

## 1. Objective & Introduction

Today's lesson objective is: **Students will describe the importance of observation and data collection to the nature of science.**



As we observe the world, we are also instinctively recording information about what we are observing. We don't realize that we are doing it, but we are storing that data in our minds for future use. Scientists do the same thing, but they use a variety of tools. Today we are going to see why it is so important for them to observe and collect data about the world around them.

Take a moment and think about this objective. What strategies do you think you will use in observing and collecting data? Do you think you will use strategies that you've used before or do you think you will use different ones? Do you like to collect and observe data using electronics or do you prefer using paper and pencil and other low-tech methods?

Open your digital notebook and describe any strategies that you might use in this lesson. When you are collecting data, how will your strategies differ from those you used when you developed questions?

## 2. Observations in Science

Making observations is extremely important in science and scientists use different types of observation to collect and record their data. This helps them design and construct experiments. Scientists observe the natural world in a few different ways. They can use their senses or they can use special tools that will help make their observations more accurate and precise. Tools help scientists collect data and study things that the naked eye can't see. Some examples of tools that are used in science are telescopes, microscopes, satellites, and computers.

What do you think they would use to study objects in space? Scientists studying objects in space use telescopes or satellites because the objects are too far away for us to see without them. The Hubble Space Telescope is an example.

What do scientists use when they want to study cells, atoms, or other things that are too small to be seen with just our eyes? When they want to study such small objects or organisms, they use microscopes. Microscopes make objects appear larger so that they can be seen and studied.



Let's see whether you can pick the correct tool to use.

Match the correct tool to the object it observes.

Speed	—	
Viruses and Bacteria	—	
Moons and Planets	—	
Air Pressure	—	
Earth	—	

Microscope Telescope Satellite Radar Barometer

### 3. Qualitative and Quantitative

Now that we know why we make observations, let's look at the different types. There are two main types of observations that we will be using, qualitative observations and quantitative observations.



Qualitative observations deal with descriptions that can't be expressed in numbers. You can make a qualitative observation about anything you can use your senses to describe. Quantitative observations deal with numbers or amounts (such as 100 pounds or 2 gigahertz). We often, but not always, use quantitative observations in science.

First, we'll practice together. How will we decide if an observation is quantitative or qualitative?

**The cat has a mass of 5 kilograms.**

In this example, a number (5 kilograms) describes the mass of the cat. Therefore, this is a quantitative observation.

**Ben's parents' new car was cherry red.**

In this example, descriptive words (*cherry red*) are used to describe the car. Therefore, this is a qualitative observation.

Now it's time for you to practice on your own.

Decide whether the statement is a quantitative or qualitative observation.

1. The plants grew 5 cm over the last week.
2. There is a cold, blustery wind blowing today.
3. My new kitten is brown with white spots.
4. My new computer has 500 gigabytes of storage.
5. The atmosphere is made up of 21 percent oxygen and 78 percent nitrogen.

#### 4. Collecting Data

While scientists make their observations, they also record what they are seeing. This is called *collecting data*. This is important because we need data to answer questions that we ask. Scientists will study collected data and use it to answer questions and they may also keep it for future experiments.



CHF	1004786	17.92	
EUR	1316955	699.62	1316781
EUR			2627227
EUR	4882386	121.72	4881503
EUR			3351046
CHF			123754
HKD			25.34%
CAD			77.22
EUR			95.90
USD			84.32
EUR			2382844
EUR			5017781
EUR			3051235
EUR			1387390
EUR			5212111
EUR			3954795
EUR			7323573
EUR			3356373
EUR			3462253
EUR			2133626
EUR			3296540
EUR			2388665
EUR			2889591
EUR			3464881
EUR			3462996
CHF			2784033
CHF			2784037
EUR			3466573
EUR			3464130
CHF			3437808

Scientists can collect data in various ways. Sometimes they are able to write it down and sometimes the tools that they are using record it for them. Most of the time, the data collected is quantitative data, meaning it involves numbers. When data is collected, it is usually placed into a table or graph so that it is easier to read and share.

#### ***Let's practice deciding when to collect quantitative data versus qualitative data.***

If we want to measure the growth of some plants over a period of time, what type of data would we collect? We would be collecting actual measurements, so the data would be quantitative.

If we want to track the changes in the developmental behaviors of a puppy, such as learning to play fetch or rolling over, what type of data would we collect? This wouldn't involve numerical measurements, so we would use qualitative observations and collect qualitative data in this case.

Now try some on your own.

Decide if you would use a qualitative observation or a quantitative observation to answer each question.

Qualitative Observation	Quantitative Observation
<input type="checkbox"/> What is the effect of sunlight on plant <b>growth</b> ?	<input type="checkbox"/> Which <b>type</b> of fruit grows mold the fastest?
<input type="checkbox"/> Does background noise affect how <b>long</b> you concentrate?	<input type="checkbox"/> Which <b>brand</b> of bubble gum produces the best bubble?
<input type="checkbox"/> What is the affect of salt on the <b>boiling temperature</b> of water?	

## 5. Summary

You did a great job! Observation and data collection are two of the most important tools used by scientists and now you know why. These tools will help when you are performing your own experiments in the future. Take a look back at your digital notebook and see whether you used the strategies that you thought you would. Determine how they helped you and whether you would like to try different strategies next time.

If you need to review, you can click the Reteach Icon. If you are ready for the assessment, you can click on the Assessment Icon. Do your best and good luck!