General guidelines:

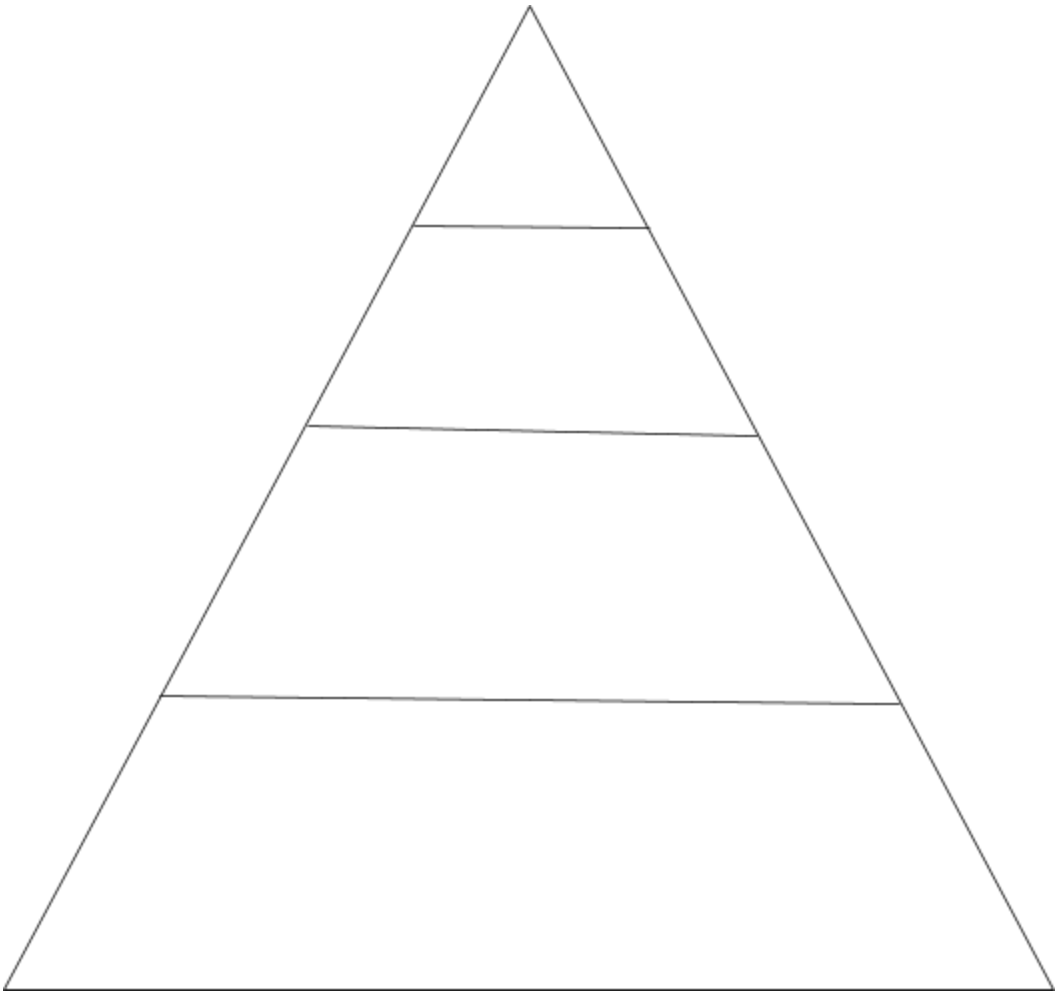
- Be critical & ask questions
- Explain your reasoning to your audience
- Acknowledge what you don't know, didn't get to, or don't understand
- Make all decisions carefully
- Design everything for your audience
- If your data involves humans, get written consent and authorization for their contribution, involve them in the process, and protect their contributions
- Recognize the power of data, visualization and research, use that power for good
- Share whenever possible, make your research and data public and findable for others.
- Don't be evil

Big Picture Question #1: What is Data

Big Picture Question #2: How do we use Data?

Discussion points:

- What types of data are there?
- How do you collect data?
- How do you analyze data?
- How do you visualize data?
- Who is your audience?
- Trust and Data
- Power and Data
- Difference between research and data
- Can data lie?
- Can data visualizations lie?



Data, Information, Knowledge, Wisdom pyramid

Questions to ask yourself when looking at research and data:

- Who made this?
- When was this made?
- What is the person who made this trying to tell me?
- Does this succeed in convincing me?
- Why or why not?
- How is the data visualized?
- What facts does it give me?
- What is missing?

Exercise:

Planning Research:

- What is a problem you're worried about?
- How do you know it is a problem?
- Is it a problem only to you or to other people too?
- How would you go about researching this problem and finding a solution to this problem?

Make a plan together as a group for conducting some research.

Collecting Data:

(pairs work together to collect and present data - are given a slip of paper to either make an inaccurate conclusion or an accurate conclusion)

- Collect some data to tell a lie
- Collect some data to tell an important truth

Visualizing Data:

What is the best way to visually communicate

1. Your problem (and why people should care)
2. What you did to better understand your problem
3. What solutions or findings you have
4. Why your solutions matter

To people in the world

Looking at Data:

- Where do college graduates work? A Special Focus on Science, Technology, Engineering and Math
- Twitterfall.com
- Obama Farewell speech - as a network of words
- Poll Everywhere / PollEv.com/poisedplant476
- https://www.oldweather.org/

Qualitative data - *Describes qualities, attributes, relationships*

- Observer impression is when expert or bystander observers examine the data, interpret it via forming an impression and report their impression in a structured and sometimes quantitative form.
- To discover patterns in qualitative data, one must try to find frequencies, magnitudes, structures, processes, causes, and consequences.

Source: Boundless. "Describing Qualitative Data." Boundless Statistics Boundless, 26 May. 2016. Retrieved 11 Jan. 2017 from https://www.boundless.com/statistics/textbooks/boundless-statistics-textbook/frequency-distributions-4/frequency-distributions-for-qualitative-data-21/describing-qualitative-data-104-4417/

Quantitative data - *Describes quantities, numbers*

- Quantitative (numerical) data is any data that is in numerical form, such as statistics and percentages.

Source: Boundless. "Quantitative or Qualitative Data?." Boundless Statistics Boundless, 08 Aug. 2016. Retrieved 12 Jan. 2017 from https://www.boundless.com/statistics/textbooks/boundless-statistics-textbook/a-closer-look-at-tests-of-significance-14/which-test-64/quantitative-or-qualitative-data-319-2783/

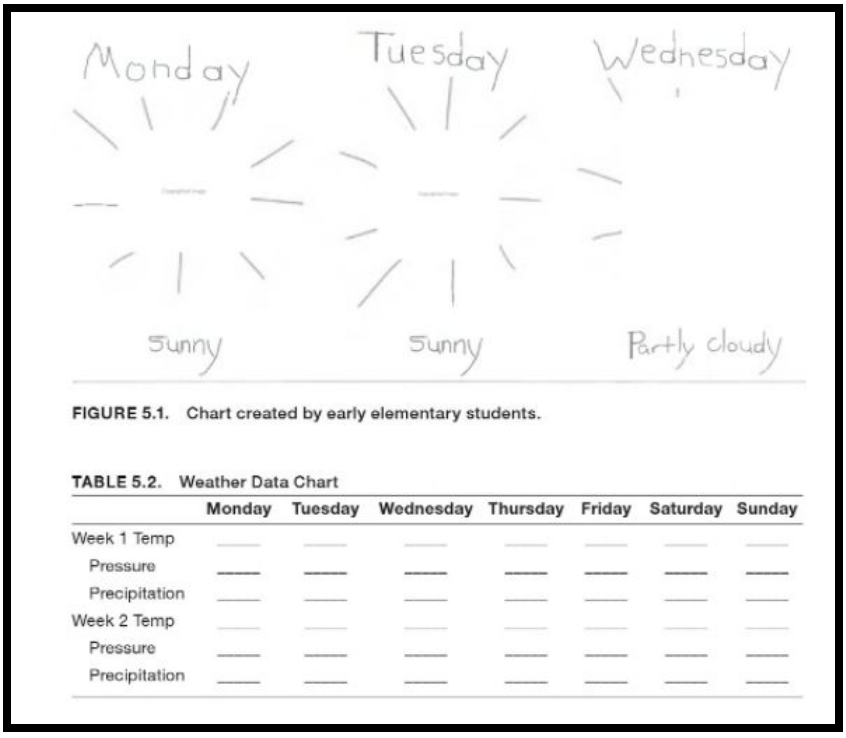


FIGURE 5.1. Chart created by early elementary students.

TABLE 5.2. Weather Data Chart

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week 1 Temp							
Pressure							
Precipitation							
Week 2 Temp							
Pressure							
Precipitation							

Source:
Teaching Science in Elementary and Middle School: A Project-Based Approach Joseph S. Krajcik, Charlene M. Czerniak Routledge, Jan 23, 2014