

Measure for Measure: Time and Temperature

Grade Level: 6-8

Subject: Life Science, Earth Science

Duration: One or two class periods

Objectives

Students will

- discuss the tools of scientific inquiry,
- develop a template to solve scientific problems, and
- use the template to work through a problem in science.

Materials

- Paper and pencils
- Newsprint and markers
- Computer with Internet access
- *Measure for Measure: Time and Temperature* video and VCR or DVD and DVD player

Procedures

1. Begin the lesson by asking students if they know the steps of scientific inquiry. Write their ideas on a sheet of newsprint. Students may respond as follows:
 - Inquiry is the way that scientists ask questions.
 - Inquiry has something to do with conducting experiments.
 - Inquiry involves solving problems.
2. Next, have students discover scientific inquiry for themselves. They can find information on the following Web sites:

<http://regentsprep.org/Regents/biology/units/laboratory/scientificmethods.cfm>
<http://w3.dwm.ks.edu.tw/bio/activelearner/01/ch1c8.html>
3. Have each student develop a template to solve a problem using the steps of scientific inquiry. The steps should include the following:
 - Identify a problem.
 - Hypothesis, or prediction, of the solution
 - Steps required to solve the problem. (The steps may be an experiment, library or online research, or interviews.)
 - Examine and organize the results.
 - Conclusions based on research or outcomes of the experiment
 - Comparison of the initial hypothesis and the conclusion based on research or experimentation

4. Have students use their templates to solve a scientific problem. Divide the class into small groups, and have each group select one of the following problems:
 - Why did the dinosaurs die out?
 - Why do scientists think that birds may be descended from dinosaurs?
 - Why did the woolly mammoth die out?
 - What evidence do scientists have for global warming?
5. The Web sites listed below have information on each of these topics. If a group selects the first topic, have them watch the segment entitled “The End of Dinosaurs” for information about why the dinosaurs died out.

Why did the dinosaurs die out?

<http://pubs.usgs.gov/gip/dinosaurs/die.html>

<http://www2.worldbook.com/wc/popup?path=features/dinosaurs&page=html/dieout.htm&direct=yes>

<http://teacher.scholastic.com/researchtools/articlearchives/dinos/extinct.htm>

Why do scientists think that birds are descended from dinosaurs?

<http://teacher.scholastic.com/researchtools/articlearchives/dinos/evolut.htm>

<http://www.dmturner.org/Teacher/Library/4thText/VerPart5.html>

<http://www.ucmp.berkeley.edu/diapsids/avians.html>

<http://www.bbc.co.uk/dinosaurs/howdoweknow/q62.shtml>

Why did the woolly mammoth die out?

<http://www.crystalinks.com/woollymammoth.html>

<http://www.unmuseum.org/missingm.htm>

<http://www.explorenorth.com/library/weekly/aa032400a.htm>

<http://www.exn.ca/mammoth/Extinction.cfm>

What evidence do scientists have for global warming?

<http://www.insightmag.com/news/2001/03/12/Symposium/Q.Do-Scientists.Have.Compelling.Evidence.Of.Global.Warming-213451.shtml>

<http://www.insightmag.com/news/2001/03/12/Symposium/Q.Do-Scientists.Have.Compelling.Evidence.Of.Global.Warming-213462.shtml>

http://www.ucsusa.org/global_environment/global_warming/page.cfm?pageID=497

http://www.ecobridge.org/content/q_evd.htm

6. Give students time in class to work on this activity. Complete templates should include the following information:
 - identification of the problem
 - hypothesis
 - steps taken to solve the problem
 - organization of results
 - conclusion
 - comparison of the initial hypothesis with conclusion
7. Ask groups to share their findings with the class, following the steps of scientific inquiry.
8. Conclude the lesson by asking students if they think scientific inquiry is an effective way to solve problems. Do students think they can use it to solve other kinds of problems? How do students think this approach will help them in other academic areas? A social studies example is determining the cause of death of a 5,300-year-old mummy found in the Alps (see segment entitled “Frozen in Time”).

Evaluation

Use the following three-point rubric to evaluate students' work during this lesson.

- **Three points:** Students participated actively in class discussions; developed a complete template for the steps of scientific inquiry; and used the template effectively to solve a problem.
- **Two points:** Students participated in class discussions; developed a mostly complete template for the steps of scientific inquiry; and used the template somewhat effectively to solve a problem.

- **One point:** Students did not participate in class discussions; developed a mostly incomplete template for the steps of scientific inquiry; and had difficulty using the template to solve a problem.

Vocabulary

evidence

Definition: the information gathered through observation, experimentation, or research to answer a question or solve a problem

Context: In conducting an experiment, scientists collect evidence to support their hypothesis.

hypothesis

Definition: a prediction about what caused a particular event to take place

Context: Developing a hypothesis based on prior knowledge is the starting point in the problem-solving strategy defined by the steps of scientific inquiry.

observation

Definition: information gathered to determine how to solve a problem or answer a question

Context: Young children may make the observation that dark clouds mean that rain is on the way.

scientific inquiry

Definition: the approach that scientists use to study the natural world; it involves asking questions, developing a hypothesis, collecting evidence to answer the question or prove or disprove the hypothesis, organizing information, and developing a conclusion

Context: Scientists using scientific inquiry have been able to determine that an asteroid struck Earth, which may have lead to the extinction of the dinosaurs.

Academic Standards

The National Academy of Sciences provides guidelines for teaching science and a coherent vision of what it means to be scientifically literate for students in grades K–12. To view the standards, visit this Web site:
<http://books.nap.edu/html/nse/html/overview.html#content>.

This lesson plan addresses the following national standards:

- Science as Inquiry: Abilities necessary to do scientific inquiry; Understandings about scientific inquiry

Credit

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