Qualitative vs Quantitative Data

Types of Data

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

**Qualitative Data**: Qualitative observations use your senses to observe the results. (Sight, smell, touch, taste and hear.) 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 observations are made with instruments such as rulers, balances, graduated cylinders, beakers, and thermometers. These results are measurable. 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, or frequency.

Example

Suppose a marine biologist observes the behavior and activities of dolphins. She identifies different dolphins within the group and observes them every day for a month. She records detailed observations about their behaviors. Some of her observations are qualitative data and some are quantitative data.

**Qualitative data examples**
- Dolphin colors range from gray to white.
- Dolphins in a pod engage in play behavior.
- Dolphins have smooth skin.

**Quantitative data examples**
- There are nine dolphins in this pod.
- Dolphins eat the equivalent of 4-5% of their body mass each day.
- The sonar frequency most often used by the dolphins is around 100kHz.

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

Read the following examples and then decide if the example is qualitative (1) or quantitative (2).

1. It is light green in color. _______ (1 or 2)
2. It taste sour. ______ (1 or 2)
3. One leaf is 9 cm long. ____ (1 or 2)
4. It makes a loud pop sound. ____ (1 or 2)
5. The mass of the computer is 1 1/2 kg. ____ (1 or 2)
6. It smells sweet. ____ (1 or 2)
7. The temperature of the room increases by 8 degrees C. ____ (1 or 2)
8. It gets darker over a period of time. ____ (1 or 2)
9. The flower clusters in 3 blooms. ____ (1 or 2)
10. Feels very rough. ____ (1 or 2)
11. The plant is short. ____ (1 or 2)
12. Leaves are stiff. ____ (1 or 2)
13. The veins are 3 mm wide. ____ (1 or 2)

Write a qualitative example:

Write a quantitative example:

What type of observation do you think is more scientific and why?

Determine which of the following statements are quantitative and which are qualitative.
1. _____________ The cup had a mass of 454 grams.
2. _____________ The temperature outside is 250 C.
3. _____________ It is warm outside.
4. _____________ The tree is 30 feet tall.
5. _____________ The building has 25 stories.
6. _____________ The building is taller than the tree.
7. _____________ The sidewalk is long.
8. _____________ The sidewalk is 100 meters long.
9. _____________ The race was over quickly.
10. _____________ The race was over in 10 minutes.

CONSTRUCTING INFERENCES FROM OBSERVATIONS
Suppose your friends went to the beach at noon on a warm day. They saw some black and white birds. Which of the following statements are observations and which are inferences? Indicate your answer with either the letter “O” for an observation, or the letter “I” for an inference.

1. _____________ It is summertime.
2. _____________ It is daytime.
3. _____________ They saw birds.
4. _____________ They saw seaguils.
5. _______ ____ They went swimming.
6. _____________ One friend’s name was Bob.
7. _____________ It was a warm day.
8. _____________ The birds were black and white.
9. _____________ They ate lunch and drank Coca-Cola.
10. _____________ The people are friends.
Qualitative vs. Quantitative

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

1. **Analyze** Give 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

<table>
<thead>
<tr>
<th>Qualitative Data</th>
<th>Quantitative Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>The gummy worm increased by 2 inches.</td>
<td>The birds were young.</td>
</tr>
<tr>
<td>There were four dogs in the group.</td>
<td>The rock sample consisted of 25 grams of quartz</td>
</tr>
<tr>
<td>The dogs were small.</td>
<td>The rock sample was reddish brownish.</td>
</tr>
<tr>
<td>The sample contained 3 different types of bacteria.</td>
<td>The sample with the baking soda appeared bubbly</td>
</tr>
<tr>
<td>The patient complained of aches and pains.</td>
<td>The leaves on the first plant specimen appeared healthier.</td>
</tr>
<tr>
<td>The patient had a temperature 102 degrees.</td>
<td>The first plant specimen had 3 more leaves than the second specimen.</td>
</tr>
<tr>
<td>The chimp identified 12 pictures correctly.</td>
<td>The leaves on the second plant specimen were green, while the leaves on the first plant specimen were turning brown.</td>
</tr>
<tr>
<td>The parrots range from bright green to dark red.</td>
<td></td>
</tr>
<tr>
<td>The balloon increased in size from 5 inches to 8 inches around.</td>
<td></td>
</tr>
<tr>
<td>Qualitative</td>
<td>Quantitative</td>
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