP.	PRECIPITATION
YOUR CITY			
SAN FRANCISCO			
SALT LAKE CITY			
CHICAGO			
NEW YORK			
ATLANTA			
HOUSTON			

POLLUTION SOLUTIONS

OBJECTIVE:

Students will understand the relationship between weather and pollution. Students will graph the high temperature vs. the amount of pollution, looking for a pattern. Students can then make predictions about the amount of pollution expected for the next day.

MATERIALS:

Classroom set of The Times or The Times eEdition, graph paper.

PROCEDURES:

1. Have students review graphs of different pollution levels recorded, such as NO2 or ozone, found in the Weather page in The Times.
2. Looking at the highest point on the graph, ask students to estimate the amount of pollution. Students should then note the high temperature for the geographic area where the pollution level was recorded.
3. Direct students to graph the high temperature on the X axis of their graphs and the pollution levels on the Y axis of their graphs for each selected area.
4. Ask students to look for a pattern or relationship between the temperature and the amount of pollution.
5. If a relationship exists, then ask students to predict tomorrow's pollution levels.
6. The next day, have students compare their predictions with the pollution levels reported in The Times and evaluate the accuracy.

EXTENSION:

Students can compare the pollution graphs in The Times with the temperature at their school. First, have students record the temperature at school on an hourly basis, such as every hour between 7:00 a.m. and 4:00 p.m. The next day, have students collect pollution data for their area form The Times. Compare temperature and pollution to see if there is a correlation. Have students describe their findings in paragraph form.

INVESTIGATIVE REPORTER

OBJECTIVE:

Students will use the scientific method to identify and investigate a local problem reported in The Times, then conduct additional research in order to reach a conclusion and make recommendations based on their findings.

MATERIALS:

Classroom set of The Times or The Times eEdition, attached Investigative Reporter worksheet.

PROCEDURES:

1. Distribute newspapers, or direct students to log on to The Times eEdition. Review with the class an in-depth news article you have pre-selected from the newspaper.
2. Ask students to explain, based on the information in the article, what steps the writer may have taken to complete the story.
3. Explain to the class the following process about news reporting and analysis: Investigative reporting or in-depth news analysis begins when a staff writer or editor believes that there is more to a story than the facts already known. The writer begins to ask questions and collect information. The writer develops a hypothesis about the issue or situation. More information is collected, organized, and verified. The data is analyzed, re-evaluated, and confirmed. Then the results are ready to be reported in the newspaper.
4. Assign students to "investigative teams" for a group research project. Just as news writers have deadlines, establish a timetable or deadline for their project.
5. Review the scientific method with the class, using the accompanying worksheet.
6. Review the teams' project plans, then monitor students' progress.
7. Assist students by providing newspapers and suggesting additional resources.
8. Have student teams report their findings to the class.

INVESTIGATIVE REPORTER WORKSHEET

ASSIGNMENT: As an "investigative team," use a method similar to that of a Times investigative reporter to produce a research report. Identify an issue or situation reported in The Times. Follow the scientific method to question, collect information, develop a hypothesis, design and conduct an "experiment," and draw conclusions.

INVESTIGATIVE TEAM NAME: _____

TEAM MEMBERS: _____ _____

_____ _____

DEADLINE: _____

ISSUE OR SITUATION:

HEADLINE: _____ DATE: _____ SECTION: _____ PG.#: _____

BRIEF DESCRIPTION: _____

_____

QUESTIONS WE HAVE:

1. _____

2. _____

3. _____

INVESTIGATIVE REPORTER WORKSHEET *(continued)*

THE MAIN PROBLEM: After thinking about the situation and the questions we have, we think the main problem is:

Smaller problems might be (list in order of importance):

SOURCES: List different ways you could find information about this problem. Identify at least three different sources.

1.

2.

3.

CHECK THE FACTS: For each item of information you gather, consider if it is true or not. If you think it might not be true, explain what questions or doubts you have. Explain how you can check to see if it is a fact.

Item 1:	Item 2:	Item 3:
Questions or doubts:	Questions or doubts:	Questions or doubts:
Verify or confirm by:	Verify or confirm by:	Verify or confirm by:

INVESTIGATIVE REPORTER WORKSHEET *(continued)*

ORGANIZE YOUR INFORMATION: Divide your information into three groups depending on how important it is for solving or explaining the problem.

Most important:

Medium importance:

Least important:

MAKE OBSERVATIONS:

What observations have you made about this situation?

What conclusions can you draw from these observations?

How can you test one of your conclusions?

INVESTIGATIVE REPORTER WORKSHEET *(continued)*

HYPOTHESIS: Use one of the following three ways to write your hypothesis:

1. Cause – Effect (one thing causes something else to occur)
2. If – Then (if one thing happens, then the other thing will happen too)
3. Correlation (two events are related)

State your hypothesis below:

COLLECT DATA: On additional pages, record data you gather by measuring, counting, weighing, graphing, charting.

LOOK AT THE RESULTS:
Describe your results below:

Based on your results, should you accept, reject or modify your hypothesis? Explain why.

INVESTIGATIVE REPORTER WORKSHEET *(continued)*

NEXT STEPS: Think about the results of your investigation and what they mean.

What else should you test?

Who should know these results and why?

How can these results be used?

Where would these findings not be helpful or useful?

What more would you like to know about this issue?

CAREERS IN SCIENCE

OBJECTIVE:

Students will use the Business and Classified sections of The Times to identify career paths and employment opportunities in science.

MATERIALS:

Classroom set of The Times or The Times eEdition, graph paper.

PROCEDURES:

1. Discuss with students how science relates to many different industries and career paths.
2. Distribute copies of The Times, or direct students to log on to The Times eEdition. Have students use various sections of The Times to identify as many different jobs related to science as they can.
3. Ask students to classify their findings into different fields of science. Examples of different fields could include: health and medicine, engineering, aviation, mechanics, environmental science, computers, etc.
4. Assign students to small groups. Have each group choose one specific field of science and look for job opportunities in that field in The Times.
5. Have students compare the number of employment opportunities available in different fields of science. Students can also compare educational and work experience requirements, salaries, and geographic locations of job opportunities.
6. Students can graph their information and compare it with the information gathered by other groups.

EXTENSION:

Students can use other sources of employment information, such as various employment websites, to supplement the information they gather from The Times.

Students can write a letter to inquire about available positions, internships, and recommendations for appropriate college or university training.

Students can predict what careers maybe needed in various science fields in the next ten years.

ENERGY SOURCES

Fuel is a material that provides energy. Fuel heats and cools buildings, cooks food, power engines, and produces electricity. Some fuels are natural resources and other are artificially made. The following are only a few examples of energy or power sources.

Fossil Fuels, such as coal, petroleum, and natural gas, supply about 90% of the world's energy. Because these fuels originate from fossilized remains of prehistoric plants and animals which took millions of years to form, they are a limited or **"non-renewable"** resource. **Carbon** is a byproduct of fossil fuel combustion, and when combined with oxygen it forms **carbon dioxide.** Carbon dioxide is a gas at room temperature and a cause for concern due to its role in **global warming.**

Nuclear Energy is the most powerful kind of energy currently known. Nuclear energy is released through fission (splitting the nucleus of an atom into smaller parts). When this energy is released, it creates large amounts of heat, which can be used to make steam, which in turn can be used to generate electrical energy. **Uranium** and **plutonium** are commonly used nuclear materials, which do not contain carbon and do not release pollutants like fossil fuels. Nuclear fuels can be recycled. Major concerns with nuclear energy are (1) nuclear materials are limited in supply and dangerous to mine, (2) fission produces hazardous **radioactive waste** which can cause health and environmental effects for about 1,000 years, and (3) nuclear materials can also be used to make weapons. Nuclear **fusion** (or reaction) is another way to produce nuclear energy. Fusion occurs when two light nuclei combine to form a heavier nucleus. This reaction does not produce any pollution and any matter lost in the process changes into energy. Fusion is the process by which our sun produces energy. So far, man-made fusion devices use more energy than they create. Once a practical way to control fusion is developed, we may have an unlimited fuel supply. Another reason that nuclear energy is valuable is because it produces high-energy particles and rays called **nuclear radiation,** which currently has important uses in medicine, industry, and science.

Hydroelectric Power is the power of moving water, which is collected to power giant **turbines** which turn **generators** that produce electricity. Water costs little, cannot be used up, and supplies energy without pollution. A major concern for this energy source is that a hydroelectric plant can only operate where water flows from a higher place to a lower place, such as a dam. Dams are expensive structures and there are also concerns about the environmental damage that construction of dams may cause.

Solar Energy is produced by the sun. Special panels placed at the proper angle absorb the sun's energy, which is converted to heat and ten transferred to a storage system. Solar energy is used for small power jobs, such as heating buildings and water, and can also be used to convert sunlight into electricity. Solar energy is clean and almost unlimited in supply. Concerns include interruptions in the supply of sunlight caused by darkness and bad weather. Another concern is the huge land area that would be needed to produce a large-scale use of solar power.

Wind Power has been used for hundreds of years. Wind propels sailboats, and windmills are used to pump water, grind grain, and generate electricity. Airplanes use the power of high-altitude winds, called the jet stream. Wind costs nothing and produces no pollution, but is only practical in areas that regularly have strong, steady winds.

Alternative Energy Sources are being developed to replace non-renewable fuels. Pollutants, waste, cost and efficiency are factors for development.

Geothermal Power is generated whenever water comes into contact with heated rocks underground and then turns into steam. Areas can be drilled where there is trapped underground steam. The trapped steam is directed into the blades of turbine engines which produce electricity. This process can also be artificially created by injecting water into areas with hot rocks. Geothermal power plants do not burn materials so no pollutants are produced.

ENERGY SOURCES *(continued)*

Magnetohydrodynamic (MHD) generators convert coal or other fuel at high temperatures to produce a hot electrified **(ionized)** gas. This gas runs through a magnetic field where it produces electric current, which can drive a turbine to produce more electricity.

Fuel Cells are devices like batteries in which gas or liquid fuels combine to generate electricity. A reaction of **hydrogen** and **oxygen** in a fuel cell can produce twice the amount of electricity produced by traditional generators with the same amount of fuel. Nothing burns in the fuel cells, so they cause little pollution and lose little energy. But they are costly to produce.

Energy from garbage. Everyday trash and garbage can also produce energy when burned to create steam that powers a turbine and produces electricity. In addition, decaying garbage in landfills produces methane gas, which can also be used as a fuel.

Future energy sources. Hydrogen burns easily, producing large amounts of heat and a harmless byproduct, water. Chilled to a liquid form, hydrogen could flow through pipes and serve as a lightweight, clean fuel for airplanes and cars. A process called **"electrolysis"** extracts hydrogen from ocean water by running an electric current through it, but this currently requires huge amounts of electricity and is costly to produce.

CENTERED ON SCIENCE GLOSSARY

Acid: a water soluble chemical compound that tastes bitter or sour, turns litmus paper red, and has a pH of 5 or less.

Alkaline: a compound that contain alkali; a carbonate or hydroxide on an alkali metal, whose aqueous solution is bitter, slippery, caustic, and typically basic in reactions; alkaline has a pH grater than 7.

Atmosphere: the blanket of air surrounding Earth.

Biodegradable: capable of being decomposed by natural biological processes.

Biome: an entire community of living organisms in a single major ecological region.

Biotic: relating to life of specific life conditions (abiotic means not relating to life).

Carbon dioxide: a colorless, odorless, incombustible gas (C02) formed during respiration, combustion, and organic decomposition and used in refrigeration, carbonated beverages, inert atmospheres, fire extinguishers, and aerosols.

Carnivore: an animal that eats other animals and is nourished by the plants and smaller creatures these other animals have eaten.

Combustion: burning.

Decompose: to rot or decay; to break down into smaller parts or elements.

Ecosystem: a group of living things (plants, animals and other organisms) that live together in a particular place.

Energy: the capacity for action or accomplishment (to do work or make things move).

Environment: the climate and conditions in which any organism lives.

Evaporate: the change from liquid to vapor.

Habitat: the place where a plant or animal naturally lives and grows; a place that provides food, water, space to live, and shelter for an interdependent community of living things, including both plants and animals.

Herbivore: an animal that relies on plants for nourishment.

Mineral: an inorganic substance or compound occurring naturally in Earth's crust and having a consistent set of physical properties such as color, hardness, and crystalline structure.

Natural resources: natural substances that support life and fulfill human needs, including air, land, water, minerals, fossil fuels, forests, and sunlight.

Nutrition: the series of processes by which living organisms take in and assimilate food for growth and tissue replacement.

Organic: related to living things; made by or extracted from plants or animals.

Oxygen: a colorless, odorless gaseous element constituting 21% of Earth's atmosphere by volume and essential to most combustion.

pH: a measure of the acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity.

Phosphate: a salt or "ester" of phosphoric acid; a chemical element necessary for plant and animal growth and often used in fertilizers and detergents.

Pollution: the act or process of making air, land, or water unusable or impure.

Precipitation: water droplets or ice particles, such as rain or snow, condensed from atmospheric water vapor and massive enough to fall onto the Earth's surface.

Velocity: the rate of rapidity or action.

Water cycle: the continuous natural process by which water evaporates from bodies of water, collects in the atmosphere as vapor, condenses in clouds, falls to the ground as precipitation, and evaporates again.