



Storm Watch

Unit Summary

People often wonder what causes the different weather conditions they experience. This unit helps students understand the many factors that determine what the weather is like in a particular location, such as the angle of the sun's light rays, the tilt of the Earth's axis, and the proximity to water, winds, and elevation. Students conduct many scientific investigations to understand the complexities of weather systems and to answer Content Questions, such as, *What are weather systems, How does air pressure affect our weather, and What causes change in our weather?* Throughout the unit, students are asked to ponder the Essential and Unit Questions, *How do people respond to change?* and, *How does weather affect our lives?* In a final presentation, students take on the role of weather forecasters and report on weather conditions in a city they would like to visit. They demonstrate their understanding about the factors contributing to weather that people throughout the world experience each day.

Curriculum-Framing Questions

- **Essential Question**
How do people respond to change?
- **Unit Questions**
How does weather affect our lives?
- **Content Questions**
What are the reasons for the seasons?
What are weather systems?
What causes change in our weather?
How does air pressure affect our weather?

Assessment Plan

Assessment Timeline

This timeline shows in chronological order the different types of formal and informal assessments that occur during the unit. The table below explains how each assessment is used and who uses it for what purpose.

At a Glance

Year/Form: Year 3 to Year 5

Subjects: Science, Math, English Language

Topics: Earth Systems, Data Analysis, Writing and Speaking

Higher-Order Thinking

Skills: Cause and Effect, Analysis

Key Learnings:

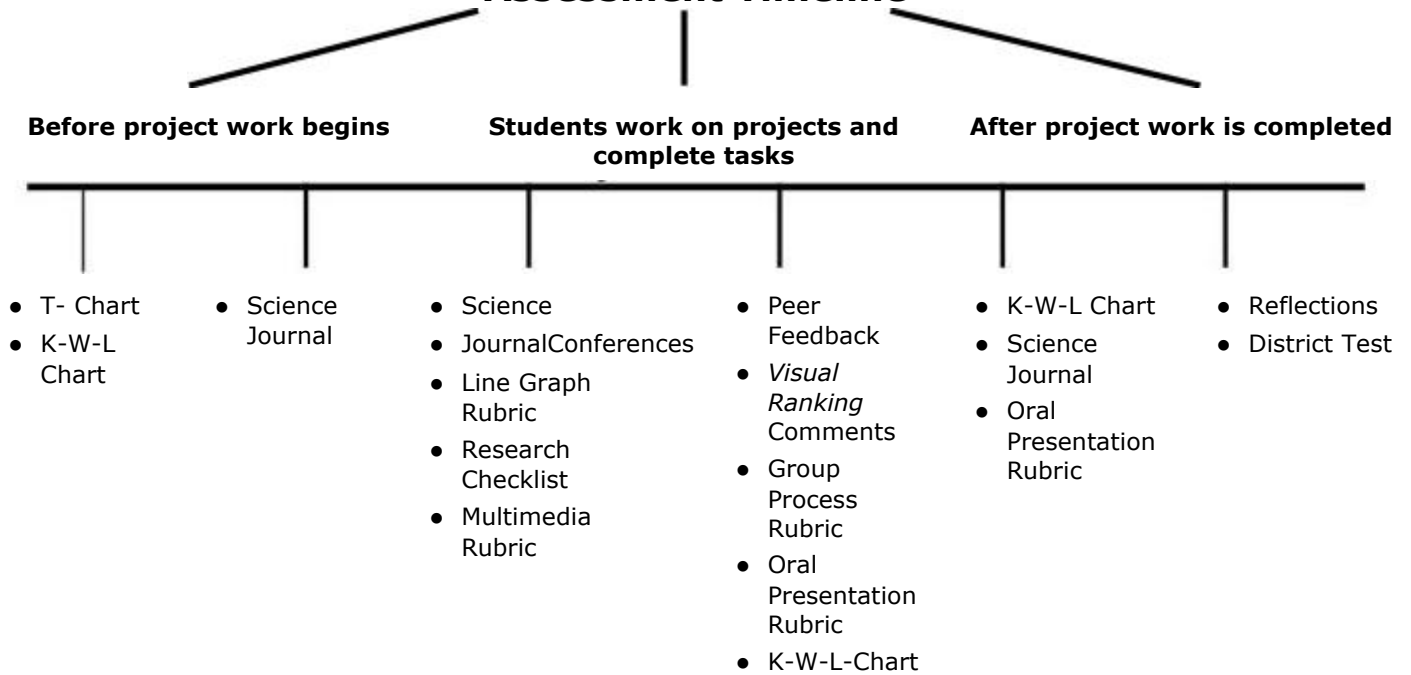
Measurement, Weather Changes, Patterns, Public Speaking

Time Needed: 6 weeks, 45 min/day

What You Need

[Instructional Procedures](#)
[Standards](#)
[Student Samples](#)

Assessment Timeline



Assessment	Process and Purpose for Assessment
T-Chart	Students create a T-Chart to compare and contrast fact from fiction in a story. The teacher uses it as a pre-assessment to determine readiness for studying weather.
K-W-L Chart	Students develop a class K-W-L chart about weather and then create an individual K-W-L in their journals. Students return to these throughout the unit to add additional questions and new learnings. The teacher reviews for understanding and to monitor progress.
Science Journal	Students make observations and keep notes in their science journal as they investigate weather systems. Students complete specific observations and reflections prompted by the teacher at key times during the unit. The teacher reviews during conferences to provide feedback, clarify misunderstandings, and provide additional lessons if necessary. The teacher reviews at the end of the unit to assess scientific understanding.
Conferences	The teacher schedules conferences to assess the students' scientific understanding and the research process and allow for feedback, clarifying misunderstandings, or providing additional lessons if necessary. Pre-planned questions and notes provide documentation for project assessment.
Line Graph Rubric	Students use the rubric to help them complete a line graph with data from their investigations. The teacher uses the rubric to assess their final line graph.
Research Checklist	Students use the checklist to guide them through the research process. Teachers ask students to bring the checklist to conferences to monitor progress and allow students to ask questions. Teachers use the checklist to assess student's research skills.
Multimedia Rubric	Students use the rubric to ensure they've met the expectations as they research a weather system and present their findings. Peers use the rubric to provide feedback to the presenters.
Visual Ranking Comments	Students rank the steps to take in a severe weather system. The teacher probes student understanding and reasoning through questioning, reviewing comments, and providing feedback.
Group Process Rubric	Students use the rubric to monitor their collaboration skills as they work together in groups on the <i>Visual Ranking</i> activity. The teacher reminds students to refer to the rubric when there are disagreements or issues about group process skills.

Oral Presentation Rubric	Students use the rubric to guide them through the research and presentation phases of the project. The teacher uses the rubric to assess content integration and oral presentation skills.
Reflections	Students reflect on areas of strength and areas needing improvement after the oral presentation. They also reflect on the Curriculum-Framing Questions throughout the unit. The teacher reviews the reflections to analyze student understanding and to gauge student's metacognitive abilities.
Test	The teacher uses the test results to assess student's science content knowledge.

Credits

Jeanne Shirley participated in the Intel® Teach Program, which resulted in this idea for an assessment plan. A team of teachers expanded the plan into the example you see here.

***Note:** The hyperlinked support documents are not part of the PDF. They can be downloaded and printed individually.*

Instructional Procedures

Introduction to the Unit

Read the *The Big Storm* by Bruce Hiscock. Discuss the family's reaction to being in the middle of a tornado. Make a T-chart comparing and contrasting the facts from fiction in the story.

Pose the Essential and Unit Questions, *How do people respond to change?* and *How does weather affect our lives?* Ask for examples from the story and from the students' lives. Discuss the victims of Hurricane Katrina and how the lives of many people were changed. (See the *Scholastic News* article regarding the Hurricane Katrina).

Introduce the project by telling the students that they will become weather forecasters for a city of their choosing. Describe the activities for the next six weeks, which include researching weather systems, investigating the causes of change in the weather and the seasons, and presenting findings for the class.

Construct a class K-W-L chart about weather to refer back to throughout the unit. Ask students to make their own K-W-L in their science journals and remind them to add questions and new learnings as they move through the unit.

Weather Investigations

Introduce students to the weather investigations by posing the Content Question, *What causes change in our weather?* Record student responses and then ask students to write in their science journals two or three hypotheses about the causes of weather change. Have students then conduct many investigations related to weather phenomena:

- The relationship between temperature and latitude
- The tilt of the earth's axis and its effect on solar energy and the seasons in different parts of the world
- The temperature patterns among cities found at the same latitude, but at different locations (near the coast, inland, elevation)
- Temperature of land versus water
- The properties of air and how they connect to winds

To assess mathematical understanding, ask students to collect data from their investigations and choose one to display in a graph. Hand out the **line graph rubric** to help students understand the expectations.

Ask students to construct a model to show the relationship of the earth's tilt and the direct and indirect rays of the sun. Also have students create a display of the water cycle, its connection to the sun's energy, and how this affects the weather. As students work on these models, circulate throughout the room, taking notes and asking questions to clarify understanding or to probe for reasoning.

Reintroduce the Content Question, *What causes change in our weather?* Ask students to reflect back on the activities and then respond to the question in their science journals. Review the journals as a check for understanding and re-teach concepts as necessary.

Multimedia Presentation

Ask students to decide on a weather system to research on the Web and then develop a slide presentation with facts and graphics related to their topic. Distribute the **research checklist** and **multimedia rubric** to help students understand expectations. Set individual **conferences** during the research phase to monitor student progress.

Have peers use the **multimedia rubric** to provide feedback to the presenters. This helps students hone their presentation skills for the weather forecaster oral presentation.

Visual Ranking Activity

Ask the class to brainstorm a list of possible steps to take if caught in a severe weather situation. Hone the ideas down to seven or eight possibilities and input the list into the [Visual Ranking Tool](#).

Place students in groups of three or four based on different weather systems (hurricane, flash flood, tornado, winter storm, etc.) and ask them to rank the list of steps to take from most important to least important. Distribute the group **process rubric** to help students monitor their collaboration skills. As teams work, remind them to use the comment feature of the tool to add explanations about why they have ranked the steps in that order. Ask questions to foster discussion and help students formulate their rationale:

- *Why do you think certain steps are especially important and others not so important when in a severe weather*

system?

- *What factors are unique to this type of weather system?*
- *Would you respond differently if you were older, younger, or in a different part of the world?*

Review the comments and provide additional comments back to the groups to consider. Then ask groups to compare their rankings with the other groups and discuss the similarities and differences they see.

Oral Presentation

Distribute the **oral presentation rubric** and review with the students.

Ask partners to decide on a dream vacation destination. Have teams then research weather conditions for the city, use their knowledge from the scientific investigations, and present their information as a weather forecaster. Remind students that they must include the temperature, climate, weather systems, and reasons for the weather systems they might encounter on their trip during the period they will be visiting.

Use the **oral presentation rubric** to assess the oral presentations. Ask students to review the assessment and reflect in their journals on things they did well, things they learned, and things they'd like to improve. Use the sample **reflection prompts**.

Wrap-Up

Lead a class discussion to answer the Unit Question, *How does weather affect our lives?* Ask students for specific examples they've discovered throughout the project and record on a chart.

Pose a "What if" question to provide students the opportunity to examine their understanding from a different perspective. Ask, *What if you had traveled to your vacation destination six months later? How would the weather have changed?* and *How would you respond to this change?* Ask students to write a response to these questions in their journal using the knowledge they've gained from the unit to provide a factual basis in support of their new suppositions.

Administer the Weather Systems final test to help in determining science content understanding.

Targeted Content Standards (Curriculum Specifications) and Benchmarks

Colorado State Standards

English

Write and speak

- write and speak for a variety of purposes such as conveying technical information, explaining concepts and procedures, and persuading
- organize written and oral presentations using strategies such as lists, outlining, cause/effect relationships, comparison/contrast, problem/solution, and narration

Read to locate, select, and make use of

- select relevant material for speaking purposes
- understand the structure, organization, and use of various media, reference, and technological sources as they select information for their reading and writing
- paraphrase, summarize, organize, and synthesize information
- give credit for others' ideas, images, or information
- use information to produce a quality product

Science

Inquiry

Grade 5 – 8 (Year 4 to Form1)

- ask questions and state hypotheses that lead to scientific investigations
- make predictions based on prior experiences and understandings
- use appropriate tools, technologies, and metric measurement units to gather and organize data
- summarize data and communicate results of investigations in a variety of ways, including written reports, graphs, charts, data tables, and oral presentations
- work as a group to solve a problem

Earth's systems and the dynamics of the solar system and the universe

Grade 5 – 8 (Year 4 to Form1)

- describe the atmosphere
- observe changes in weather conditions
- describe weather systems
- explain how the sun affects atmospheric circulation
- investigate the occurrence of storms and explain their effects on human populations and the environment

Math

Grade 5 – 8 (Year 4 to Form1)

- read, construct, compare, and contrast displays of data using appropriate techniques and technology
- gather data, formulate hypotheses, draw conclusions, and make convincing arguments based on data analysis

Technology Foundation Standards for Students

- Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.
- Students use technology to locate, evaluate, and collect information from a variety of sources.

Student Objectives

Students will be able to:

- Work like scientists to plan, conduct, analyze, and report the results of various scientific investigations
- Make periodic measurements and record temperature, wind speed, cloud cover, precipitation, and graph results using various displays (bar or line graph)
- Document the methods of their investigations in a science journal
- Synthesize information from a variety of electronic sources (weather Web sites, etc.)
- Produce an informational oral presentation that synthesizes information from multiple sources

Assessing Projects: Storm Watch
Student Samples

[Line Graph Student Work](#)

Here are student samples of line graphs and final assessments at three different levels of performance:

Line Graph Student A [View as Microsoft Word*](#) | [View as PDF](#)
Assessment Student A [View as Microsoft Word*](#) | [View as PDF](#)

Line Graph Student B [View as Microsoft Word*](#) | [View as PDF](#)
Assessment Student B [View as Microsoft Word*](#) | [View as PDF](#)

Line Graph Student D [View as Microsoft Word*](#) | [View as PDF](#)
Assessment Student D [View as Microsoft Word*](#) | [View as PDF](#)

Sample Conference Questions

Questions	Notes
<p>Before Project Work</p> <ul style="list-style-type: none"> • Why are you learning this? • What do you know from previous work that can help you with this project? • What problems do you usually have with projects and how are you going to deal with them? • How are you going to use your strengths in this project? • How interested are you in learning this? • How difficult will it be for you to learn? • What are the critical questions? • What should you do first? • Do you know what you need to know? What questions do you need to ask? • Where can you find answers to these questions? • How much time will you need to do this? • What can you do during this project that will challenge you? 	
<p>During Project Work</p> <ul style="list-style-type: none"> • What do you do when you are working on a project and you find yourself unable to do something? • What are some strategies you can use to keep on track? • What do you notice about your thinking? • How did you remember that information? • Are you checking your understanding as you work? How? • Are there other ways you could work that may be better? • How can you see an error if you make one? • How could you expand on this? What is the logical next step? What is missing? What needs to be filled in? • When might it be a good idea to revise something? • Why do you think that is so? 	
<p>After Project Work</p> <ul style="list-style-type: none"> • What can you tell me about your project? • What is the most important thing you learned from this? Why? • What did you think was easy to do and hard to do? Why? • What changes would you want to make? 	

- Did you meet all of your goals?
- How did your planning contribute to the success of the project?
- What did you learn about yourself by doing this project?
- How has your thinking affected your learning?
- What goals can you set for the future?
- How can you apply your learning to new situations?

Assessing Projects: Storm Watch
Gauge Student Needs

The Big Storm
by Bruce Hiscock

What are facts in the story?

What is fiction in the story?

Group Process Trait Rubric

	4	3	2	1
Group Process	<p>We paraphrase what others have said in our group to clarify understanding.</p> <p>We ask probing questions.</p> <p>We encourage and value the ideas and opinions of our group members.</p> <p>All of us can express our opinions and positions without hurting the feelings of others in our group.</p> <p>Our differences are appreciated--We seek out diverse opinions and try to come to common understanding.</p>	<p>We can respond verbally to the ideas of others in our group and may ask for clarification.</p> <p>We are interested and curious about the ideas of others in our group.</p> <p>Our opinions are communicated without passing judgment such as using "I" versus "you" messages.</p> <p>We can extend our discussions beyond our initial thoughts and ideas.</p> <p>Differences that we have are resolved.</p>	<p>We acknowledge the ideas of others.</p> <p>Occasionally we repeat the ideas of others to acknowledge or indicate support.</p> <p>Sometimes, we have a difficult time responding to the ideas of others in our group.</p> <p>We pay attention to the consequences of what we say or do at times, and taking turns or accepting suggestions from others is difficult.</p> <p>Our differences are sometimes ignored and when acknowledged, can be left unresolved.</p>	<p>We offer feedback only if requested.</p> <p>We have difficulty responding to questions.</p> <p>Our contributions are neither acknowledged nor responded to.</p> <p>We don't pay attention to the consequences of what we say or do.</p> <p>Our differences are usually suppressed or ignored and sometimes result in arguments.</p>

Line Graph Rubric

	4	3	2	1
Titles/labels	My title, labels, and key are accurate, clear, and appropriate for the theme of the line graph.	I labeled my graph accurately. The title is appropriate to the line graph.	My title and some of my labels are accurate. The title is not appropriate to the line graph.	My title and labels are inaccurate, missing, or do not make sense to the reader, nor do they relate to the line graph.
Organization	All data is spread along the line graph with equal intervals. Temperatures are recorded on the y-axis line. Time is recorded on the x-axis line.	Most data is spread along the line graph with equal intervals. Temperatures and time are on appropriate axis lines.	There is some order of data along the line graph. Temperatures and time are not on appropriate axis lines.	There is no organization of data located within the line graph.
Conventions	My line graph contains no spelling or grammatical errors.	My line graph has a few spelling or grammatical errors that do not distract the reader from the content.	Many spelling and grammatical errors interfere with understanding the line graph.	Multiple errors in both spelling and grammar distract the reader from the content of the line graph.
Data	My data is a result of accurately recording temperatures in a lab investigation.	My data is a result of performing a lab investigation with few errors.	My data is a result of performing a lab investigation with some errors.	My data is a result of performing a lab investigation with many errors.

Multimedia Rubric for Weather System Presentation

	4	3	2	1
Knowledge of Subject Matter	<p>My presentation demonstrates in-depth understanding of a particular weather system:</p> <ul style="list-style-type: none"> I correctly name all the parts of the system, explain how they work and why they're important. I explain how the different parts relate to each other and how changes in one part affect other parts. <p>I am the expert who can answer reasonable questions with certainty.</p>	<p>My presentation demonstrates understanding of major concepts related to a weather system:</p> <ul style="list-style-type: none"> I correctly name all the parts. I explain how the different parts of a system work together. <p>I answer majority of reasonable questions.</p>	<p>My presentation demonstrates that there are gaps in conceptual understanding related to the weather system:</p> <ul style="list-style-type: none"> I correctly name some of the parts, but I do not explain how they work very well. I explain some ways that parts of a system work together. <p>I answer some questions.</p>	<p>My presentation shows significant gaps in conceptual understanding of the weather system:</p> <ul style="list-style-type: none"> I make many errors in naming the parts and explaining how they work together. I cannot explain how different parts work with each other in a system. <p>I cannot answer questions.</p>
Writing	<p>My headings and subheadings are used effectively to convey relationships among ideas.</p> <p>My bullets summarize main points using well chosen and descriptive words.</p> <p>My presentation contains no spelling, grammatical or typing errors.</p>	<p>My headings are used effectively.</p> <p>My bullets summarize main points. Technical and unfamiliar words are explained.</p> <p>My presentation contains a few spelling, grammatical, or typing errors that slightly detract from the content.</p>	<p>My headings are used somewhat effectively.</p> <p>My bullets summarize main points. Technical and unfamiliar words are not explained.</p> <p>My presentation contains spelling, grammatical, or typing errors, that detract from the content.</p>	<p>My presentation does not use components of technical writing (eg. headings and bullets) to convey meaning.</p> <p>My presentation has numerous spelling, grammatical or typing errors that make it difficult to understand.</p>
Graphics	<p>My graphics explain and reinforce the screen text and add to the presentation.</p>	<p>My graphics are relevant to the text and presentation.</p>	<p>I occasionally use graphics that support the text and presentation.</p>	<p>I do not include graphics in my presentation.</p>
Preplanning Scaffold or Storyboard	<p>My preplanning demonstrates material has been planned in a logical and sequential order. Place holders for appropriate graphics are in place.</p>	<p>My preplanning has been done. The material is planned in a logical order. Some place holders for graphics are in place.</p>	<p>I have done some preplanning, but information is not organized in a logical manner. The planning does not reflect the required material.</p>	<p>I have not completed any preplanning for my presentation.</p>
Internet	<p>I have researched and</p>	<p>I have researched and</p>	<p>I have researched and</p>	<p>I have shown no</p>

Resources

correctly cited a minimum of three Web sites in the presentation.

correctly cited a minimum of two Web sites in the presentation.

correctly cited a minimum of one Web site in the presentation.

evidence of researching Web sites OR the sites are not cited properly.

Weather Forecast Oral Presentation

	4	3	2	1
Eye Contact	I look at the audience almost all of the time. I make direct eye contact with most of the members of the audience at some point in the talk.	I look up for most of the talk. My direct eye contact with members of the audience is sporadic.	I look at the audience part of the time. When looking up, I make little direct eye contact with members of the audience.	Most of the time, I do not look at the audience.
Voice	Every spoken word can be heard and understood clearly with no difficulty by each person in the audience. I use an expressive, engaging tone of voice to keep my audience's attention throughout the presentation.	A very brief portion of the talk may be unclear or inaudible to some members of the audience OR the audience has to make an effort to hear and understand. I use an expressive tone of voice to keep my audience's attention.	Several parts of the talk are unclear or inaudible to some members of the audience OR one portion is unclear or inaudible to most of the audience. I try to use an expressive tone of voice, but I get distracted or I'm nervous so it doesn't always work.	Several portions of the talk are unclear or inaudible to most of the audience. I use a monotonous tone of voice and lose my audience's attention.
Pace	My talk moves at natural rate and rhythm. There are no inappropriate pauses or silences.	My talk is slightly hurried or slow. There may be occasional gaps of "dead air" that do not detract from the meaning.	My talk is somewhat hurried or sluggish throughout OR there are several noticeable pauses in an otherwise well-paced talk.	My talk is noticeably rushed or protracted OR there are several lengthy pauses in the talk.
Knowledge of subject	I thoroughly integrate my knowledge of the weather concepts (temperature, climate, elevation, proximity to water, severe weather expectations, and reasons for the expected weather) in my presentation.	I adequately integrate my knowledge of the weather concepts in my presentation. Some minor concepts may be left out.	I integrate some knowledge of the weather concepts in my presentation.	I do not integrate weather concepts into my presentation OR the concepts I focus on are not important.
Rehearsed	I rehearse my presentation and ask for feedback to help improve my efforts. I occasionally look to my cue cards or notes but without losing contact with the audience.	I rehearse my presentation enough so that I only have some extended looks at my cue cards or notes.	I do not adequately rehearse my presentation so the lines are mostly read from my cue cards or notes.	I do not rehearse for my presentation at all.

Props/Visual display	My props/visual displays are highly relevant and enhance the purpose and meaning of the presentation.	My props/visual displays are relevant and aid the understanding of the presentation.	My props/visual displays do not add to the understanding of the oral presentation.	My props/visual displays are not relevant to the oral presentation topic, OR no visual material supports the oral presentation.
Sources	My content is supported by reference to a variety of reliable sources, and all sources are properly cited within the project.	My content is supported by reliable sources, and most are properly cited within the project.	My content is supported by too few or unreliable sources and sources are often cited improperly.	My content is supported by a single source or by unreliable sources, and they are not cited correctly.

Assessing Projects: Storm Watch Reflections

Reflection Questions

- How was the project successful?
- What might I do differently next time?
- How was taking on the role of a weather forecaster different from other oral presentations?
- What did I learn from doing this project that I could use on my next project?
- What did I do that challenged me?
- How did I deal with problems?
- How did I use my strengths?
- What do I understand now that I didn't understand before?
- What surprised me about working on this project?
- What do I still wonder about?
- How do I think other people involved with the project felt it went?
- How did other people help me with my project?

Assessing Projects: Storm Watch
Research Process

Weather System Research Checklist

Choosing a Weather System

- I thought about what interested me.
- I decided what I already knew.
- I thought about what I wanted to know.
- I thought about what interested me.
- I decided on a question to study about my weather system. I made my question clear and pertinent.
- I thought about the different ways I could explore my weather system.
- I made sure I could complete it in the time I had.
- I brainstormed a list of my ideas.
- I clustered my ideas to help organize them for my research.

Gathering Information

- I gathered information from a variety of Web sites.

Sorting Information

- I selected only the information that answered my question.
- I revised my search based on the information I found.
- I paid attention to the quality of my information; it was from a reliable source.
- I thought about the timeliness of the information.
- I took into account the difference between fact and opinion. I watched for propaganda or biased information.
- I noticed when sources agreed or disagreed.
- I decided what the most important information was.
- I kept track of my sources (eg. title, path information, date).

Organizing Information

- I compared the information I collected from various sources.
- I used a graphical organizer such as a web, a chart, a timeline or a table to help me understand or explain how the information goes together.
- I decided on the most important points and eliminated information I didn't need.
- I organized the key ideas in a logical order.
- I summarized using my own words.

Communicating Information

- I considered my audience.

- I thought about the best way to show what I found out.
- I answered my questions in my search for information.
- I clearly communicated my information so others could understand.

Evaluating My Research

- I looked for the strengths and weaknesses of my research process and product.
- I thought about the advice I would have for someone doing research.
- I thought about ways I could make my research even better.