Name: _____ Date: _____

Guided Learning: Sources of Scientific Information

Learning goals
After completing this activity, you will be able to …

- Identify the organizational structure of a news report.
- Learn the main components of a scientific journal article.
- Understand why marketing materials are not reliable sources of information.
- Evaluate various sources of scientific information.

Vocabulary: biased, peer review

Warm-up question:
Explain how Earth is different from the Sun.

_____

_____

_____

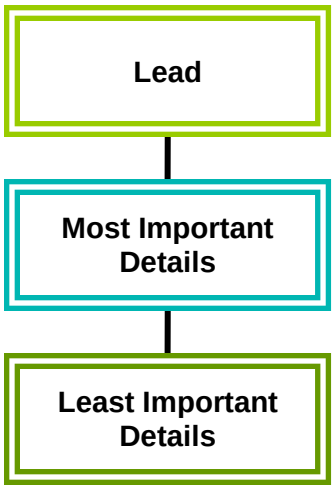
_____

Current Events and News Reports
Guess what? You've just communicated scientific information. This is a very important skill for you to have as you progress in your science studies. Most of the scientific information you know was likely gleaned from sources such as your teachers, books, magazine and journal articles, and Web sites. Another common source of scientific information is news reports.

News reports, both written and oral, tend to organize information in a standard way. Understanding their organizational structure can help you locate important information in the reports more efficiently.

Study the diagram at right. News reports always start with a lead. The lead gives the main idea of the report. It also typically answers the questions *Who, What, Where, When,* and *Why*. It is written to grab the audience's attention. You can use the lead to determine what other information will likely be found in the report.

After the lead, a news report will give the most important details of the story. This portion of a report is meant to deliver the most pertinent facts quickly for people who don't have time to listen to or read the full report. The least important details will follow.



Take a look at the newspaper article below. Circle the lead, underline the most important details, and put brackets around the remaining portion of the text (the least important details). Then, answer the questions that follow.

Scientists Engineer Flu-Resistant Chickens

By William Scispeare
Science News Daily

A research team from Edinburgh University announced yesterday that they have developed a breed of chickens capable of resisting the flu. The chickens were genetically modified with genes from a bird flu virus. This means that the chickens are technically infected with the virus but are unable to pass the virus along to other chickens.

"Not only could we use this approach to tackle bird flu but other diseases," says researcher Helen Sang. In the future, scientists expect to use this technique to develop livestock resistant to a whole host of viral and bacterial diseases. Thus, the technology could lead to an increase in food production. In addition, the technology could have a positive impact on human health. By controlling the spread of viruses between animals, you will decrease the chance of mutant viruses infecting nearby human populations.

Not everybody is so optimistic about the new technology, though. Some scientists worry about the safety of consuming animal meat that contains viral genes. In addition, animal rights groups are concerned that this new technology will encourage farmers to overcrowd animals since there is no longer danger of disease transmission. For this reason, activists prefer farmers adopt more humane organic farming methods rather than rely on genetically modified animals.

1. What was the main idea of the article? _____

2. What are possible advantages and disadvantages to this new technology? _____

3. Would you consider eating food genetically modified with virus genes? Explain. _____

Journal Articles

Often the best and most accurate source of scientific information is an article published in a scientific journal. Articles published in scientific journals are typically written by professional scientists who are reporting the results of their research. Before the articles are published, they must go through a **peer review** in which other qualified scientists in the field evaluate the article to make sure it meets current scientific standards.

Most scientific articles have the following components:

- **Abstract:** Summarizes the entire article. Abstracts give basic details about the study, its results, and the conclusion drawn.
- **Introduction:** Introduces what the problem is and why it is an important problem to consider.
- **Methods:** Explains how the researcher went about studying the problem.
- **Results:** Gives details about the researcher's findings.
- **Conclusion:** Describes the importance of the findings and explains what can be deduced from the findings.
- **References:** Lists any sources that the author mentioned in the article.

An abstract from a scientific article is given below. Read through the abstract and then answer the questions that follow.

Abstract: The zebra mussel invasion in the Great Lakes has caused large losses in biodiversity as well as economic damage. Currently, there is no consensus regarding how the biotic and abiotic factors of the Great Lakes have enhanced the zebra mussel's success or explained it spread dynamics. Experimental and theoretical studies suggest that regulation of the mussel's spread is possible; however, regulation has not yet been empirically demonstrated. In this study, we explore how regulation affects the rate of new site colonization. Employing analytical tools from the study of abundance dynamics, we are able to show that spread of zebra mussels follows a consistent trend, and can thus be regulated by careful management. We base our conclusions on the analysis of the spread dynamics of 30 other marine species. In contrast to current beliefs that the zebra mussel invasion is an idiosyncratic phenomenon, here we provide evidence that a general pattern does indeed exist.

Keywords: Great Lakes, invasion, population dynamics, regulation, zebra mussel

1. What issue does this journal article address? _____

   _____

2. What conclusion did the author draw? _____

   _____

3. The author listed keywords at the end of the abstract. What do you think these keywords are intended for? _____

_____

Marketing Materials

Marketing materials are any kind of article, advertisement, brochure, booklet, Web site, and so on that is written with the intention of selling a product or service. Many marketing materials contain scientific information (or information that the author claims is scientific). However, unlike scientific journals, marketing materials do not undergo peer review. Furthermore, because the intention of marketing materials is to sell something rather than to educate its readers, marketing materials are very likely to be **biased**. Something that is biased is prejudiced or favors one side over another.

Sometimes it is not immediately obvious that a source of scientific information is biased. When you come across a scientific source, ask yourself the following questions in order to evaluate how reliable the source is:

- **What is the purpose of the source?** Is any particular product or service mentioned in the source? If so, the purpose of the source might be to sell that product or service. Other sources, such as science fiction books, are meant to entertain, but not educate its readers about science. Even sources such as news reports may be written to entertain as well as inform its readers. Sources such as textbooks and scientific journals, however, are primarily meant to educate.
- **Who wrote the source?** Is the author an expert in the field or a layman? Does the author work for a company that might benefit from selling any products or services mentioned in the source? You can often find out this kind of information by doing a Web search of the author's name.
- **What is the intended audience of the source?** Scientific journals are often written for other scientists. Marketing materials are written for consumers. Science textbooks are written for students. A source's intended audience can make a big difference in how thoroughly and accurately scientific information is presented.
- **Does the source agree with other sources?** Always try to verify scientific information using a variety of sources. If a source is accurate, it will likely agree with or closely match other reliable sources. If you cannot identify another source to verify the information, treat the information with skepticism.
- **How old is the source?** Scientific information is often refined and updated. Because of this, it is important to only use current sources. Verify that a source is current by checking the publication date or, for a Web site, the date the page was last updated.

Consider all five of these questions when evaluating the reliability of the source on the next page. The source comes from the National Aeronautic and Space Administration's website (www.nasa.gov).

Feature

Text Size

Tweet Like 1K

NASA Research Finds 2010 Tied for Warmest Year on Record

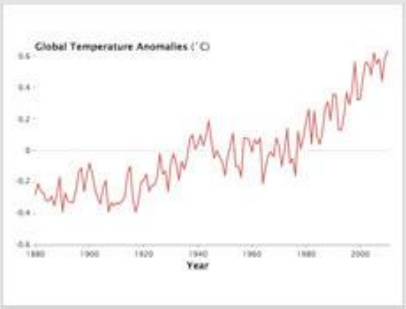
01.12.11

WASHINGTON -- Global surface temperatures in 2010 tied 2005 as the warmest on record, according to an analysis released Wednesday by researchers at NASA's Goddard Institute for Space Studies (GISS) in New York.

The two years differed by less than 0.018 degrees Fahrenheit. The difference is smaller than the uncertainty in comparing the temperatures of recent years, putting them into a statistical tie. In the new analysis, the next warmest years are 1998, 2002, 2003, 2006, 2007 and 2009, which are statistically tied for third warmest year. The GISS records begin in 1880.

The analysis found 2010 approximately 1.34 F warmer than the average global surface temperature from 1951 to 1980. To measure climate change, scientists look at long-term trends. The temperature trend, including data from 2010, shows the climate has warmed by approximately 0.36 F per decade since the late 1970s.

"If the warming trend continues, as is expected, if greenhouse gases continue to increase, the 2010 record will not stand for long," said James Hansen, the director of GISS.



In 2010, global temperatures continued to rise. A new analysis from the Goddard Institute for Space Studies shows that 2010 tied with 2005 as the warmest year on record, and was part of the warmest decade on record.
Credit: NASA/Earth Observatory/Robert Simmon
› Download PDF

The analysis produced at GISS is compiled from weather data from more than 1000 meteorological stations around the world, satellite observations of sea surface temperature and Antarctic research station measurements. A computer program uses the data to calculate temperature anomalies -- the difference between surface temperature in a given month and the average temperature for the same period during 1951 to 1980. This three-decade period acts as a baseline for the analysis.

Leslie McCarthy
Goddard Institute for Space Studies, New York

1. What do you think the purpose of this source is? _____

_____

2. Who wrote the source, and are there any indications about this person's level of expertise?

_____

_____

_____

3. How could you find out more about the author? _____

_____

4. Who do you think the intended audience of the source is? _____

_____

5. Use an Internet search to try to verify a fact given in the source. Were you able to find another source that confirmed the information? Did you find a source that contradicted the information?

_____

_____

_____

6. How old is the source? _____

7. Based on all the information you collected about the source, how reliable do you think the source is? Explain your answer. _____

_____

8. Look through magazines, the Internet, and other types of media in order to find a source of scientific information that appears to be unreliable. Turn in a copy of the source with this worksheet. Then, on the lines below, explain why you think the source is unreliable.

_____

_____

_____

_____