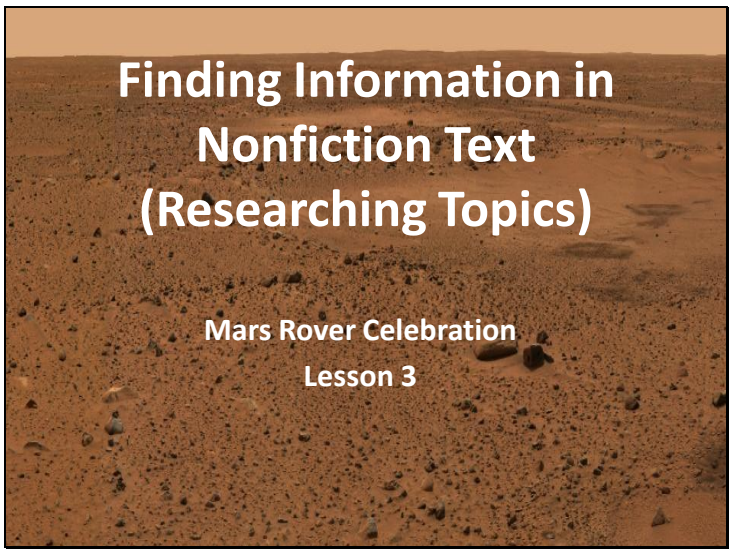
Slide 1

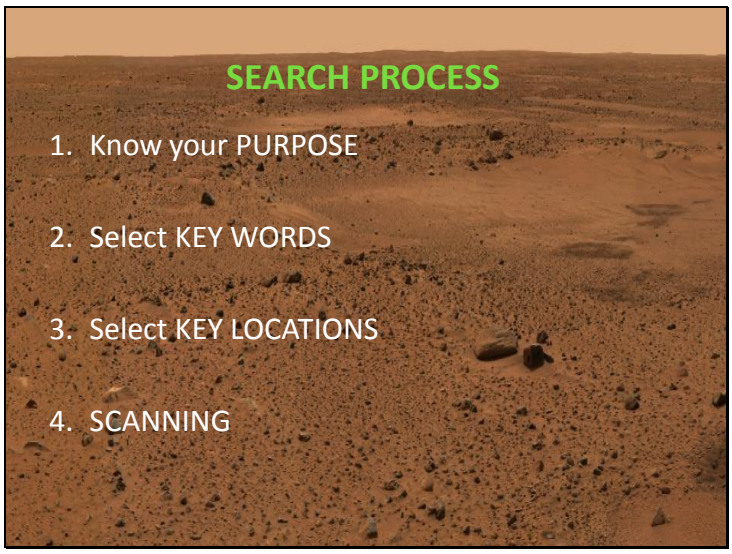


To complete your Mars rover mission, you will need to conduct research. Your research will involve reading books and online articles about Mars and spacecraft. Most of your reading will be non-fiction or informational text. This type of reading can be challenging in many ways so today I will be going through this mini-lesson with you to help you find the information you need quickly and effectively.

Slide 2

Paraphrase the information on this slide.

Slide 3



Let's start by discussing how to find information.

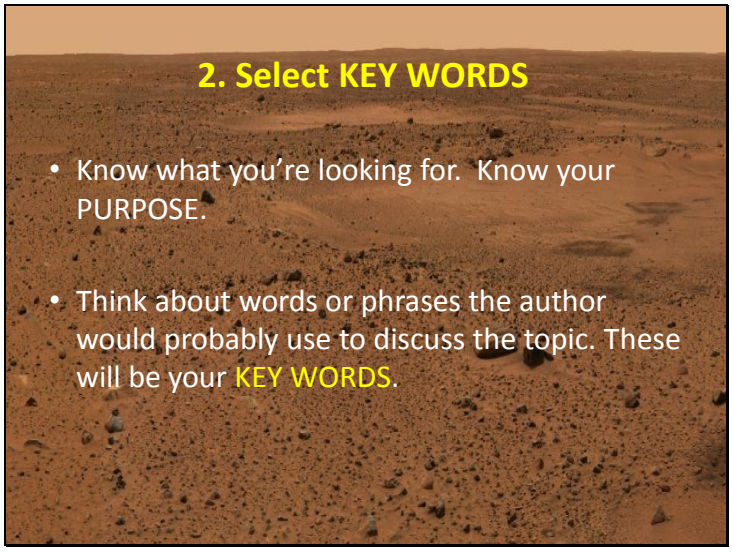
Searching for information in informational text involves 4 basic steps. The are… (read the slide). Let's look at each of these one at a time.

Slide 4

It is essential that you know your purpose for reading and that you keep that purpose in mind as you conduct your research. Writing your purpose down on a piece of paper or in your notebook will help you develop and refine your stated purpose. It will also allow you look back and remind yourself of your purpose as you are doing your research. As you conduct your research, you should refer back to your purpose frequently to make sure that the what you are reading and the information you are compiling is related to what you are trying to learn about. Your purpose will probably be different each time you conduct your research. One day your purpose might be to find the perfect landing spot for your rover. Another day your purpose might be to learn about how to communicate with your rover on Mars.

When you are reading informational text, you will often find lots of fascinating information. It is very easy to get so interested in what you are learning, that you actually forget about your purpose for reading the article in the first place. While you may learn lots of neat things, the problem is that you may not have all the information you need when your research time is over. If you find that you are reading something that is not related to your purpose, but that you find very interesting, write down where this information is located and a brief sentence of what the reading is about. Then continue researching your purpose. Your notes will tell you where to go to find this interesting information at another time, and allow you to stay focused on your specific PURPOSE.

Slide 5



Looking for specific information in an text is a lot like looking for something that you have never specifically seen and do not know exactly where it is located. For example, say a friend of yours was telling you about a new board game that sounded really fun. When you were at the store a few days later you decided that you wanted to find the game and see it for yourself to see if you might be interested in buying it. However, you could not remember the name of the game. BUT, you did know it was a board game, and you remembered that the name of the game started with a B and that your friend said the box was green. Using this information, how would you find the game? Your PURPOSE is to find the board game that starts with a B and is in a green box. What are your KEY WORDS? Answers: board game, a title starting with B and green box.

Slide 6

Paraphrase the information on this slide.

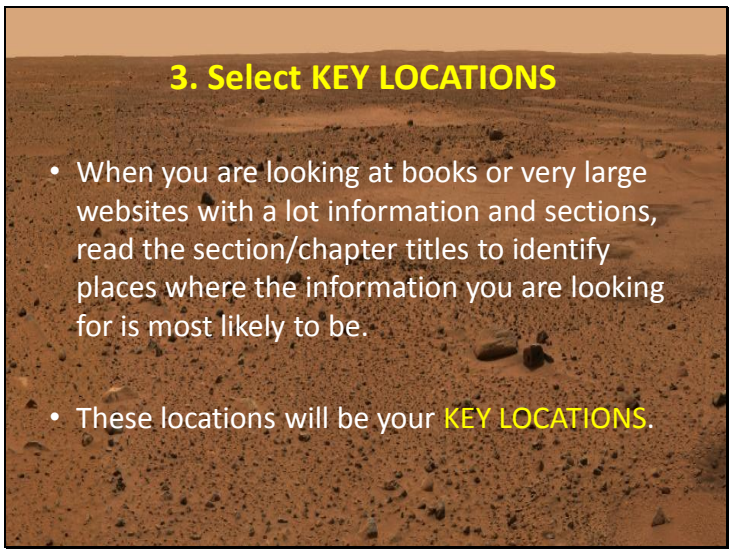
Then say, “The next slide has a list of some search engines made especially for kids.”

TEACHERS: If your district has approved search engines for students, feel free to skip slide 7 and direct your students to the preferred website.

Slide 7

TEACHERS: If your district has pre-set preferred search engines for your students or if your students are accustomed to doing research using other search engines, feel free to skip this slide.

Slide 8



TEACHER: Paraphrase the information on this slide, then say:

Let's return to our example of the game we are trying to find. Now, where would you look for this game in the store? First, you would look at the signs that label the different sections of the store. The sections of the store labeled TOYS or GAMES would probably be your best option – and sections like CLOTHING and TOOLS would not be good places to find a board game – right?

Slide 9

TEACHER: Paraphrase the information on this slide, then say:

In some cases, the articles, books, or websites you are reading as part of your research will be very long and have a lot of information. You do not always have to read an entire book or every section of a webpage to find the information you need. SCANNING the text for information about your PURPOSE is often very helpful.

Scanning involves using your KEY WORDS and KEY LOCATIONS to help you find information about your PURPOSE. If you do, you begin reading the text around that word at that point to see if the information useful for your PURPOSE.

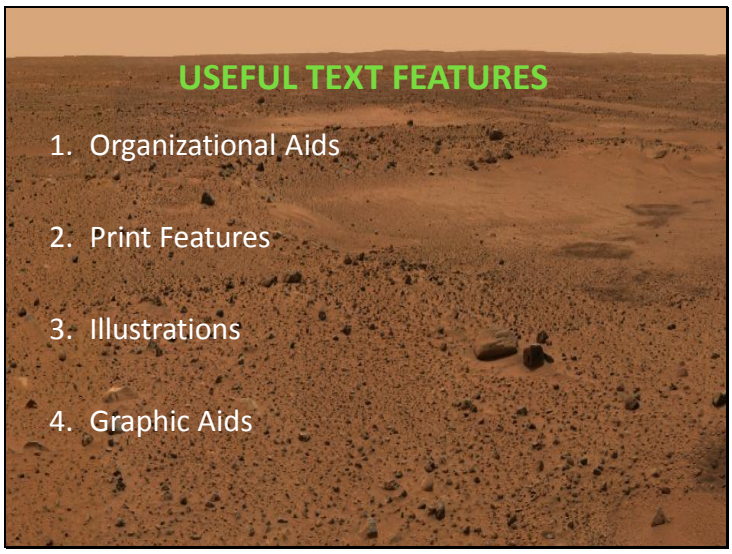
Let's go back to our example:
Once you are in the toy/game section of the store, you scan the aisles looking for "board games" or "games". Once you find this section, you scan the aisles look for a green box with a title that starts with the letter B.

You look for information in text in the same way. First, think about what you are looking for. Suppose you want to know about how hot and cold it gets on Mars. Think about what word an author might use to talk about that topic. An author might actually use the words "hot" and "cold", but what else might they use instead? An author might use the word "temperature" or "climate" when describing how hot or cold it gets, or maybe even the word "weather". Of these 5 words, hot, cold, temperature and climate are probably the strongest. But, if you cannot find anything using these words, weather may be a good next option.

Once you have some key words to help you find the information you want, you need to decide where to look in the text to find this information. You can probably skip the sections called, "What is Mars made of?" and "Moons of Mars". You would first look in the sections that seem like they might contain the information you need and sections where you are not sure. I am going to say the titles of some book chapters and I want you to give me a thumbs up or thumbs down depending on whether you think the chapter would be a good place to find information about how hot or cold it gets on Mars:

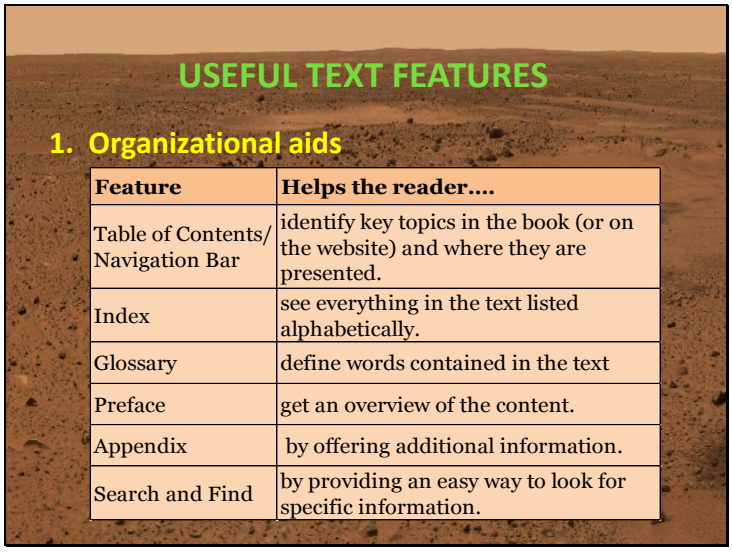
- Is Mars Really Red? (thumbs down)
- **Conditions on Mars (thumbs up)** *(If students don't know what conditions mean, they should still put thumbs up because it might be right)*
- **Temperature Extremes on Mars (thumbs up)**
- **Climate (thumbs up)**
- How was Mars Discovered? (Thumbs down)

Slide 10



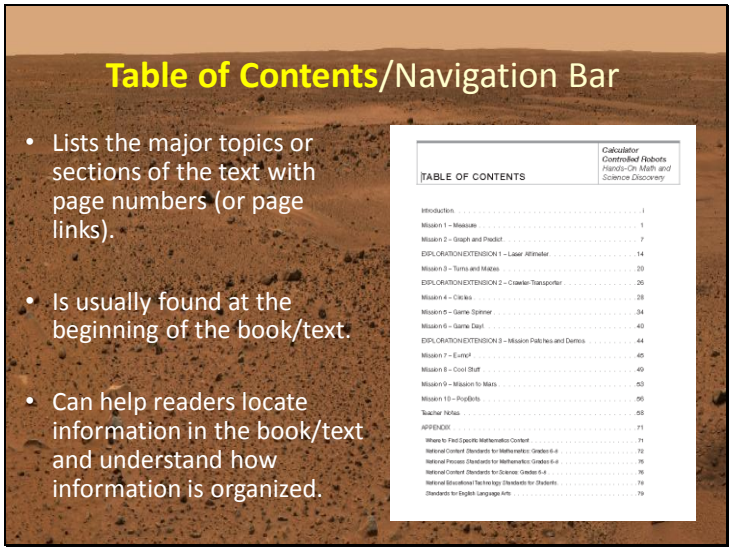
Let's now look at the way information is organized in informational text. Knowing about Organizational Aids, Print Features, Illustrations and Graphic Aids will help you find the information you need more quickly. It's okay if you don't know all of these terms yet. We are going to go over them one at a time before you start your research so you can use them to help you find the facts and information you need.

Slide 11



Organizational Aids refers to different parts of books and websites that authors include to assist researchers. This table shows you the most common Organizational Aids informational text has to help readers locate information they need. Let's talk about these one at a time.

Slide 12

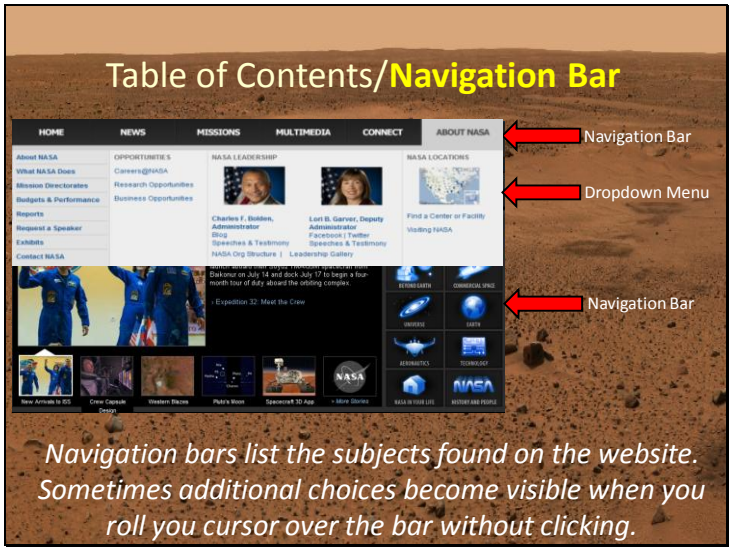


(Paraphrase the information on this slide.)

Tables of contents are usually found in the very beginning of longer printed materials. The table of contents tells the reader the main subjects to be discussed and on which page the subject starts. This can be very helpful in quickly locating the information you need, particularly if a book is very long. Here is a typical table of contents from a book.

Source of Graphic:
http://www.nasa.gov/pdf/239518main_Calculator_Controlled_Robots_Introductory_Materials.pdf

Slide 13



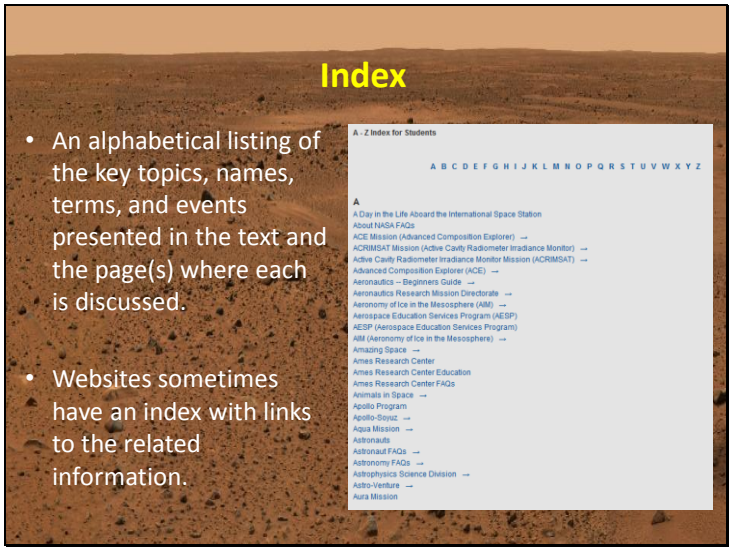
This slide has two CLICKS of animation.

Most websites have tables of contents, however, they look very different than those we usually see in books. The Table of Contents for most websites are often called the “navigation bars” and are usually found at the top or on a side of the page. The topics listed on the navigation bar(s) serve the same purpose as the main subjects in a typical book’s Table of Contents. Navigation bars might be made up of words or pictures. The NASA homepage has both (CLICK). The top arrow shows a navigation bar consisting of words. The bottom arrow shows a picture or icon navigation bar.

On some websites, if you roll your cursor over parts of the navigation bar without clicking, additional choices will appear. We call these dropdown menus – but they are simply more sections of the table of contents. For example, if I roll the cursor over “ABOUT NASA”, (CLICK), all of these additional options become visible.

Source of Graphic: www.nasa.gov

Slide 14



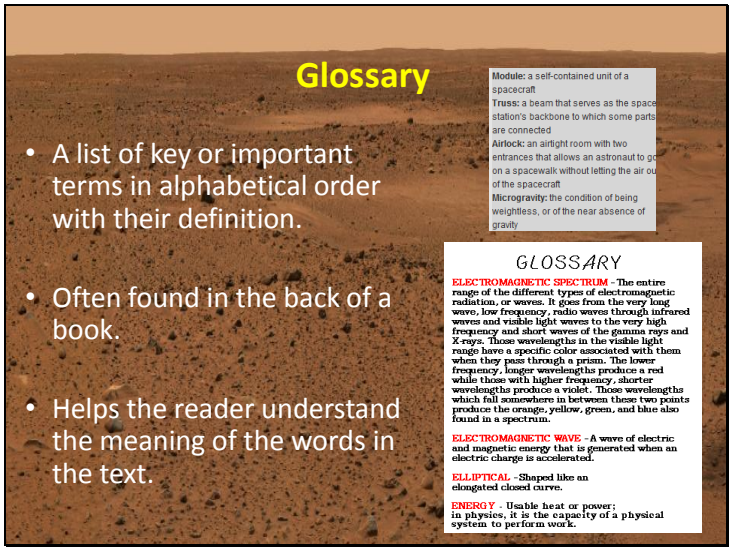
This slide has one CLICK of animation.

When we need to find information in a short article, we can simply scan the text and an index is not very important. However, when we need to find specific information in a book with hundreds of pages or on a website with a lot of pages and information, an index is very useful. Some books contain an index that lists all of the pages on which keywords and phrases may be found. For example, on the page shown here, if you need to find information on energy, the index tells you to look on pages 6, 8 and 16.

Some websites have indexes. CLICK

The one shown here is the NASA website index. For most websites, the index is linked to the actual information, so if you click on a line of the index, it take you to the related part of the website.

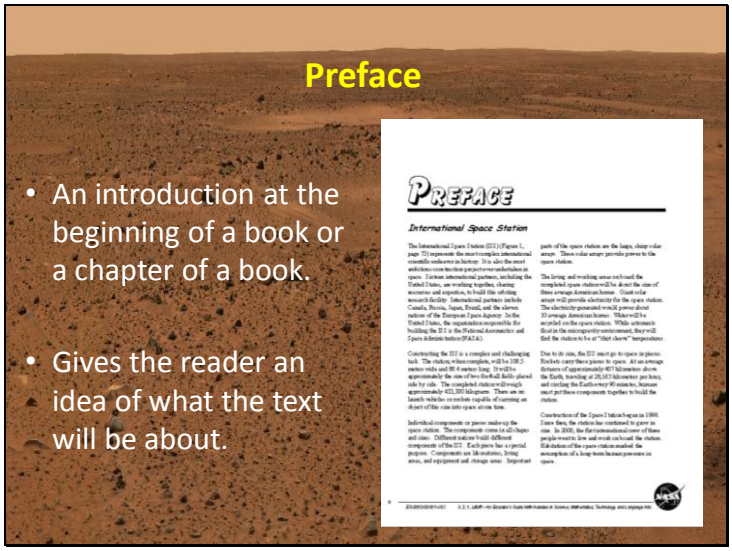
Slide 15



When you are researching, you sometimes will run across words that are new to you. In some books and websites, you will often find a glossary. A glossary is a list of key, or important words with their definitions. In books, glossaries are usually found in the very back, listed in alphabetical order. Some websites may have a special section labeled “glossary”. Other websites may have glossary terms in the margins. Some websites do not have a special section for a glossary or glossary words, but instead, they show these words in color or highlight them. In these cases, if you click on the word, there is likely to be a link to its definition.

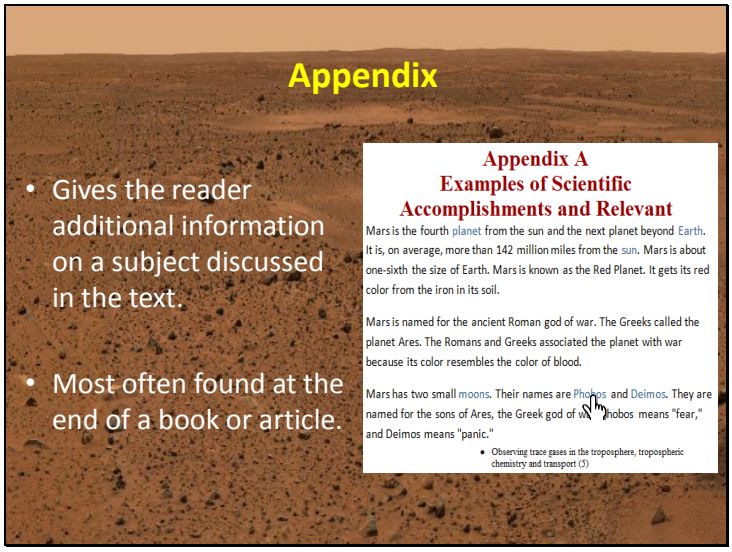
Source of graphics: http://www.nasa.gov/audience/forstudents/5-8/features/what-is-the-iss-58.html and
http://starchild.gsfc.nasa.gov/docs/StarChild/glossary_level2/glossary_e.html

Slide 16



(Paraphrase the information on this slide.)

Slide 17



This slide has 2 CLICKS of Animation

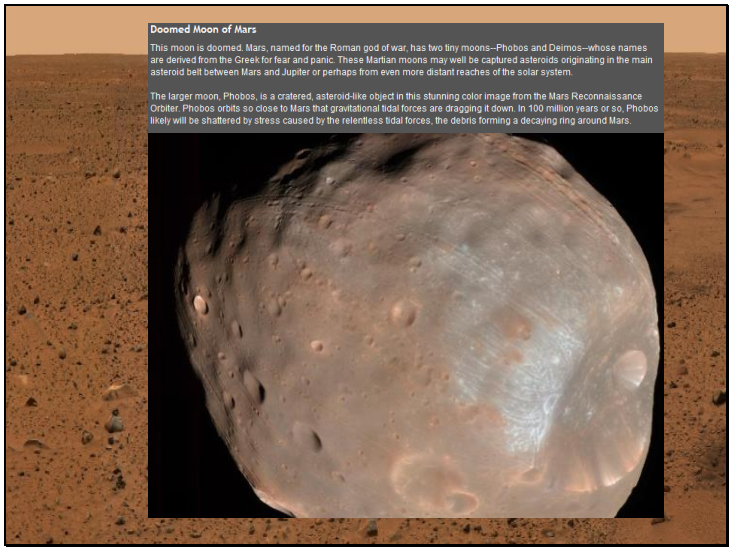
(Paraphrase the information on this slide.)

An appendix may be short or long. The appendix often has more detailed information than what is included in the book itself. For most readers, the information in the book is sufficient, but sometimes authors include an appendix for readers who may want further information.

Online sources usually don't have an appendix. Instead, online authors will include hyperlinks to the more detailed information. CLICK

As you can see, some of the words are in blue. If you place your cursor over the word PHOBOS (pretend to do so) the pointed finger click icon appears and if you want, you can click and get more information on the topic. CLICK

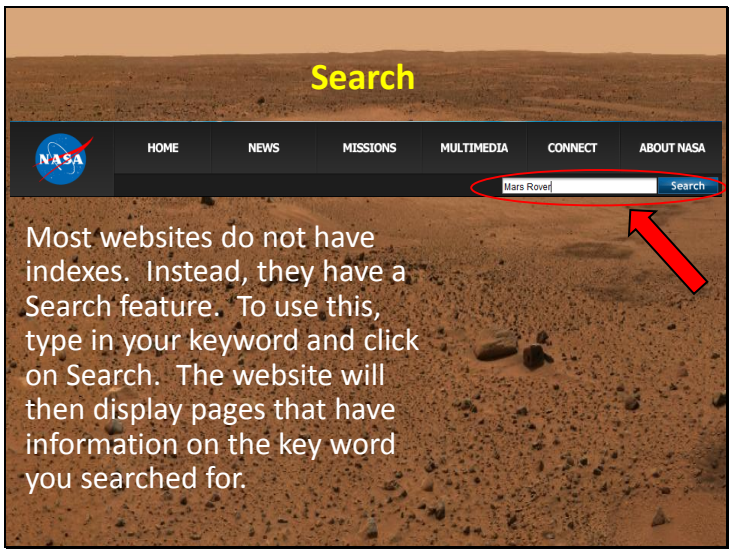
Slide 18



This link has further information and even a photograph of Phobos.

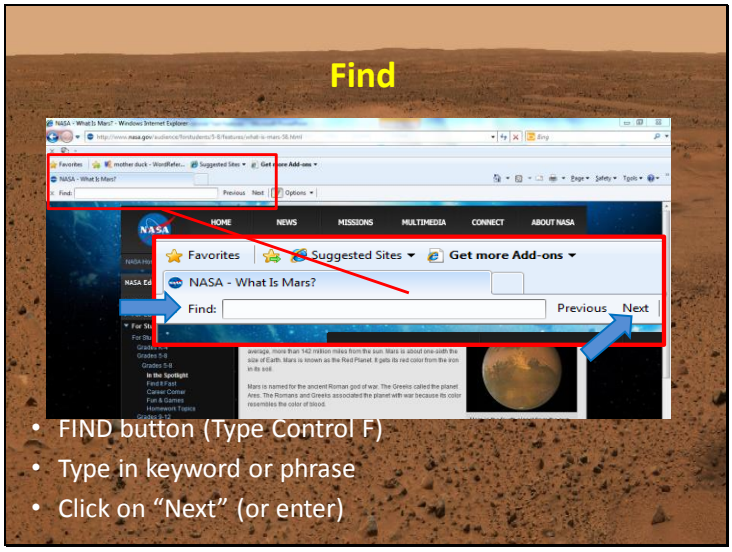
Source of Graphic: http://www.nasa.gov/multimedia/imagegallery/image_feature_1199.html

Slide 19



A useful tool on most websites in the SEARCH feature. This feature helps you find specific key words or phrases on the website. You simply type in the keyword or phrase and the SEARCH feature scans the website for a match. The website then displays the pages that have the key words or phrases you searched for.

Slide 20



Similar to the SEARCH feature, the FIND feature allows you to find a specific word or phrase on in the article of section you are reading.

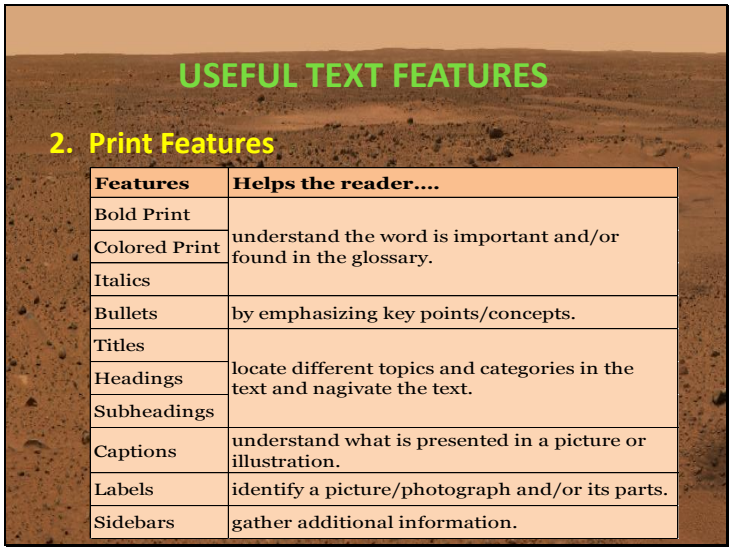
(This slide has 2 CLICKS of animation)

If you are searching online, the computer can do the scanning for you. CLICK

Look for a FIND button on your web browser. CLICK

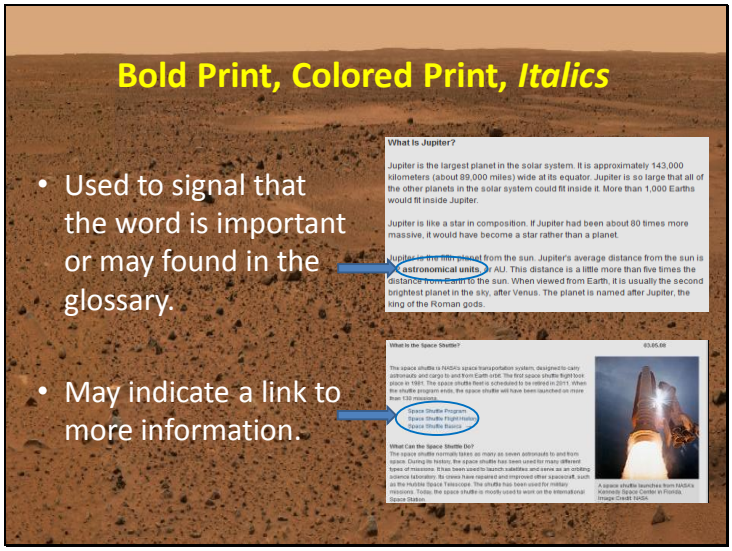
Type in your keyword and click on next. Just as I explained on the previous slide, read the information around the keyword to see if it helps your research. If not, click on Next and the computer will take you to the next place in the text where your keyword appears.

Slide 21



The next feature of informational text we will look at are what we call “Print Features”. These are usually a part of a page in a book or magazine or part of a single web page. Here you can see a list of some of the most common Print Features. Now, let’s look at each one of these in more detail.

Slide 22

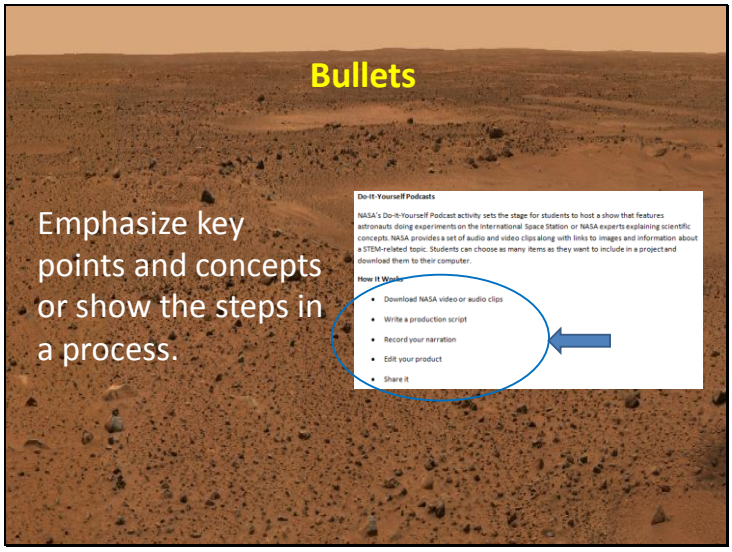


Informational text often uses bold print, colored print, or italic print to let you know that something is important, different in some way, or even to remind you that the term can be found in a glossary. When you come across a word in bold, colored or italic print, you should make certain you know what that word means. If a section of text is in bold, colored or italic print, it is likely an important piece of information and something you should be sure to read well and make sure you understand and remember it.

If the text you are reading is electronic, these types of print may indicate that more information is available by clicking on the word or rolling your cursor over the words/phrase. Doing this may provide you with a new web page or pop-up box that has more information about the word/phrase. In the example on this slide, you can see hyperlinks to additional information on the Space Shuttle Program; Space Shuttle Flight History and on Space Shuttle Basics.

Source of Graphics: http://www.nasa.gov/audience/forstudents/5-8/features/what-is-jupiter-58.html and
http://www.nasa.gov/audience/forstudents/5-8/features/what-is-the-space-shuttle-58.html

Slide 23

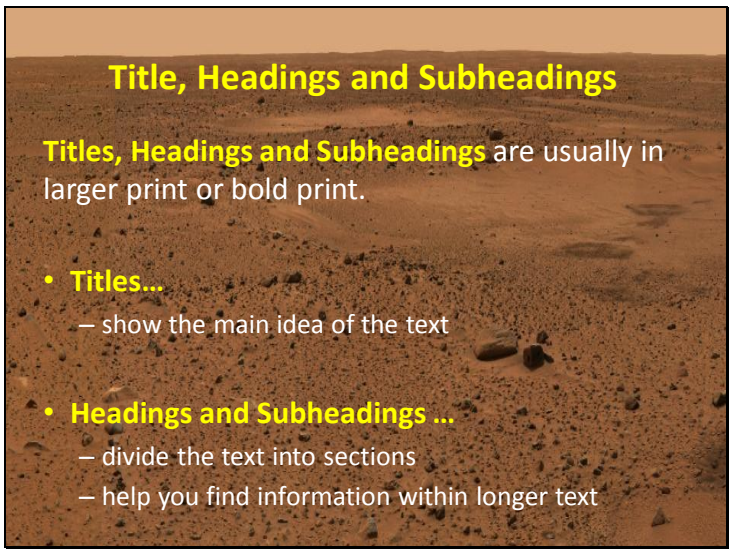


Bullets are used to indicate key points and concepts or to show the steps in a process.

Bullets usually appear together and highlight the most important information for the reader.

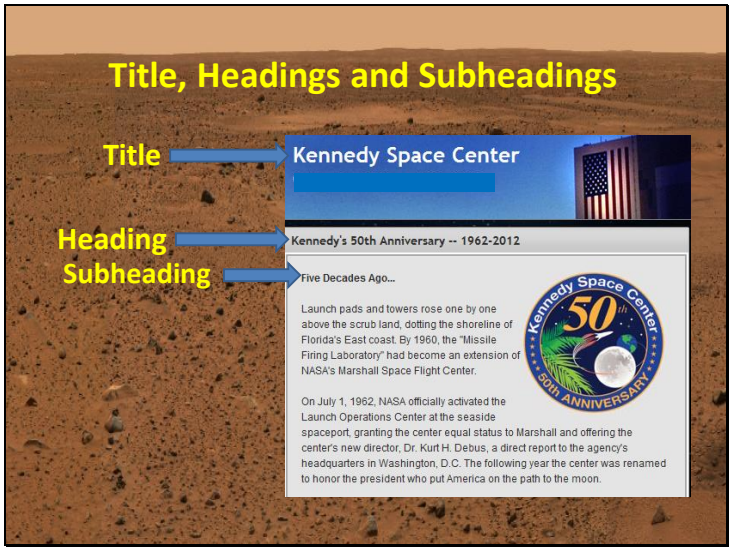
Source of graphic: http://www.nasa.gov/audience/foreducators/diypodcast/index.html

Slide 24



Other Print Features include…(Paraphrase the information on this slide.)

Slide 25



Titles are typically shown in the largest print. Titles tell the reader what the chapter or webpage that follows is about, just like the title of a book helps us to know what the book is about. In this example, the title lets you know that the article is about the Kennedy Space Center - the place in Florida where NASA launches missions to outer space.

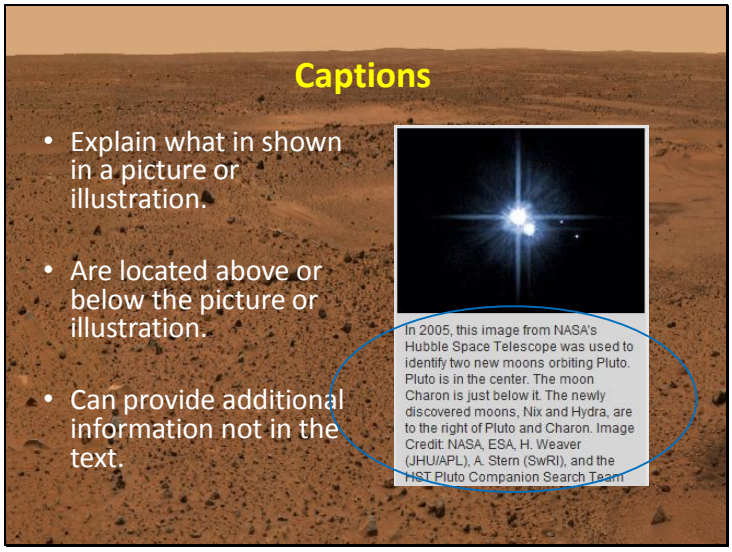
Headings are also written in larger print, but usually a little smaller than the title. A heading tells you what the next section of print is about. In this example the heading says "Kennedy's 50th Anniversary—1962-2012". This heading lets you know that the Kennedy Space Center had it's 50th Anniversary in 2012 and the text below has information about the last 50 years at the Center.

Some text also has subheadings. The sub-headings tell you about even more specific topics within the text. This subheadings says "Five decades ago…". SO, we know that the information in the following paragraph will be something about the Kennedy Space Center 50 years ago (or five decades ago).

So, if your PURPOSE is not to find information about the history of the Kennedy Space Center, or what happened at the Space Center in the last 50 years, this article is probably not going to be very useful for your specific research PURPOSE.

Source of Graphic: http://www.nasa.gov/centers/kennedy/about/history/index.html

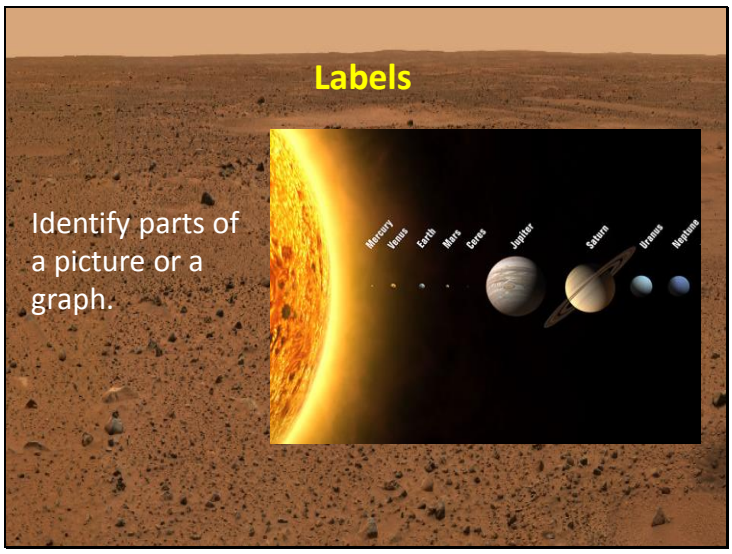
Slide 26



(Paraphrase the information on this slide).

Source: http://www.nasa.gov/audience/forstudents/5-8/features/what-is-pluto-58.html

Slide 27

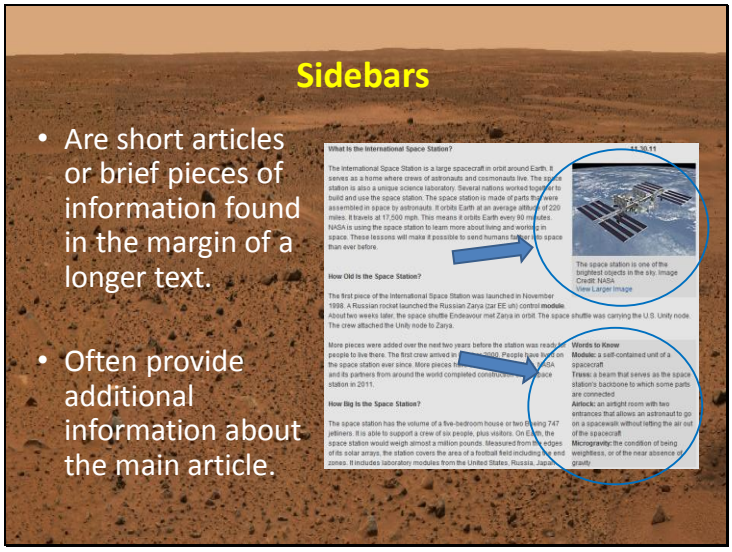


(Paraphrase the information on the slide. Explain the labeling as necessary.)

Source of Graphic: www.universetoday.com, which gives credit for the original to NASA.

http://www.universetoday.com/15891/lesson-plans-solar-system/

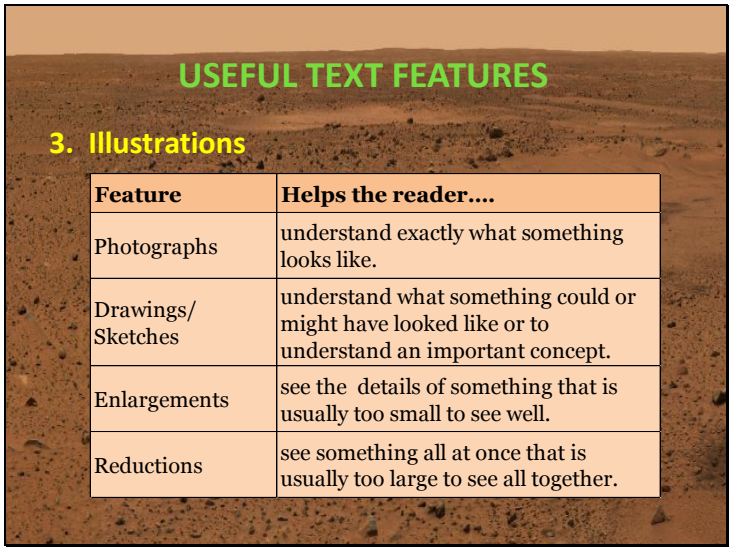
Slide 28



Authors will sometimes put information into sidebars. Sidebars appear in the margins of books, magazines and websites. Sometimes they are short stories about the topic being discussed. Other times, they are small pieces of information or pictures that are related to the topic. In other cases, they are lists of information – words or important points to remember about the topic.

Source of Graphic: http://www.nasa.gov/audience/forstudents/5-8/features/what-is-the-iss-58.html

Slide 29



Illustrations are another type of useful text features. Illustrations can be drawings or photographs. Let's take a look at how informational text uses illustrations to help readers better understand the text.

Slide 30

This slide has 1 CLICK of animation.

Authors do their best to help the reader understand the subject about which they are writing. However, some things are very difficult to describe using words alone. Let's read the text on this slide together:

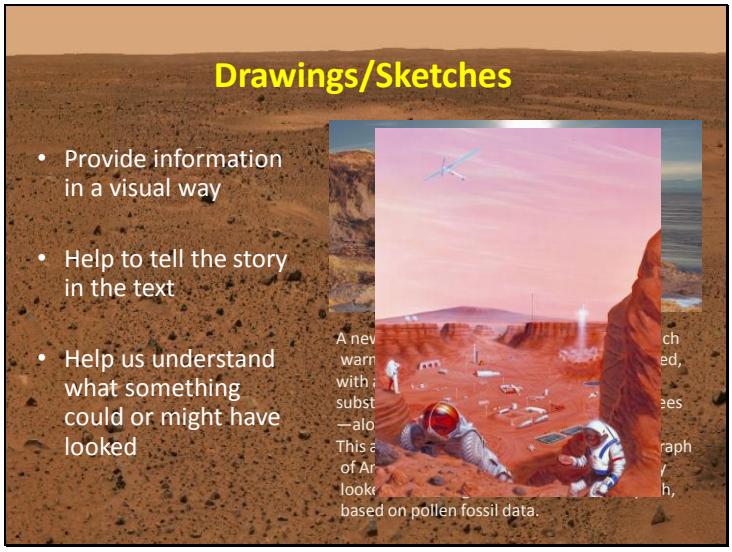
"When it lands, the shuttle's main landing gear touches down on the runway at 214 to 226 miles per hour, followed by the nose gear. The drag chute is deployed and the orbiter coasts to a stop." Now, let's add a photograph… CLICK

…and see if that helps us to better understand what the author wrote.

(Allow students to comment on how the photograph helps them understand the text better.)

Source of Graphic: http://www.nasa.gov/pdf/466744main_AP_ST_Phy_Landing.pdf

Slide 31



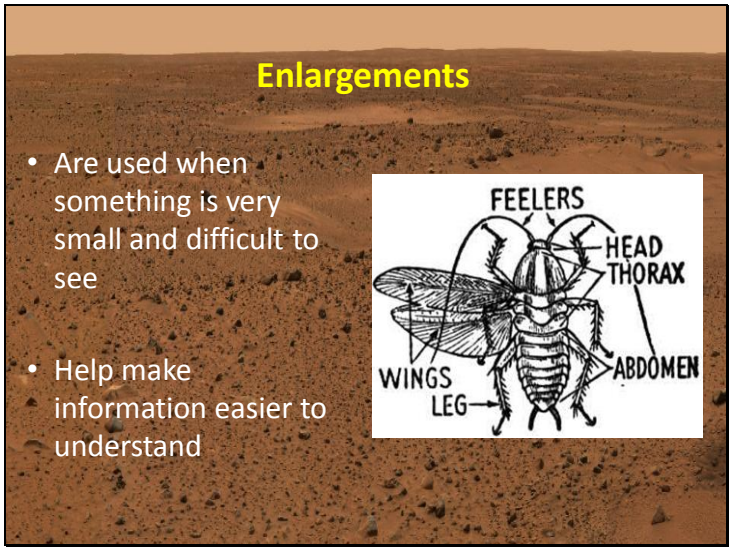
This slide has 1 CLICK of animation.

Photographs aren't always available to help explain text. An author may write about events that no one took a picture of, or that occurred before the camera was invented, or that pictures do not do a good job of describing. In these cases, authors might include drawings or sketches to help the reader. The picture on this page shows what an artist thinks Antarctica may have looked like thousands of years ago, when it was not covered by ice. CLICK

Drawings/sketches can also show what something may look like in the future. Shown here is an artist's concept of a future mission to Mars by people. Remember, currently only robots have landed on Mars.

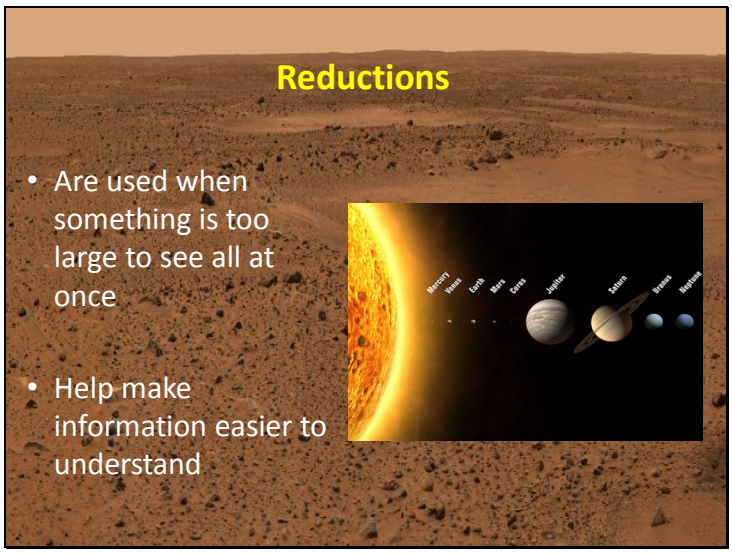
Source of graphics: http://www.nasa.gov/topics/earth/features/antarctica20120617.html and http://www.nasa.gov/topics/earth/features/antarctica20120617.html

Slide 32



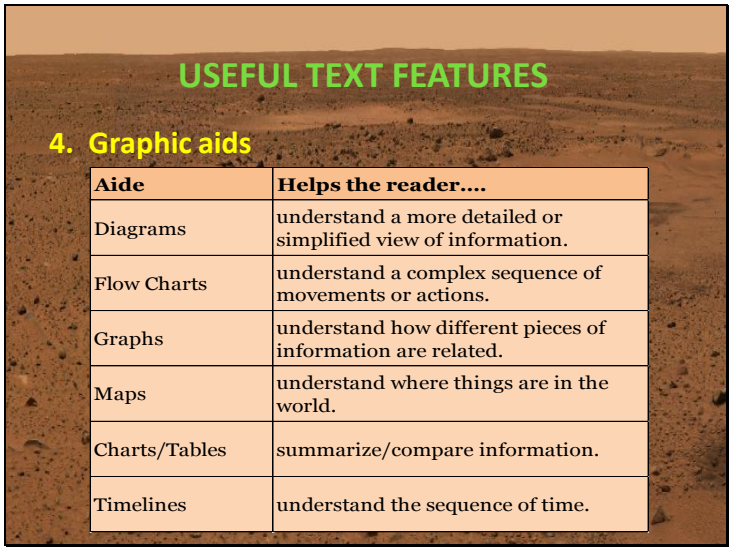
Another tool that authors of informational text use to assist readers is enlargements. When an something is very small, authors will sometimes use an enlargement of the object to make it easier to see. For example, most insects are too small for use to see much detail with just our eyes. As you can see, if we look at the enlargement on this slide, it is much easier for us to see the different parts of this insect.

Slide 33



Authors also sometimes use reductions to help us understand important information. When things are too large for us to see all at once, making them much smaller sometimes helps us understand how things look. In this example, the author wanted the reader to understand the relative size of the objects that make up our solar system. Since these objects are way too big for us to see all at once, he reduced their size. We can easily see that Jupiter and Saturn are the largest planets, but that both of these are tiny when compared to the sun. Even in this reduction, we only get to see a small part of the sun due to its size. (While the sizes of the planets and sun are to scale, the distances are NOT to scale.)

Slide 34



Another type of text feature that informational books and websites often include are graphic aids. Graphics are special types of drawings that help to simplify information that would otherwise be hard for us to understand. This table lists the most common graphic aids. Let's look at these one at a time.

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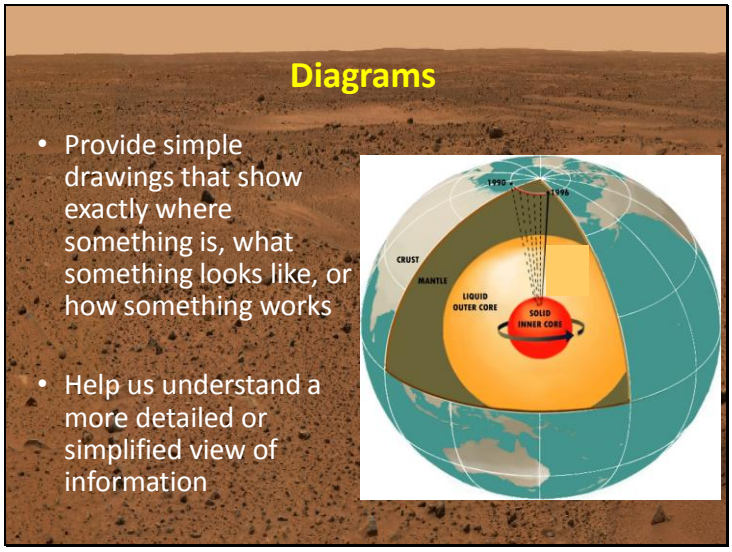

(Paraphrase the information on this slide.) This graphic helps us understand the different layers of the Earth that are below the surface and their motion. The diagram also shows that the rotation of the solid inner core actually moves the Earth's magnetic North Pole.

Source of Graphic: http://www.nasa.gov/images/content/607065main_world.jpg

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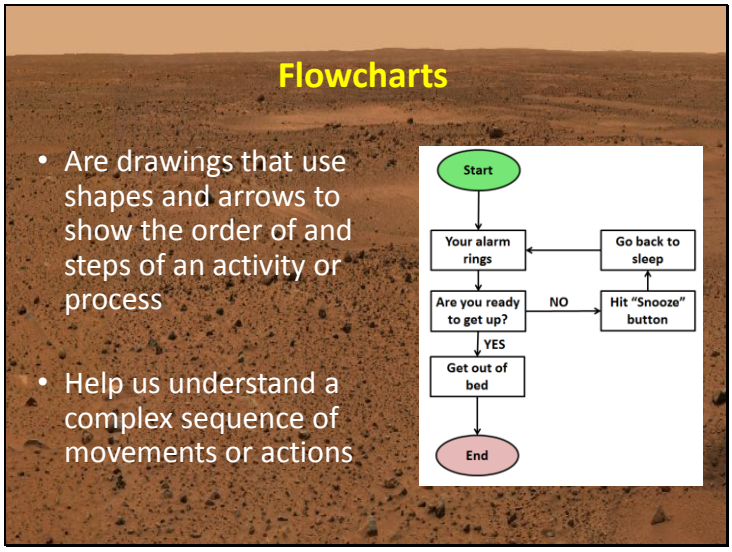
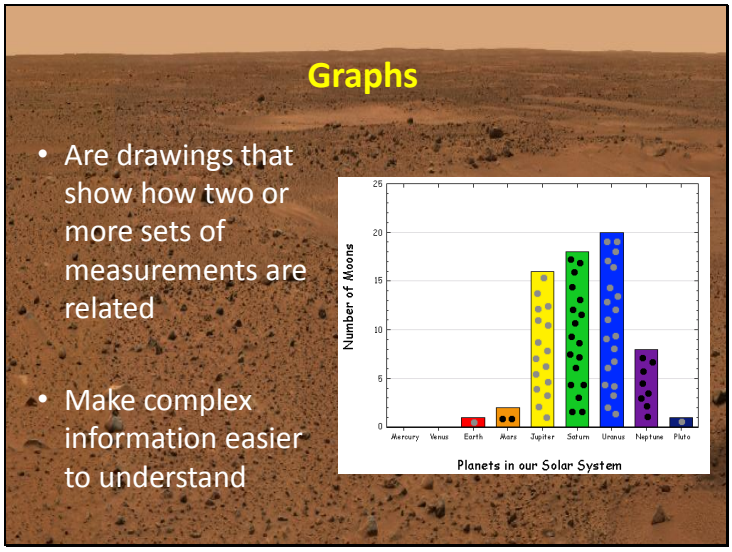


Another type of graphic is a flowchart. A flowchart is a drawing that uses shapes and arrows in order to show the order of and the steps of an activity or process.

(Walk your students through the getting out of bed flowchart logic.)

Slide 37



Another type of graphic often seen in informational text are graphs. There are many different kinds of graphs. The one shown here is a bar graph. Graphs can show us how two or more different sets of measurements are related. In the example shown here, the bar graph is comparing the number of moons that orbit the planets and dwarf planets in our solar system.

Source of Graphic:
Http://starchild.gsfc.nasa.gov/docs/StarChild/solar_system_level1/javascript/moon_count.html

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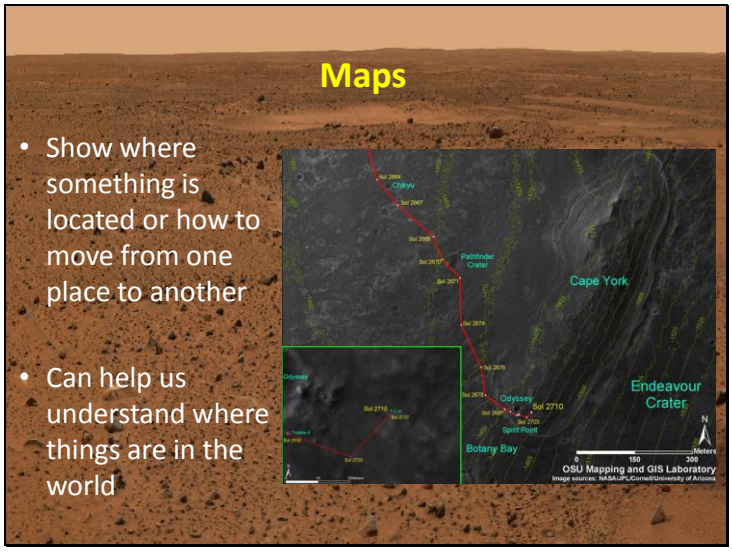

(Paraphrase the information on this slide.)

This map shows the progress of the Mars Rover Opportunity on the surface of Mars.

Source of Graphic: http://www.nasa.gov/mission_pages/mer/images/opportunity2710.html

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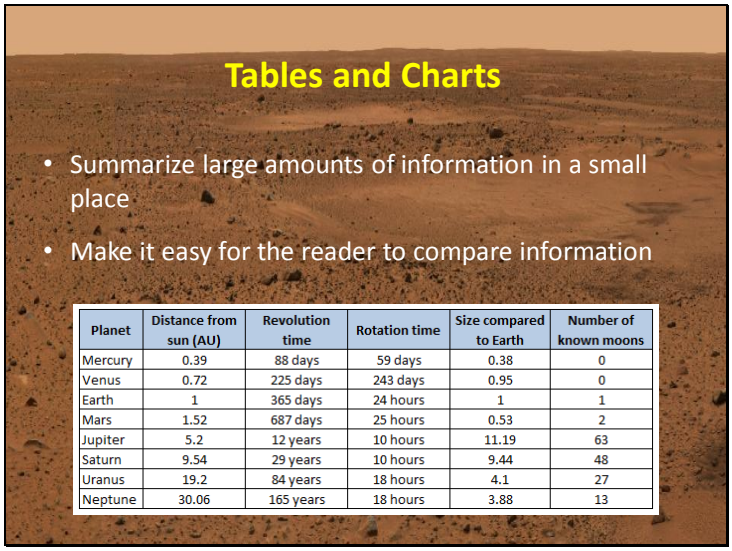

Planet	Distance from sun (AU)	Revolution time	Rotation time	Size compared to Earth	Number of known moons
Mercury	0.39	88 days	59 days	0.38	0
Venus	0.72	225 days	243 days	0.95	0
Earth	1	365 days	24 hours	1	1
Mars	1.52	687 days	25 hours	0.53	2
Jupiter	5.2	12 years	10 hours	11.19	63
Saturn	9.54	29 years	10 hours	9.44	48
Uranus	19.2	84 years	18 hours	4.1	27
Neptune	30.06	165 years	18 hours	3.88	13

There is one CLICK of animation on this slide.

(Paraphrase the information on the slide.) CLICK

The table shown here tells us a large amount of information in a very small space. It tells us how far away each planet is from the Sun, how long each one's revolution is, how quickly each planet rotates on its axis, the size of each compared to Earth and the number of known moons. The table takes up much less space than it would take to write all of this down in words. More importantly, the table format makes it very easy for the reader to compare information and to "see" the information the author wants the reader to know.

Source :"Major Planets of the Solar System (table) — Infoplease.com." *The Columbia Electronic Encyclopedia.*

05 Jul. 2012 <http://www.infoplease.com/ce6/sci/A0831284.html>.

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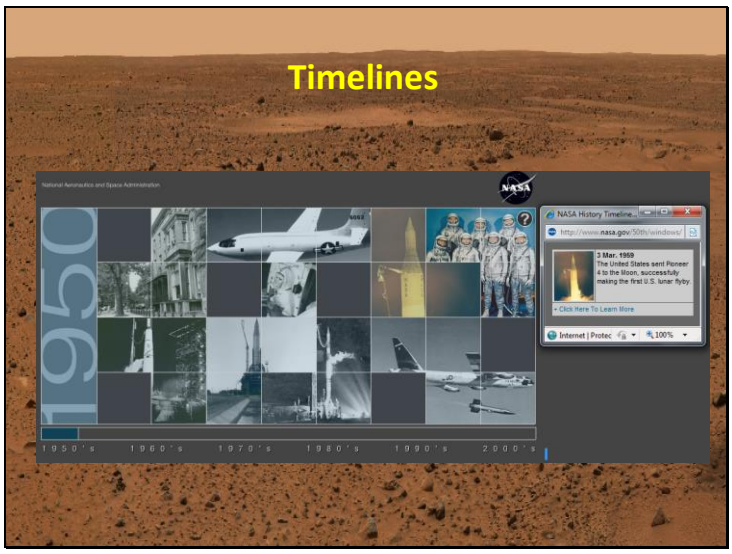

Timelines are graphics that provide a history or sequence of important events. Sometimes timelines are actually lines with dates marked in different places indicating when an important event occurred. Online timelines, such as the one above can be much fancier. This timeline shows important events in the history of NASA. On the bottom are ten year periods, called decades (1950s, 1960s, 1970s, etc…) Clicking on a decade brings up a grid of pictures like the ones above. You can then click on one of the pictures and a screen appears (like the one on the right) that provides the date and information on the event.

Source of graphic: http://www.nasa.gov/50th/timeline.html

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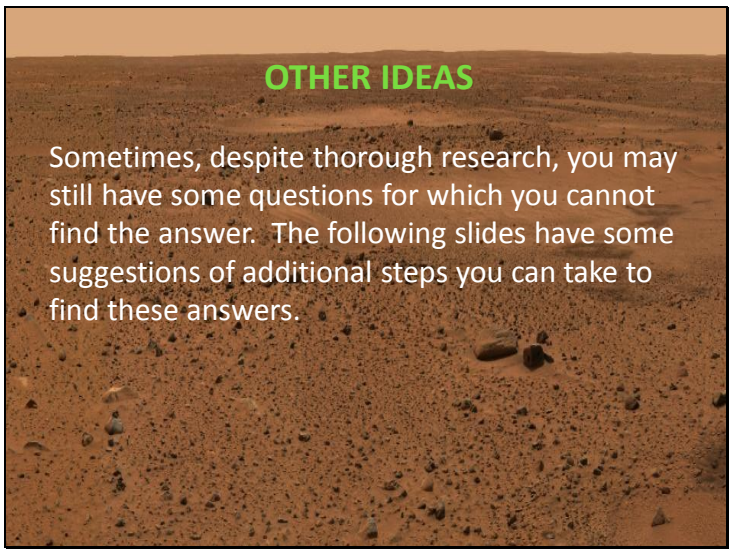

TEACHERS: It can be very frustrating for students when, despite thorough and well-thought out research, they are unable to answer some of their important mission questions. In these cases, remind students that their frustrations are no different than those of NASA scientists, who often need to discover the information they need.

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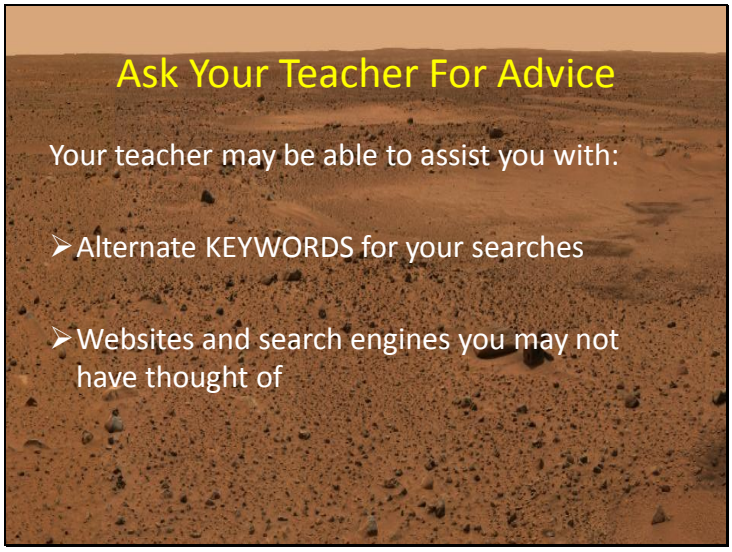

Your first stop should be your teacher. He or she may have some ideas you haven't thought of yet, such as providing you with some other key words you can use to search for the information you need. Your teacher may also be able to direct you to websites or search engines that you haven't tried or know about.

Slide 43

Read or paraphrase this slide.

TEACHERS: We have chosen not to include direct links to adults who may be able to assist with student research for many reasons. First, for internet safety, all research questions students have should come through you as an intermediary. We suggest you create a single email address on a free website (Yahoo, Gmail, Ymail, Hotmail, etc…) for your class and direct all emails through that address. You alone should have the password for that account and should approve all outgoing emails from students. To encourage responses from these very busy professionals, you may wish to include your own message above the student request explaining a little about your school, the Mars Rover Celebration and how the students will use the information.

You may be surprised at the number of professionals who will take the time to answer your students questions. Many people want to encourage students' curiosity and support the children's interest in their field of professional endeavor. However, do advise students that the people they are writing are extremely busy individuals who may or may not be able to take the time away from their job responsibilities to answer their questions. When possible, have a back-up individual to ask in cases where the first email goes unanswered.

Below you will find a list of possible sources of experts for you to ask. This list is by no means exhaustive, feel free to use other sources you have found on your own.

LOCAL UNIVERSITIES: Professors at local universities may be able to answer many student questions. The departments of Physics, Astronomy, Engineering, Natural Sciences and Technology all may be good starting points for mission related questions. In addition, the schools of English and Theater Arts may be excellent sources of ideas for the Mission presentations/skits.

AIAA (American Institute of Aeronautics and Astronautics): The AIAA representative will forward student inquiries to members who may be able to help your students with their research. Direct emails to: askanengineer@aiaa.org

NASA: NASA encourages students to use the website for finding answers to their research questions. When answers cannot be found, students may write to: public-inquiries@hq.nasa.gov . For such inquiries, NASA does ask that you allow 10-15 business days for answers. They also request that you include a subject line and do not include any attachments.

JANICE VAN CLEAVE: Janice Van Cleave is a well-known author of many children's science experiment books. In collaboration with this project, Ms. Van Cleave has generously offered her assistance as a Research Mentor and can be contacted at askjvc@aol.com.

PARENTS: There may be parents at your school who can serve as experts on a variety of topics. If you think this may be the case at your school, ask colleagues if they know of any parents who may be able to aid students with research.

WEBSITES: People who create science-related websites share the same interests as your students. Creators of websites where students have found some answers to their research questions may be good people to approach. Most websites have a "CONTACT US" page.

WRITERS IN THE SCHOOLS: Some localities have organizations that can send poets, writers, essayists, journalists and playwrights to your school to help students develop their skits. If this is not available in your area, you might still be able to invite a local writer to assist your students in writing their presentations. Check with local newspapers and theaters for people who may be willing to work with your students.

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Scientists, engineers and designers are extremely busy people. In order to answer a question from you, they must take time away from their job. Remember, you are asking them for a favor, so when you ask your question, do so respectfully. Say words like PLEASE, THANK YOU and APPRECIATE.

Since these people are extremely busy, you need to carefully write your email. Keep your email CONCISE. This means keep your email short by only writing the most essential information. Don't tell this person about your pets, school or classmates. Tell them that you have tried to find the information on you own but that you were unable to find the answer in your research. Then ask your question CLEARLY. Make sure that your question will be understood exactly as you want. Have your teacher read the question first. If your question is not clear, the answer you receive may not help you with your mission.

Since the adults you write are very busy, they may not always have time to answer your question. This may be disappointing, but do remember that this is a possibility when you write someone. You may have to write several experts before you receive an answer. You might also receive an answer that comes late. If this happens, you may have to re-write part of you mission after you thought you were finished. This may be frustrating for you, but this is part of doing research and happens to real scientists frequently.

Finally, never write a stranger unless your teacher or your parents say it is okay. This is for your own safety.

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Read or paraphrase the information on this slide. Tell students the information below...

TEACHERS: Your students, just like NASA scientists, are working on cutting edge science and technology. Sometimes, there are no answers to the questions they have. In these cases, these scientists, designers and engineers must make their best hypotheses or guesses. If all else fails, your students may have to make their best guess or hypothesis based on all of the other information they have learned.

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TEACHERS: Mentor the students through this process. Guesses should not be wild guesses, but should be thoughtfully made, based on the research they have done, the knowledge they have gained and hunches. Mentor your students through this process. Often it is helpful to do a "think aloud" with your students. In a think aloud, you explain how you make a similar guess by telling students your thought processes as you go from what you know to your educated guess. Encourage students to do the same and guide their thoughts as they develop their guess.

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