

# Data Analysis

## Qualitative & Quantitative Data

### Types of Data

Scientists collect two different types of data: qualitative data and quantitative data.

**Qualitative Data:** Qualitative data are descriptions in words of what is being observed. They are based on some quality of an observation, such as color, odor, or texture.

**Quantitative Data:** Quantitative data are numeric measurements. The data are objective- they are the same no matter who measures them. They include measurements such as mass, volume, temperature, distance, concentration, time, density, or frequency.

### Examples

Oil Painting	
Qualitative Data	Quantitative Data
<ul style="list-style-type: none"> <li>- Blue/green colour</li> <li>- Gold frame</li> <li>- Texture shows brush strokes of oil paint</li> <li>- Peaceful scene of the country</li> <li>- Masterful brush strokes</li> </ul>	<ul style="list-style-type: none"> <li>- Picture is 22 cm by 35 cm</li> <li>- Frame is 35 cm by 42 cm</li> <li>- Weighs 6 kg</li> <li>- Surface area of painting is 770 cm<sup>2</sup></li> <li>- Cost \$300</li> </ul>

Latte	
Qualitative Data	Quantitative Data
<ul style="list-style-type: none"> <li>- Robust aroma</li> <li>- Frothy appearance</li> <li>- Strong taste</li> <li>- Burgundy cup</li> </ul>	<ul style="list-style-type: none"> <li>- 12 ounces of latte</li> <li>- Serving temperature 65.6 °C</li> <li>- Serving cup is 17.8 cm in height</li> <li>- Cost \$4.95</li> </ul>

Grade 11 students	
Qualitative Data	Quantitative Data
<ul style="list-style-type: none"> <li>- Friendly demeanors</li> <li>- Environmentalists</li> <li>- Positive school spirit</li> </ul>	<ul style="list-style-type: none"> <li>- 428 students</li> <li>- 205 girls, 223 boys</li> <li>- 78 % on honour roll</li> </ul>

Notice the qualitative data are descriptions. The quantitative data are objective, numerical measurements.

## Qualitative vs. Quantitative



### Identify Data Types

Suppose you are a biologist studying elephants in their natural habitat in Africa. You observe their behaviours and interaction, and take photographs of their interactions to study later. Examine the photograph of the elephants shown above.

1. **Analyze** – Give at least two examples of qualitative data that could be obtained from the photograph of the elephants.
  
2. **Analyze** – Give two examples of quantitative data that could be obtained from the photograph of the elephants.

## Qualitative vs. Quantitative Sorting Activity

1. Cut out the data below
2. Decide whether the data is qualitative or quantitative
3. Sort and paste the data on the chart provided

Solution is light green in colour	The boiling point of ethanol is 78.37 °C
Glass is transparent	The sample is coarse
Salt melts at 801°C	The mass of residue recovered was 2.78 g
Adding lye to fat makes soap	Magnesium reacts with acid and produces bubbles
Copper conducts electricity	The sample collected was in the gas phase
Student dispensed 14.37 mL of methanol	The sample formed cubic crystals
Density of copper is 8.96 g/cm <sup>3</sup>	The rock sample consisted of 25 grams of quartz
The red dye travelled further than the blue dye	It took 335 seconds for all of the magnesium to react

<b>Qualitative</b>	<b>Quantitative</b>

# Sorting Properties of Matter

Some properties of matter are observable and some are measurable.

Cut out each property below and sort into the two categories.

<b>Observable Properties</b>	<b>Measureable Properties</b>

<b>texture</b>	<b>odor</b>	<b>mass</b>	<b>length</b>
<b>weight</b>	<b>shape</b>	<b>volume</b>	<b>density</b>
<b>temperature</b>	<b>magnetic</b>	<b>density</b>	<b>state</b>
<b>malleability</b>	<b>boiling point</b>	<b>colour</b>	<b>hardness</b>
<b>lustre</b>	<b>viscosity</b>	<b>length</b>	<b>conductivity</b>