

databot™ Sensor Starters



Meet the Temperature Probe

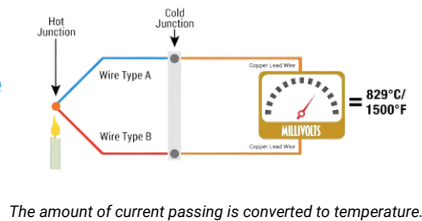
The **temperature** probe measures **temperature** when placed on a surface, inserted into an object, or submerged in liquid. Temperature probes are used in Heating Ventilation, Air Conditioning (HVAC), medical, food, pharmaceutical, and many other industries to monitor the **temperature**.

What Does it Measure?

The **temperature** probe measures **temperature**, a measure of hotness or coldness of a material. **Temperature** is the degree or intensity of the heat present in a substance or a system. The change in **temperature** is based on the amount of heat released or absorbed.

How Does it Work?

The **temperature** probe works by monitoring the change in **resistance** of the given area (solid/liquid/gas) and converts it into readable data. The probe has two metals whose **resistance** varies with change in **temperature**.



The amount of current passing is converted to temperature.

What Are the Units for Temperature?

Temperature is most often expressed in **Celsius** and **Fahrenheit** scales.

0°C = 32°F

Condition	Temperature in °C	Temperature in °F
Freezing temperature of Water	0°C	32°F
Boiling temperature of Water	100°C	212°F
Normal body temperature range	36.1°C to 37.2°C	97°F to 99°F

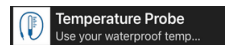
Important Terms

- **Celsius:** (symbol: °C) An international, standard **temperature** scale in which 0°C is the freezing point of water and 100°C is the boiling point.
- **Endothermic Reaction:** A type of chemical reaction that requires energy to take place. When this happens you will see a drop in **temperature** in your reactants.
- **Fahrenheit:** (Symbol °F) A **temperature** scale used in the United States in which water freezes at 32°F and boils at 212°F.
- **Resistance:** The measure of opposition to the current flow in a material.
- **Temperature probe:** A type of sensor used to measure the **temperature** of any material it touches.

- Grades:** 6 & Up
Time: 15 Minutes - PDQ 1 & 2
Subject: Physics, Technology
Topics: **Temperature, Celsius, Fahrenheit, Resistance, Endothermic Reaction.**

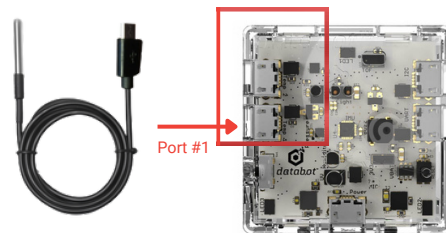
What You Will Need/Prep

- databot™ 2.0 & a smart device (iOS or Android).
- Read the Vizeey™ Fast Start Guide and install Vizeey™ if you haven't already.
- Scan the QR code for the **Temperature Probe Experiment**.
- Baking Soda
- Vinegar
- Beaker or glass jar/bottle





Where Does it Live?

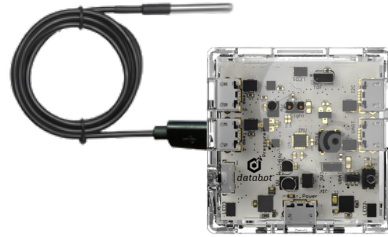
The **temperature** probe is an external, waterproof sensor included with databot™. databot™ has two dedicated ports to connect **temperature** probes. When only one probe is used connect it to the Temp 1 port.



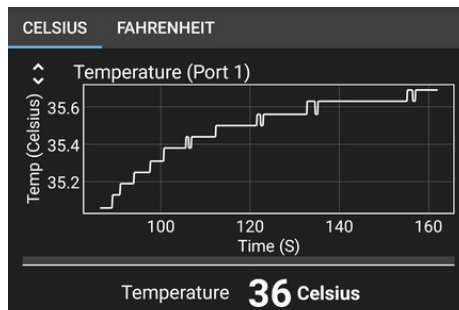
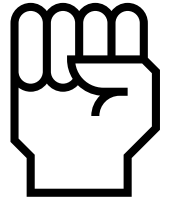
PDQ1 : Give Me a Hand Please!

Using the **temperature** probe it is possible to measure the **temperature** of the material on which it is placed. Your mission is to find your own body **temperature**. Is your temperature normal? Let's check it.

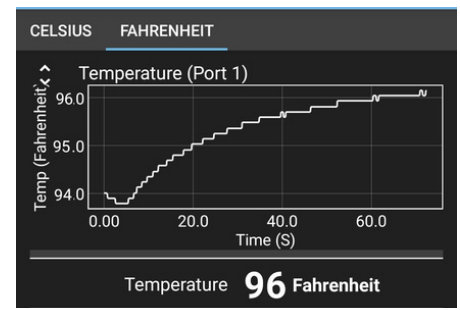
1. Tap on **Temperature Probe** in Vizeey™ to load the experiment & use these icons to start and pause the experiment. 
2. Connect the temperature probe to databot™'s Temp 1 port and hold it tightly in your hand.
3. Use the start icon  and observe the data. Keep your hand closed for **60** seconds.
4. When you feel the temperature is constant, pause the experiment. This will record your temperature in **Celsius** and **Fahrenheit**. Swipe right or left on the screen to change views between **Celsius** and **Fahrenheit**.
5. Compare your **temperature** with the normal body **temperature** range given in the table. Is your temperature normal/low/high?



Connect the temperature probe to the Temp 1 port and hold it tightly in your clenched fist.



Temperature shown in Celsius




Temperature shown in Fahrenheit

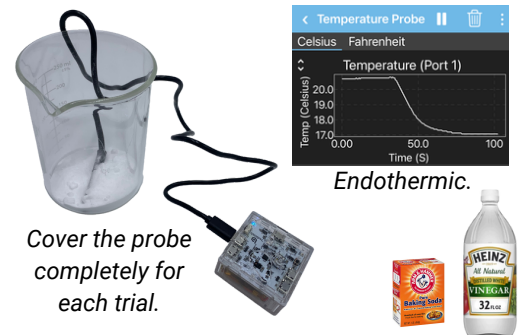
Challenge: Friction generates heat. Challenge your classmates to achieve the highest possible temperature by rubbing their hands together. How many degrees above your recorded body temperature can you reach?



PDQ2 : Chemical Reaction Vs Temperature!

In PDQ 2 use the **temperature** probe to record the change in **temperature** when two substances (baking soda + vinegar) react with each other. You should see a decrease in temperature as this is an **endothermic reaction** that requires energy.

1. Tap on **Temperature Probe** in Vizeey™ to load the experiment & use these icons to start and pause the experiment. 
2. Connect the **temperature** probe to databot™'s Temp 1 port.
3. Add baking soda to a container and measure the temperature. Swipe right or left on the screen to change views between **Celsius** and **Fahrenheit**.
4. Now add measured amounts of vinegar to the baking soda and watch the temperature decrease. This is called an **endothermic reaction**.
5. Create a series of controlled experiments in which you use the same amount of baking soda each time, add increasing amounts of vinegar using precise measurements and write down the **temperature** change each time.



Cover the probe completely for each trial.

Baking Soda	Vinegar	Temperature Start	Temperature End	Temperature Change
1 tbsp				
1 tbsp				
1 tbsp				
1 tbsp				
1 tbsp				

Recommended vinegar increments of 1 tsp.

Challenge! After your study, can you determine the exact amount of vinegar needed to create a controlled reaction that will raise the temperature exactly three degrees Celsius? Go science!