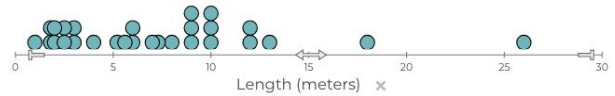# Language for Asking Questions

**Questions about variability** ask about the nature of a group in terms of one measurement. Show variability as a distribution of points along a single number line using dot plots, histograms, and box plots.
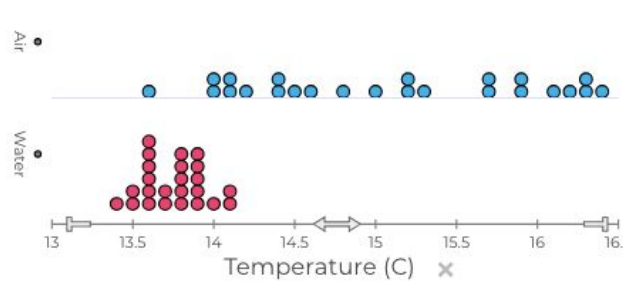
> *Sample Questions*
> 1. How long are dinosaurs?
> 2. How much do pennies weigh?
> 3. How many texts to students send in a week?



**Questions about comparing groups** ask how two or more groups compare in a measure such as heights, weights, or temperature. Comparison questions can be analyzed using *distributions* (to show the whole group of data points) or using *bar graphs* (to compare single-number totals or averages).
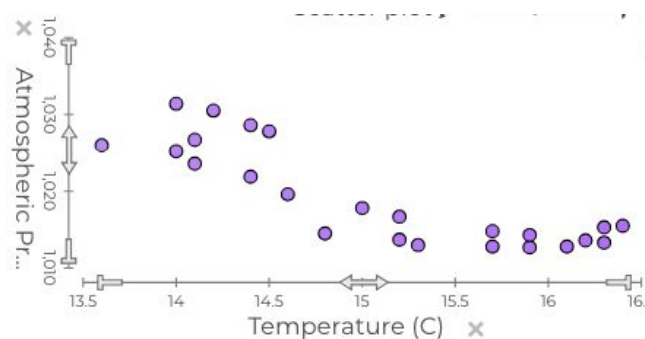
> *Sample Questions*
> 1. Which makes the most energy-efficient car models, Toyota or GMC?
> 2. How do the magnitudes of earthquakes in Japan and California compare?
> 3. Which city tends to have lower temperatures in January, Portland ME or Portland WA?



**Questions about relationships (or correlations)** are to see if there is a relationship between two numeric attributes. Relationship questions can be analyzed using **scatter plots**, with one numeric attribute on each axis.
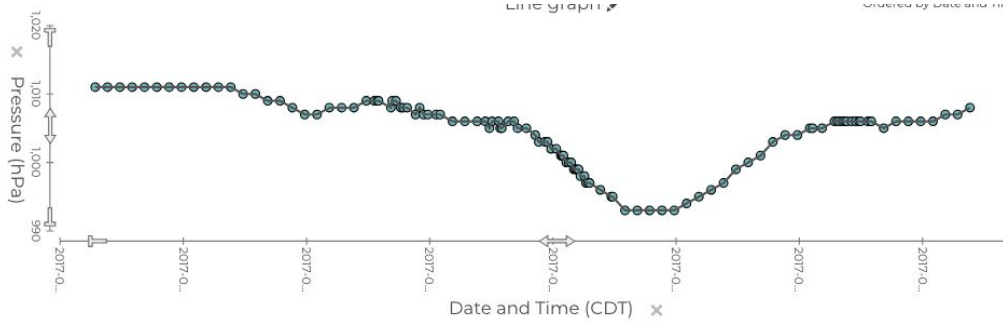
> *Sample Questions*
> 1. What is the relationship between atmospheric pressure and air temperature?
> 2. Do plants take up more carbon dioxide when it is warmer?
> 3. What is the relationship between boiling point and melting point of elements?

**Questions about change through time** ask how a measurement changes over time. Change through time can be displayed using **line graphs**, usually with the time variable on the X axis.
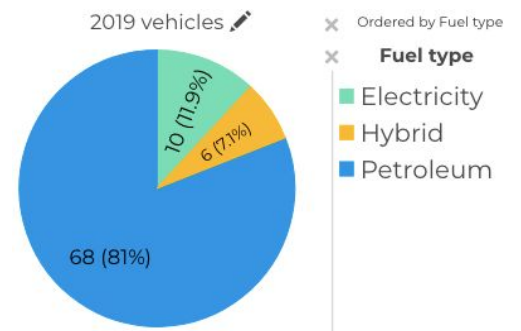
*Sample Questions*

1. How have global sea surface temperatures changed over the last 50 years?
2. What was the hourly air temperature between sunrise and sunset today?
3. How have winning marathon times changed over the past 100 years?



**Questions about proportions** ask about the proportional make-up of a whole group. Proportions can be visualized using **pie charts**, or ***stretched or stacked bar charts***.

*Sample Questions*

1. Which countries grow most of the world's wheat?
2. What proportion of our budget goes towards health care?
3. What percentage of 2019 car models are electric?



**Questions about geographic distribution** ask about how something varies geographically. Geographic distribution analyses use *latitude* and *longitude* data to plot locations on a **map**.

*Sample Questions*

1. Where were the samples taken?
2. Where earthquakes tend to occur?
3. What were the tracks of the migrating whales?