The Data Literacy Company

# What *happens* in data analysis?

**analysis (n.):** *from* **ana,** "upward, up in place or time" + **lysis** "a loosening", *from* **lyen**, "to loosen, divide, cut apart"  (Antonym: synthesis)

Merriam-Webster:
> a:  a detailed examination of anything complex in order to understand its nature or to determine its essential features; a thorough study.

Oxford Living Dictionary:
> 1.  detailed examination of the elements or structure of something.
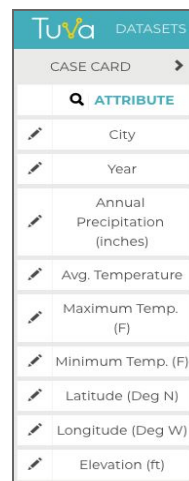
**Analyzing data** involves breaking up components of a dataset and examining them in different ways, often visually (in graphs or maps) or statistically (in numeric summaries and computations), or both, to determine essential features and patterns.

Features and patterns are then **interpreted** in terms of what they mean *in the context of a question, claim, argument, or problem.*

So, to analyze and interpret data involves breaking something apart (a set of data) in order to synthesize meaning (answer a question, support a claim, or justify an action). Breaking up, then putting together.

The process of breaking up components of a dataset and then reconstructing them into meaning involves making some decisions. These decisions are opportunities for student-driven learning. Decisions in analysis depend on the purpose of the investigation. The purpose can be in the form of a driving question, or a claim to test, or an action to justify.  It is difficult to scaffold students in learning to analyze and interpret data if the *purpose* of the analysis is not clear. We can either provide students with a question or claim to investigate, or students can frame their own (also a skill to develop), but learning to analyze data will be much easier if it can be guided by a clearly stated purpose.

The following prompts assume that students are starting with a set of data, either in a visualization program such as Tuva ([tuvalabs.com](tuvalabs.com)), or in an electronic or handwritten spreadsheet.

# Prompts to scaffold students through data analysis

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→ Look over the data set

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- What data do I have to work with?    (Evaluate)

- What question can I investigate?    (Wonder)

- What data do I need to investigate that question?    (Evaluate)

- What kind of graph would help me answer the question?  (Evaluate)

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→ Graph the data as evidence   (Visualize, synthesize)

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- How can I describe to someone else what the graph looks like?    (Describe)

  - Qualitatively, in descriptive words    (Communicate)
  - Quantitatively, using numbers, calculations, or equations   (Think mathematically)

- What do patterns in the graphed data say in answer to my question?  (Interpret patterns)

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→ Write a claim and explain it   (Interpret, communicate)

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- How can I label or annotate my graph to make it even clearer to someone else how it supports my claim?   (Communicate)

- How will I explain my reasoning to someone else so they are convinced of my interpretation?    (Explain the evidence; Develop an argument)

- How sure can I be that my interpretation accurately represents what happens in the wider world?   (Evaluate and Synthesize in a meaningful context)

- What new question(s) do the evidence and my analysis raise?    (Ask questions)

- (What data do I need to investigate the new question(s)?)    (Plan an investigation)

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