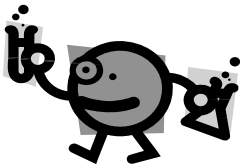
APPENDIX A



METAL REACTIVITIES DESIGN-A-LAB

DUE: _____

How reactive a metal is compared to other metals is an extremely important property. The non-reactivity of certain metals, ex. gold, Au, helps account for their widespread use in jewelry. Other metals are used for their reactivity. As scientists, we can test the relative reactivity of metals and establish an activity series based on our results. To this end, you will design and carry out an experiment to compare the reactivities of several metallic elements, trying to see if you can rank their reactivities. The reactions you will look at are referred to as single displacement reactions. Recall, that single displacement reactions occur between a metal and the ions of other metals. In general, these reactions can be symbolized as:

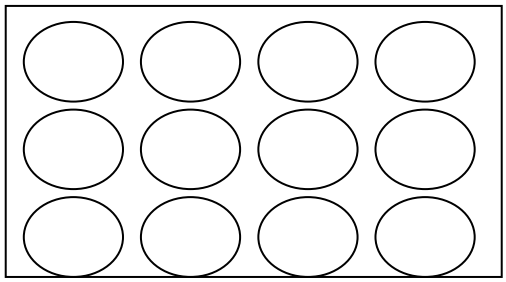
M1 (s) + M2+ ion (aq) → M2 (s) + M1+ ion (aq)

In the above example, metal 1 (M1) would be considered more reactive than metal 2 (M2) because metal 1 became oxidized to an ion (M1 ion) and the ion from metal two (M2+) became a metal.

You will compare the reactivities of four metals (copper, magnesium, silver and lead) by looking at their reactivities with aqueous solutions of ionic compounds of each of the four metals: Cu, Mg, Pb, and Ag nitrates.

Materials Available to You

one spot plate (12-well, see diagram)
dropper bottles with 0.1 mol/L solutions of the following reagents: $Mg(NO_3)_2$, $AgNO_3$, $Cu(NO_3)_2$, $Pb(NO_3)_2$
four pieces of each metal: copper - Cu, lead - Pb, and magnesium – Mg



STEPS TO COMPLETE

1. Using your textbook review single displacement reactions.

2. Working individually, on a separate piece of paper, write out the possible single displacement reactions for the materials available to you.

3. Within your lab group formulate a purpose for this experiment.

Purpose:

4. Compare the available reactions. Based on your experience, which of the metals will be most reactive? Least reactive? Formulate a hypothesis for the relative reactivity of the metals.

Hypothesis:

5. Pair up with another groups and exchange both your "Purpose" and "Hypothesis" statements. Make suggestions for improvement and listen to their suggestions. Modify your statements as needed.

6. Brainstorm to design a procedure (based on the Materials Available to You). How will you know if a reaction is taking place? What will you need to control for? What safety precautions should be taken? How will you dispose of the reactants/products?

7. Design a procedure, including safety precautions and how you will record your observations. How will you indicate that a reaction DID NOT take place? Once again exchange with another group and comment on each other's designs. Modify the procedure as needed.

8. Submit your procedure to the teacher for review. Come prepared to carry out your experiment next class!

WRITE UP

For your write up you will be following the included "Presenting a Formal Lab Report".

- Don't forget to note any observations in an organized format.

- Your Analysis should address the following questions:

1. Which metal reacted with the most number of solutions?
2. Which metal reacted with the least number of solutions?
3. Rank the four metals in order of reactivity, with the most reactive first and the least reactive last. In your own words, define what is a metal activity series.
4. Based on your results, why do you suppose the roof of the Parliament Buildings was made from copper instead of magnesium or lead?
5. Based on your observations, which of the above metals is most likely to be found in its "free" or uncombined state in nature?
6. In the introduction, what is meant by the statement "M 1 is more reactive than M2"
7. In the actual activity series of metals the elements that are higher will displace the elements that are lower, allowing us to predict whether a reaction will occur. It is usually indicated on the side of the Periodic Table. Locate the metal activity series and compare it to your results. Are there any discrepancies? Explain.

APPENDIX A

Presenting a Formal Lab Report

Science involves the extensive use of experiments to observe and draw conclusions about the world around us. A laboratory report is a method of clearly presenting one's experimental work and its possible conclusions to others. A good lab report documents your findings and communicates their significance by explaining:

1. Why the experiment was conducted
2. How it was done
3. What happened
4. What the results can mean

There are many formats for a lab report. We will be using the following:

1. Title Page

Your title page should contain the title of the experiment, your name, the names of your lab partners, your class and the date.

2. Purpose

Use complete sentences to explain the purpose of doing the experiment (ex. To determine which laundry detergent most efficiently removes tomato stains.)

3. Hypothesis

This is an educated guess that predicts the results (ex. Tide with Bleach will be the best at removing the tomato stains.). Depending on the experiment you will not always have a hypothesis.

4. Materials

Provide a detailed list of all the materials used in the experiment. (ex. water, 60 mL of each detergent, tomato-stained napkins) A diagram can be used to show the experimental set-up.

5. Methods

Use numbered steps clearly written in full sentences to describe, in past-tense, how the experiment was done. This should not be a word-for-word repetition of your protocol – you are to describe what you DID, not what you were supposed to do.

6. Observations

Observations should be complete and indicate **only what you saw** (no inferences!). They should be organized (using a table, diagram, graph, quantitative or qualitative) and should include the relevant units of measurement. They SHOULD NOT include calculations.

7. Analysis

Provide the relevant calculations if needed. Discuss your observations in terms of the purpose and the hypothesis, noting any interesting details. How do the results differ from any expected outcomes? What do you think caused the differences? Indicate AT LEAST two sources of error. Answer any assigned questions. Don't forget to include references if applicable!

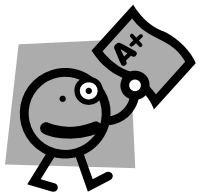
8. Conclusion

State the results and whether you were able to fulfill the purpose/prove the hypothesis.

Overall Considerations:

Is your report neat and in proper order? Have you checked your spelling and grammar?

APPENDIX A



FORMAL LAB REPORT RUBRIC

You will be evaluated based on the criteria below.

Please use pencil to assign yourself a mark in each category:

___ THE LABORATORY REPORT IS WRITTEN **IN YOUR OWN WORDS**

*** note: if you plagiarize (copy word-for-word) in your presentation you will receive a zero (0) for that section; if you plagiarize more than 1/3 of the content of your presentation you will receive a zero (0) for the ENTIRE submission**

KNOWLEDGE mark*: **4 3 2 1 R**

___addresses the following:
- the **Purpose**
- the **Hypothesis** (if relevant)
- **Materials**

___ well-organized and show a deep level of understanding
___answers make sense and are correct
___key words and ideas are correctly used

APPLICATION mark*: **4 3 2 1 R**

___the **Methods** section is clearly stated
___ in past-tense
___ describes the exact steps followed
___ the **Observations** are well organized and include units
___ do not include inferences!
___key words and ideas are correctly used
___complicated vocabulary is explained/defined, references are indicated if used

THINKING mark*: **4 3 2 1 R**

___ the **Analysis** includes all of the relevant calculations
___ all the calculations are done well (sd, units)
___ addresses assigned questions
___includes two potential sources of error

___ **Conclusion** the conclusion ties back to the purpose/hypothesis

___answers make sense and are correct
___key words and ideas are correctly used
___complicated vocabulary is explained/defined

COMMUNICATION mark*: **4 3 2 1 R**

___ the report is very well organized in a clear, logical sequence that's easy to follow
___ the headings are in the correct order, the title page is complete
___ observations do not include calculations
___good spelling and grammar

*4 (excellent), 3(good), 2(satisfactory), 1(needs improvement), R(incomplete, please resubmit)

name:_____

POST-EVALUATION SELF-ASSESSMENT

Please complete the following.

My strengths in this evaluation are:

_____

_____

_____

My weaknesses are:

_____

_____

_____

My next step will be to:

_____

_____

_____

name:_____

POST-EVALUATION SELF-ASSESSMENT

Please complete the following.

My strengths in this evaluation are:

_____

_____

_____

My weaknesses are:

_____

_____

_____

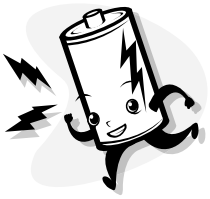
My next step will be to:

_____

_____

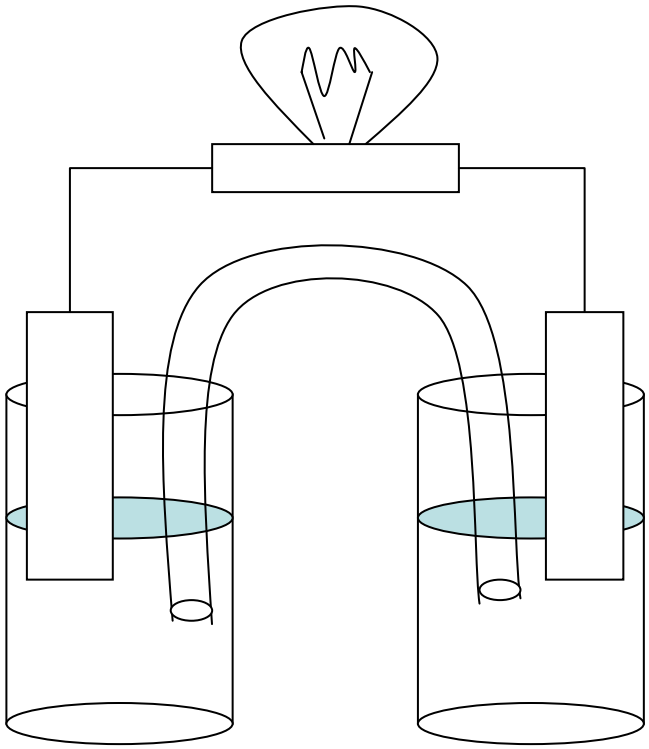
_____

APPENDIX B



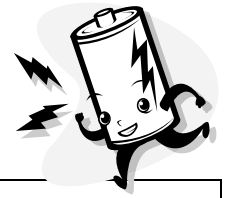
DESIGNING A GALVANIC/VOLTAIC CELL

Names of Group Members:



Use the diagram above to "design" a galvanic cell. Place a checkmark beside each of these as you indicate on the diagram:

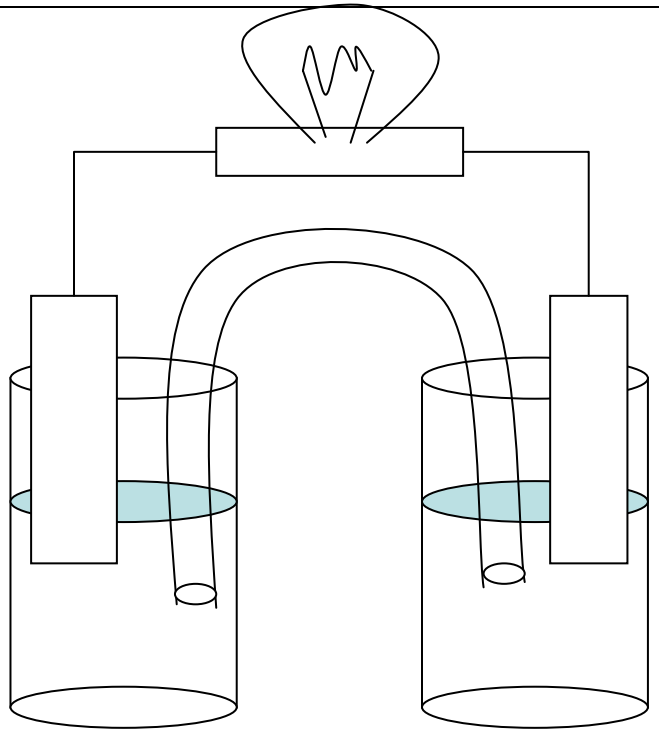
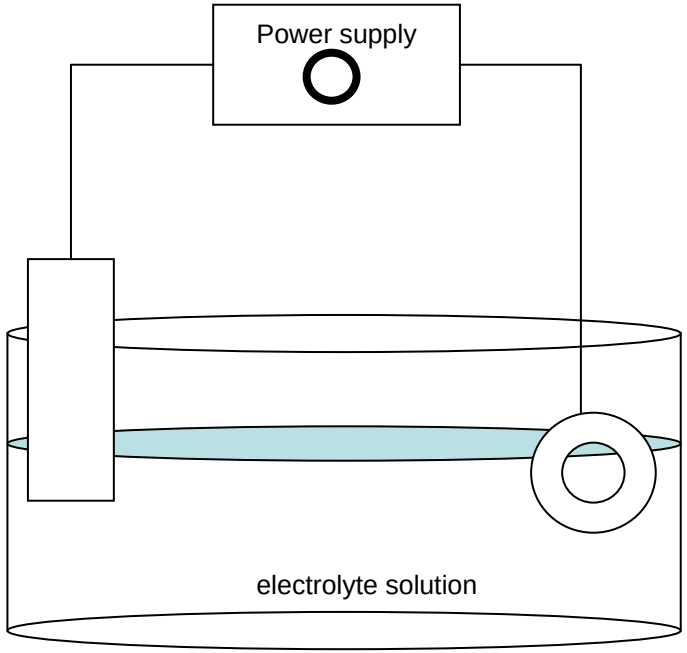
___anode and its half-reaction
___cathode and its half-reaction
___flow of electrons (use arrows)
___ion flow through the salt bridge
___solutions present in each half-cell
___which electrode will lose mass
___which electrode will gain mass



APPENDIX C

COMPARING GALVANIC AND ELECTROLYTIC CELLS

Based on what you have learned complete the following table:

Cell Type	Galvanic/Voltaic	Electrolytic
Labelled Diagram: - anode - cathode - oxidation - reduction - direction of electron flow - direction of ion flow		
Reaction (spontaneous/not)		
Produces/requires energy		
How is energy produced/obtained		

APPENDIX D

TAKING IT OUTSIDE:
ESTABLISHING A CELL PHONE RECYCLING PROGRAM

YOUR TASK

As members of our community we are responsible for the use and disposal of products with hazardous ingredients. We all love the convenience of instant communication at our fingertips, but few of us realize the dangers of an old, unused cell phone. In this project you will learn about cellular telephones as household hazardous waste, their potentially dangerous effect on human health, wildlife, and the ecosystems we live in. Your goal will be to encourage people in our community to bring in their unused old cell phones for recycling and disposal. Once collected, the cell phones will be sent to the National Cell Phone Collection Program, http://www.pitch-in.ca/Pitch-In.php The money generated from this project will enable us to take part in further ecological projects at the school.

In order to promote the proper recycling and disposal of cell phones you need to find a means to communicate your findings. You can present your findings in the format of

a) a newspaper article
b) a pamphlet
c) a poster
d) a format of your choice (please discuss this with me before starting)

The best article will be sent to the local newspaper and may be published. The best pamphlet will be forwarded to the City of _____ Planning and Environment Committee, again with the intent of being more widely distributed. Remember that you are trying to engage the community with your work! Pay attention to colour, style, graphics, and sizes of fonts.

You can work in groups of up to _____ people, keeping in mind that each person's contribution will be evaluated individually (i.e. each member of a group has to demonstrate what he/she has contributed to the assignment). Alternatively, you can choose to work individually, keeping in mind that you will still be required to complete all of the expectations of the assignment.

Group Members:_____ Phone number:_____ E-mail:_____
Group Members:_____ Phone number:_____ E-mail:_____
Group Members:_____ Phone number:_____ E-mail:_____

Format chosen: _____

THE DETAILS

Your group is responsible for including the following information in your visual. Please use the attached format to fill in the relevant information. You will be submitting this written report on _____. The in-class presentation of your visual will take place on _____. Be sure to answer in point form – do not "cut and paste" or copy from the internet! **Use your own words!**

Organizing Your Data

1. Description of the danger:
   - What makes old, unused cell phones dangerous and why?
   - What are the potential environmental consequences of improper disposal?
2. What is the National Cell Phone Collection Program?
   - How does it work?
   - Where do the cell phones go?
   - What happens to the usable cell phones?
   - What happens to the unusable cell phones?
3. Why is this a worthwhile project?

4. How can people participate?
   - where and when will the collection take place

You must also include references to indicate where your information was obtained, whether that's a visual (diagrams, etc.) or written information. Please attach a page with at least three references – websites, books, articles, etc. that you used to gather information.

SOME POSSIBLE SOURCES OF INFORMATION

Waste in the wireless world

http://www.pitch-in.ca/Pitch-In.php
http://www.worldwatch.org/node/1482
http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=2BD76030-123D-4094-806E-EE422F069EA8

Cell phone recycling

http://www.pitch-in.ca/Pitch-In.php
www.epa.gov/epaoswer/education/pdfs/life-**cell**.pdf

Google – enter your search topic and look for websites ending with "edu" or "org"

www. google.ca

Please use the enclosed "Guide to Google", keeping in mind that not all internet information is reliable!

APPENDIX D **Organizing Your Data**

to be submitted _____ ***Group members:***

1. Description of the danger:
   - What makes old, unused cell phones dangerous and why?

   - What are the potential environmental consequences of improper disposal?

2. What is the National Cell Phone Collection Program?
   - How does it work?

   - Where do the cell phones go?

   - What happens to the usable cell phones?

   - What happens to the unusable cell phones?

3. Why is this a worthwhile project?

4. How can people participate?
   - where and when will the collection take place

references used:

APPENDIX D

TAKING IT OUTSIDE CHECKLIST

The visual:

___answers **ALL** of the questions asked

___is an excellent visual description of what the problem is

___is neat, easy to read, appropriate font (for a poster that's not smaller than 18)

___excellent use of colour

___visual is original and shows creativity

___good spelling and grammar, not cut-and-paste

___references are included

Appendix D **TAKING IT OUTSIDE RUBRIC**

The following rubric will be used to assign a mark your project. In addition, your group should submit a copy of the information collected to answer the questions assigned for this project. Please use the provided "Organizing your data" format to hand in required information.

Category/Criteria*	Level 4	Level 3	Level 2	Level 1
KNOWLEDGE: understanding of concepts related to the environment, addresses questions assigned	- group demonstrates thorough understanding of concepts, addresses all of the questions assigned in a clear and concise manner	- group demonstrates considerable understanding of concepts, addresses all of the questions asked	- group demonstrates some understanding of concepts related to environment, addresses 3 of the required topics	- group demonstrates limited understanding of concepts related to environment, addresses 2 or less of the required topics
INQUIRY: application of concepts in ecology	- group clearly and accurately applies all of almost all of their knowledge of ecology	- group applies all of most of their knowledge of ecology	- group applies some of their knowledge of ecology	- group applies little knowledge of ecology
COMMUNICATION: communication of information and ideas communication for different audiences and purposes	- all group members communicate information with a high degree of clarity - all members communicate with a strong sense of audience and purpose - visual is neat, colourful and creative	- some group members communicate information with considerable clarity - members communicate with a clear sense of audience and purpose - visual is easy to read	- group members communicate information with moderate clarity - members communicate with some sense of audience and purpose - visual is not easy to read	- group members communicate information with considerable difficulty - members communicate with a limited sense of audience and purpose - visual is difficult to read
APPLICATION: understanding of connections among scientific knowledge and everyday life - proposal of courses of practical action to deal with problems involving science, technology, and the environment	- group shows thorough understanding of connections between knowledge of ecology and everyday life - group proposes highly effective courses of practical action	- group shows considerable understanding of connections between knowledge of ecology and everyday life - group proposes courses of practical action of considerable effectiveness	- group shows some understanding of connections between knowledge of ecology and everyday life - group proposes courses of practical action of some effectiveness	- group shows limited understanding of connections between knowledge of ecology and everyday life - group proposes courses of practical action of limited effectiveness

* based on the Ontario Curriculum Achievement Chart for the Sciences

Appendix D **The Student's Guide to Using** Google™

What is Google?

Google is one of the world's leading internet search engines. It uses a web page ranking system to return your search in order of reliability.

Where can I find it?

Type www.google.ca into your internet browser.

How do I use Google?

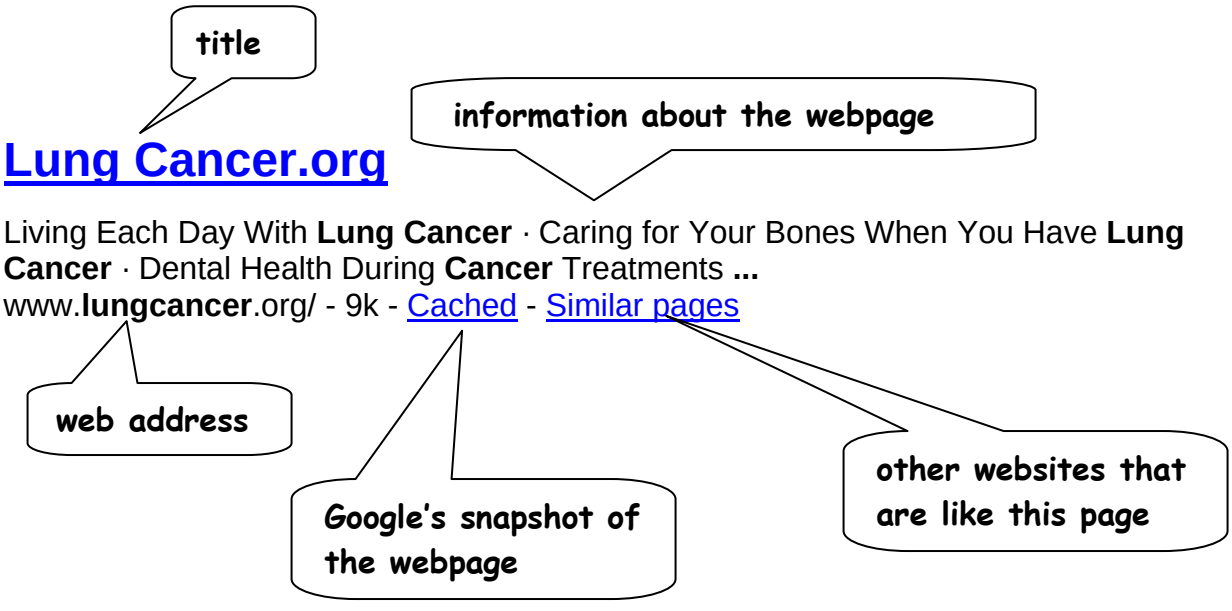
Before you start your search, you should always keep the following things in mind:
- know exactly what you are looking for.
- be specific, ex. "lung cancer", not "cancer"

Once you have determined what you will be searching for, you can use these tips to get the best information:

- Google automatically searches for all the words that you type into the search box, therefore you do not need to use "and".
- The search will function better if you do not put in questions but rather words you want to see on the website.
- Google is not case-sensitive, so don't worry about capitalizing words.
- If you want to search for a phrase you will need to use quotation marks around your words. For example, if I type in "Lung cancer is caused by" I will get websites that mention the phrase "Lung cancer is caused by". If I type in Lung cancer is caused by, the words "lung", "cancer", "is", "caused" and "by" can appear anywhere on the websites that my search finds.
- You can also use Google's Advanced Search option by selecting **Advanced Search** on the right of the "Search" button.

What does a result look like?

A result for "lung cancer" will list the following: title of the webpage, information about the webpage, the web address (URL) of the webpage, a "Cached" link and a "Similar pages" link. ":



The tough part: evaluating the results

Many people post a website, and many of them are aimed at selling something or changing your point of view rather than sharing expertise. Google makes no effort to uncover and eliminate unreliable web pages, so it is up to you to learn to evaluate websites! However, Google`s web-page-ranking system does tend to give priority to better respected information. Keep in mind that well-respected websites have links to other well-respected websites. So, when looking at the search results the websites that are more reliable will tend to be towards the top of the page. Here are some other questions you should ask before you use information from a website:

Who are the authors of the website? What are their qualifications?
If you can't find the authors you can't trust the website!

Can you verify the information provided? Are there references and citations included with it?
Academic postings will include verifiable references.

What is the purpose of this website? Are there any advertisements on it?
If the website is credible it often will not have any advertisements.

When was the website last updated? Are there any broken links?
If the website does not look maintained the information on it may not be valid.

What is the intended audience? Is the material presented at an appropriate level?
If you can't understand the information presented perhaps you should look for another website! Ultimately, remember that you are running the search to gather information, not to explore the internet!

Although website addresses can give you a clue as to how reliable the information is, you cannot rely just on the endings of URL's, since these vary from country to country. For example, .edu is usually used to indicate a college or university, but most Canadian universities use .ca. Endings like .org, .com, .net can be used by anyone! Most government websites will include .gov in the URL.

Referencing a website

There are several style guides for writing references. The following is the MLA guideline for referencing a website:

Author's Last Name, First Name. "Title of Webpage" Name of Web Site, date the page was updated. Organization that posted it (may be the same as the name of the website). Date accessed. <<full URL>>

ex. CancerCare Publications. "Lung Cancer 101: About Lung Cancer" www.lungcancer.org, CancerCare Inc. May 26, 2008. <http://www.lungcancer.org/reading/about.php>

If you cannot find some piece of information discuss it with your teacher and omit it from the reference.

Good Luck and Happy Finding!