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**

The gummy worm increased by 2 inches.

There were four dogs in the group.

The dogs were small.

The sample contained 3 different types of bacteria.

The patient complained of aches and pains.

The patient had a temperature 102 degrees.

The chimp identified 12 pictures correctly.

The parrots range from bright green to dark red.

The balloon increased in size from 5 inches to 8 inches around.

The birds were young.

The rock sample consisted of 25 grams of quartz

The rock sample was reddish brownish.

The sample with the baking soda appeared bubbly

The leaves on the first plant specimen appeared healthier.

The first plant specimen had 3 more leaves than the second specimen.

The leaves on the second plant specimen were green, while the leaves on the first plant specimen were turning brown.

Qualitative	Quantitative