Can You Sort These Items?

Items to Sort

- Vinegar
- Washing up liquid
- Orange juice
- Coca Cola
- Lemon juice
- Water
- Bicarbonate solution

Think About

- How they taste (if edible)
- How they feel
- What they can be used for

Instructions

- Work with your tables
- Create **three** seperate groups
- Explain your reasoning

Did you get these groups?

Group 1: **Acidic Substances**

- Vinegar
- Orange juice
- Coca-cola
- Lemon juice

Group 2: **Neutral**

- Water

Group 3: **Basic Substances**

- Washing up liquid
- Bicarbonate solution

Soil pH and Plants

Success Criteria

By the end of this lesson, you should be able to:

1

Explain pH

I can explain the pH scale and categorise substances as acidic, neutral, or basic.

2

Measuring pH

I can measure soil pH using pH strips.

3

Forming Hypotheses

I can form a hypothesis about how pH affects plant growth.

4

Data Collection

I can record and interpret data from the experiment.

5

Drawing Conclusions

I can draw conclusions based on my findings.

Let's Explore What These Categories Mean

Acidic Substances

Items like vinegar, orange juice, and lemon juice

Neutral Substances

Items like water that are neither acidic nor basic

Basic Substances

Items like washing up liquid and bicarbonate solution

Why is pH Important

1 The pH Scale

pH measures how acidic or basic a substance is.

2 Safety

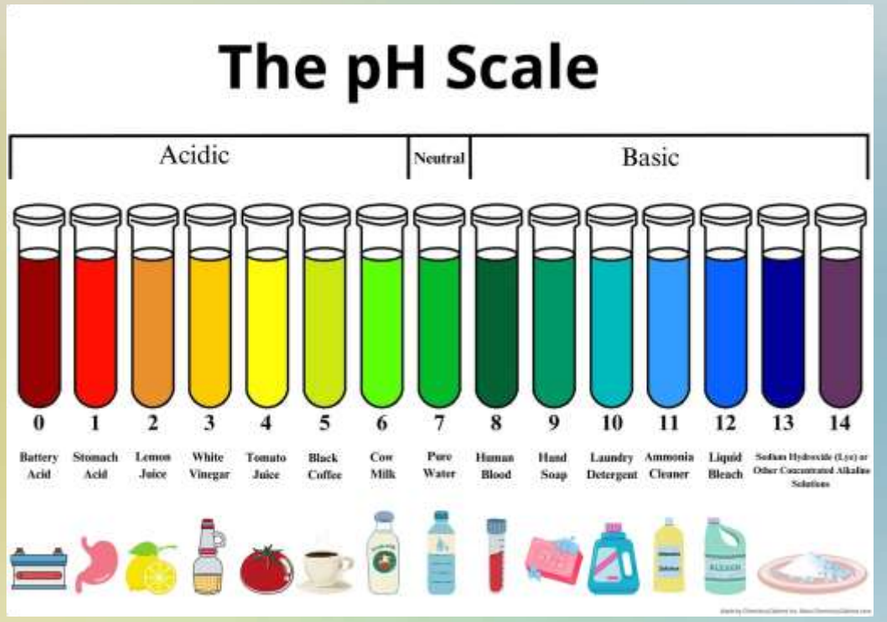
Strong acids and bases can be dangerous to humans. So its important to be careful

3 In the Environmental

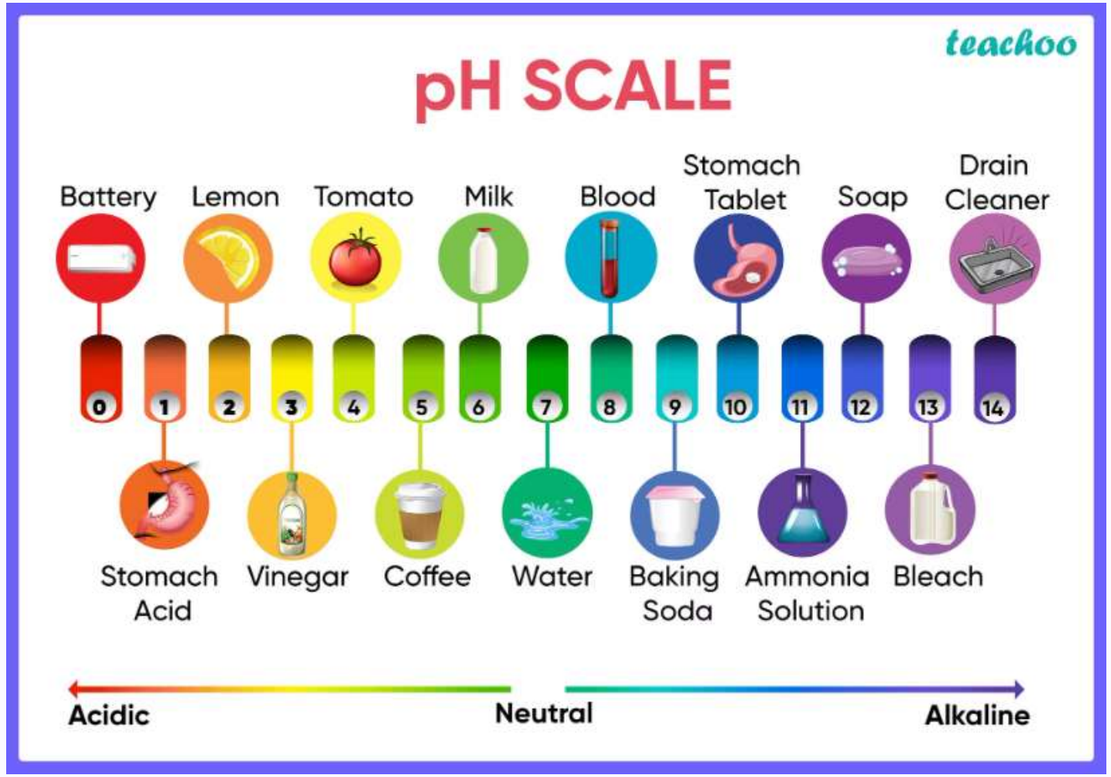
pH affects living organisms and ecosystems.

4 Day-to-day life

Understanding pH helps in activities such as gardening, cooking, and cleaning.



https://www.etsy.com/uk/listing/1484810878/ph-scale-chart-print-pdf-download



https://www.teachoo.com/13317/3499/Strength-of-Acids-and-Bases/category/Concepts/

The pH Scale

Think of pH like a number line from 0 to 14.

Numbers from 0-6 are acids. The lower the number, the stronger the acid (like stomach acid).

Numbers above 8 are bases (also called alkalis). The higher the number, the stronger the base.

Number 7 is neutral; this is where pure water is.

Acids

pH Range

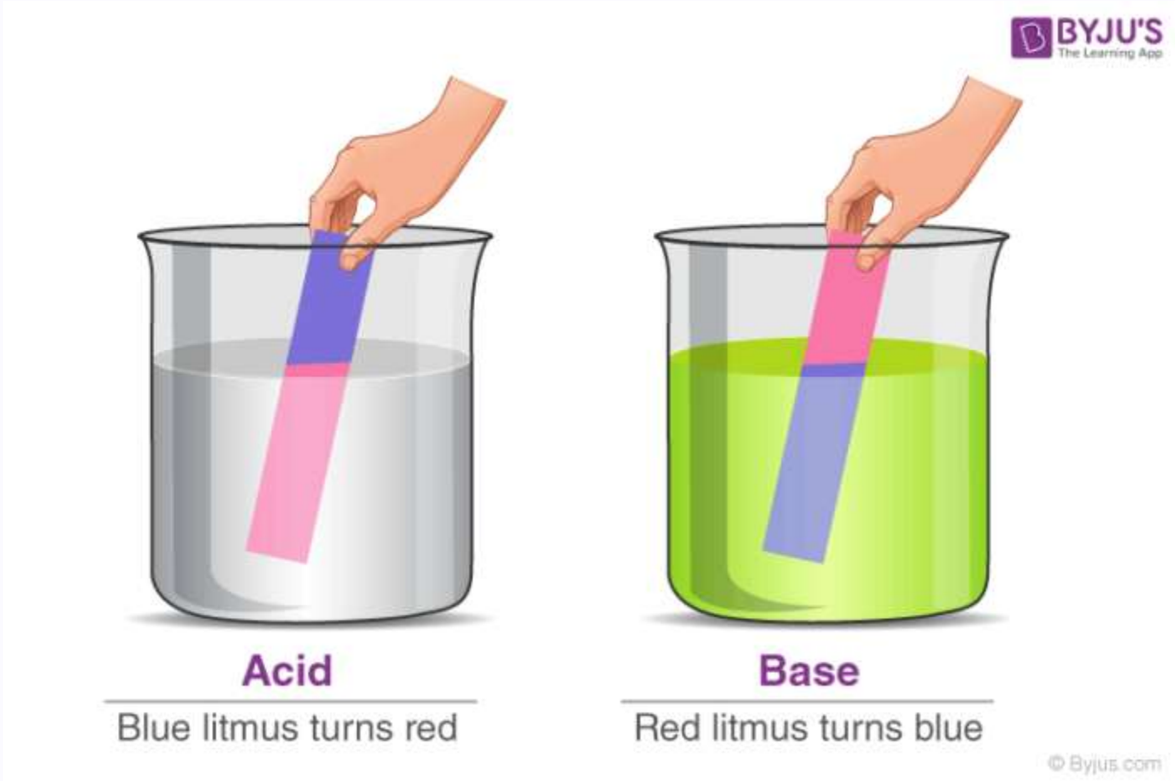
Acids have a pH from 0-6.

Example

Stomach acid is a very strong acid.

Colour

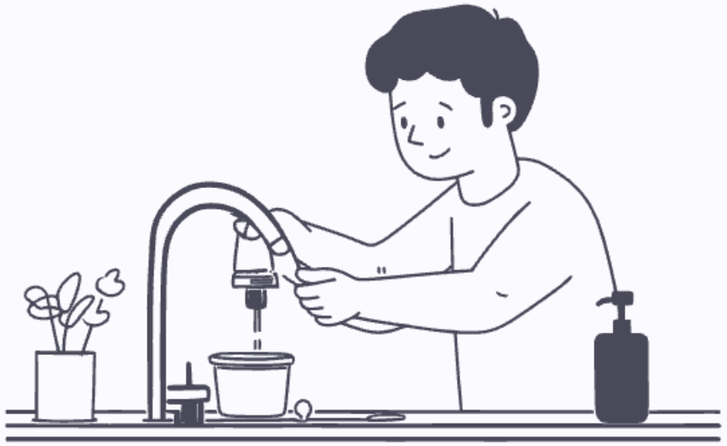
Acids turn blue litmus paper red.



https://byjus.com/chemistry/litmus-paper/

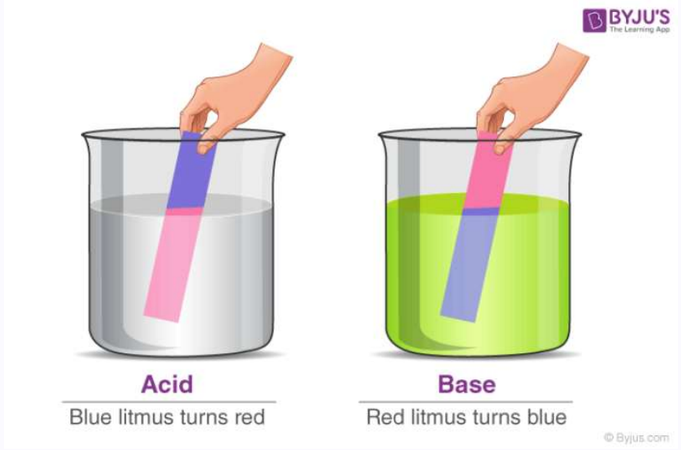
Bases

Bases are the opposite of acids.



Common Examples

- Washing Up Liquid
- Baking Soda



https://byjus.com/chemistry/litmus-paper/

Testing Bases

Bases turn red litmus paper blue

pH Range

They have a pH from 8-14

Neutral Substances

7

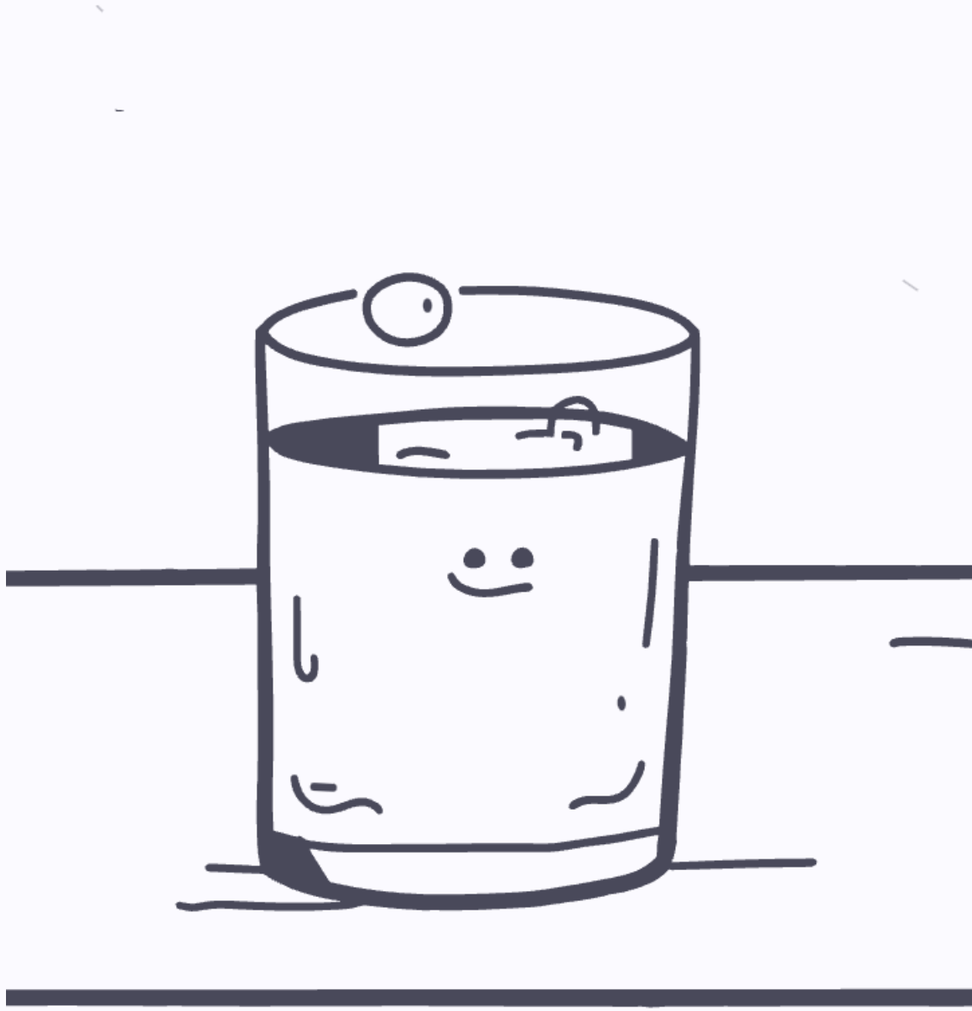
Neutral pH

Pure water has a pH of exactly 7.

6.5-9.0

Tap Water Range

Tap water varies slightly due to dissolved minerals.



Neutral substances are neither acid nor bases

Fun Fact

Chemical Reaction

Vinegar (acid) and baking soda (base) react dramatically when mixed

https://curiokids.net/en/try-your-homemade-volcano/

Volcano Experiment

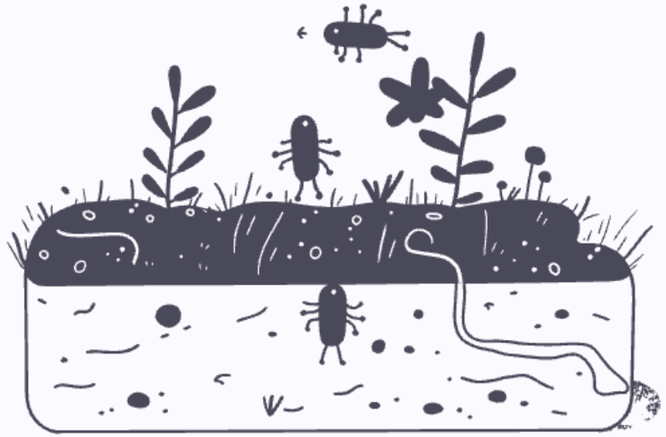
This reaction powers is what happens in the volcano science experiment you may have done before

Why is Soil pH Important?

If you were to measure the pH of different soil samples you will see that the pH is not the same. Different plants like different types of soil, and pH is one factors that plants are picky about.

Growth

The right soil pH helps plants grow better



Ecosystem

The right pH range keeps helpful bugs and worms happy

Acid vs Base

Some plants like acidic soil, others prefer basic or neutral soil.

Some Examples

Plants That Like Acidic Soil

Blueberries and azaleas love soil that's a bit acidic (pH 4.5-5.5).

Plants That Like Neutral Soil

Most vegetables like soil that's not too alkali or too basic (pH 6.5-7).

Plants That Like Basic Soil

Lavender, lilac, and thyme grow best in soil that's a bit more basic (pH 7.5-8).

How Do We Test Soil pH?

https://www.preclaboratories.com/product/ph-4-5-10-test-strip/

pH Test Strips and litmus Paper

These paper strips change colour when you dip them in soil.

https://www.plantcaretools.com/en/digital-soil-ph-meter/

Digital pH Meters

They give you an exact pH number and are what scientists use to get accurate results.

Let's Test Soil pH Together

Soil Samples

We will use small amounts from different areas.

Prepare the Samples

Mix each with distilled water to make it easier to test.

Test with pH Strips

Dip strips into the mixture and wait for colour change.

Compare and Record

Match colours to the pH chart and record your findings.

Bean Seeds and pH

What do we want to Investigate?

Which pH will bean seeds grow best in?

How can we Design the Experiment?

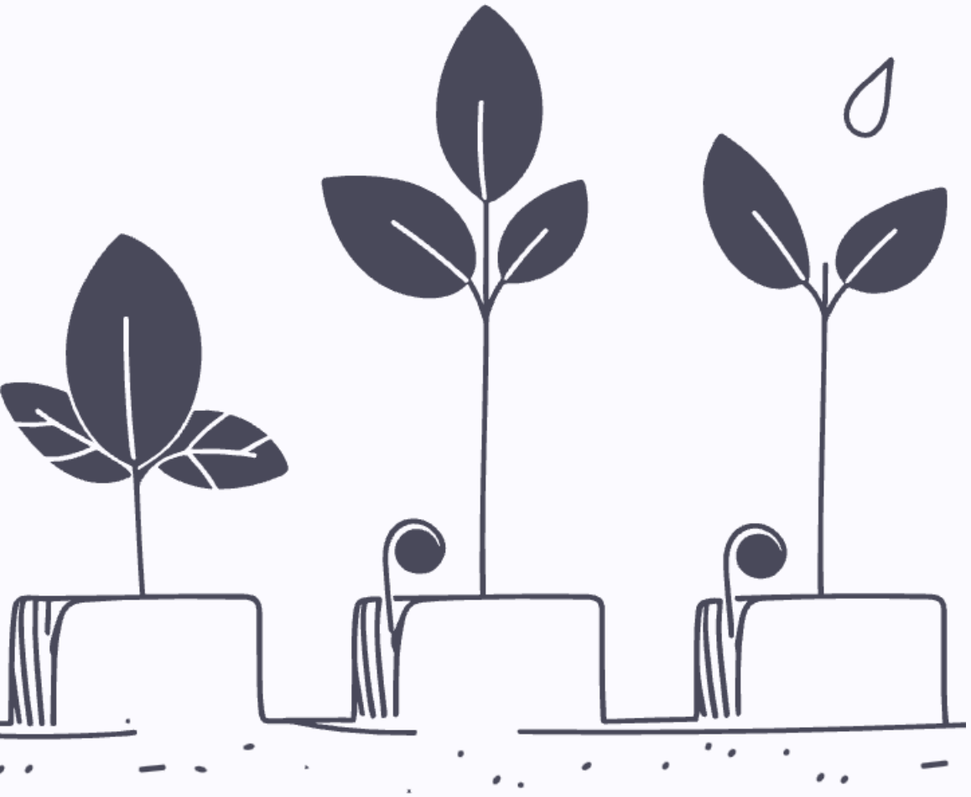
Think about the variables and steps we will follow.

Fair Testing

Think about how we can make this a fair test

Our Test Conditions

Jar Label	Liquid Used	pH Level
Acidic	Vinegar/Lemon Juice	4-5
Neutral	Water	7
Basic	Bicarbonate Solution	8-10



Variables

What We'll Keep the Same

- Type of seeds
- Amount of light
- Room temperature
- Amount of liquid

What We'll Change

- pH of the liquid

This is the factor we're testing.

What We'll Measure

- Plant height
- Can you think of anything else?

Let's Set Up Our Experiment! 🔬

Get Your Jars Ready

Fold a **paper towel** and place it inside each jar.

Plant Your Seeds

Carefully put **2 bean seeds** between the paper towel and the glass.

Add the Liquid

Pour in your assigned liquid **until the paper towel** is damp.

Label Your Jars

Stick labels on each jar: Acidic, Neutral, and Basic.

Measure pH

Use your pH paper to measure how acidic or basic each solution is.

Making Predictions

Think

Consider what you know about plants and pH.

Predict

Write down your hypothesis about the growth outcomes.

Which condition will produce the healthiest plants? Will some fail to grow at all?

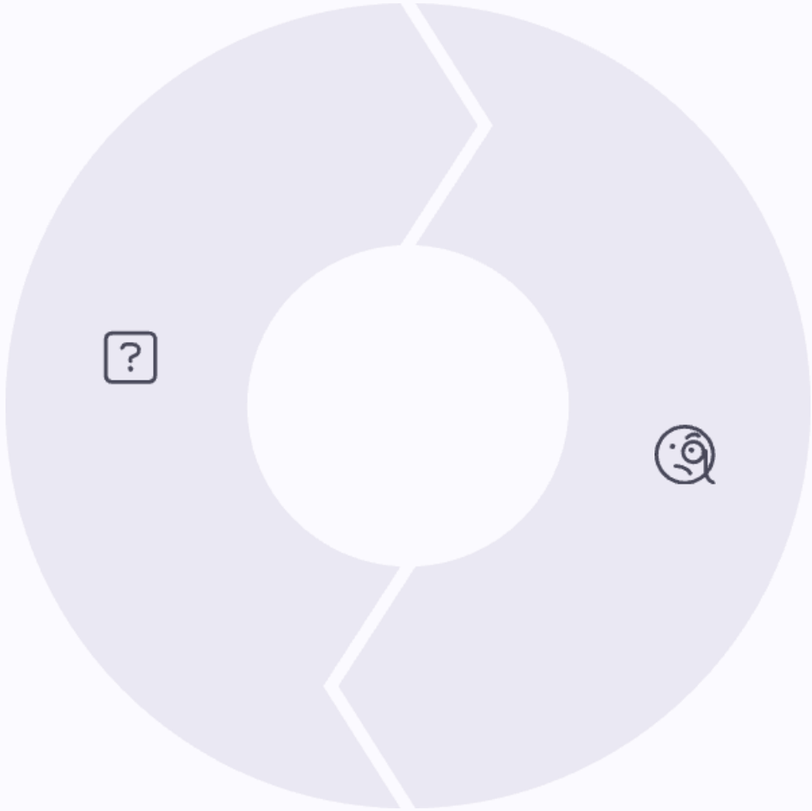
Justify

Explain the reasoning behind your prediction.

Quiz Time

Test Your Knowledge

Let's see what you've learned about pH and plants.



Think Carefully

Consider all we've discussed in today's lesson

Question 1: What Number is Neutral on the pH scale?

Question 1

pH of 7

Acids (0-6)

Neutral pH (7)

Pure water is exactly neutral

Bases (8-14)

Question 2: How can we measure soil pH?

Question 2: How can we measure soil pH?

pH Test Strips or Litmus Paper

Paper strips that change color based on pH.

Digital pH Meters

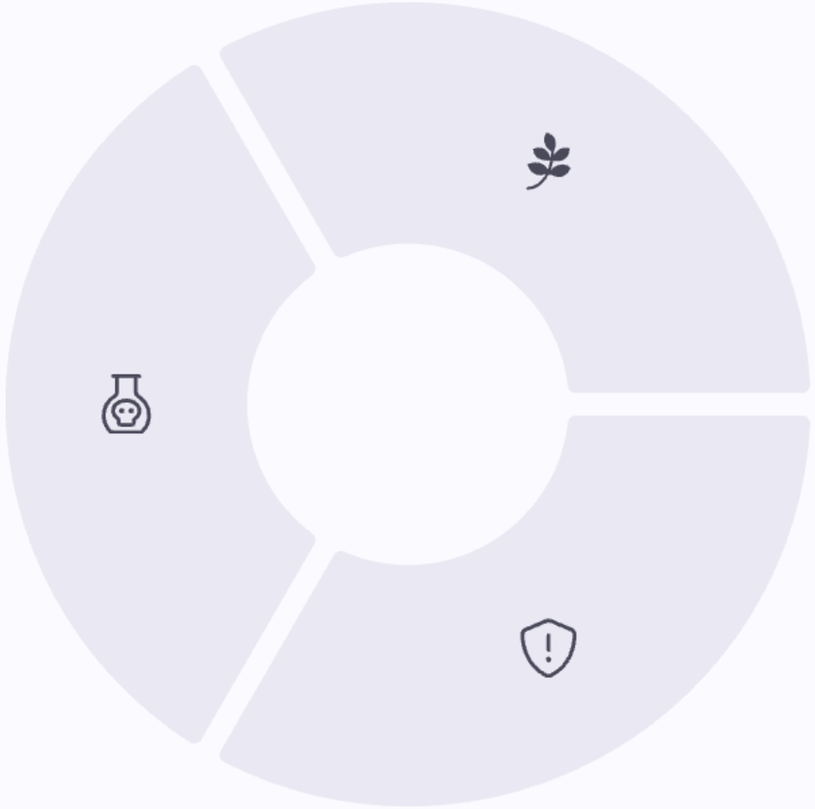
Devices for precise measurements.

Question 3: Why is knowing the pH helpful of liquid or soil helpful?

Question 3: Why is knowing the pH helpful of liquid or soil helpful?

Acidity Level

How acidic or basic a substance is.



Plants

Which plants might thrive in this environment.

Safety

Can give us an idea of how risky a substance is

Question 4: Fill in the Gaps

- Acids have a pH that is _____ than 7.
- Bases have a pH that is _____ than 7.
- A pH of 7 means the substance is _____.

Question 5: True or False?

"All soils have the same pH."

Question 5: True or False?

"All soils have the same pH."

Answer

FALSE!

Bonus Question: What could a farmer do if their soil is too acidic, and they want to grow a plant that prefers neutral soil?

Bonus Question: What could a farmer do if their soil is too acidic, and they want to grow a plant that prefers neutral soil?

They can a substance that is a base to help raise the pH of the soil

Success Criteria

Understanding pH

I can explain the pH scale and categorise substances as acidic, neutral, or basic.

Testing Skills

I can measure soil pH using pH strips.

Scientific Method

I can form a hypothesis about how pH affects plant growth.

Data Analysis

I can record and interpret data from the experiment.

Drawing Conclusions

I can draw conclusions based on my findings.

Go Further: Plant pH Preferences

See if you can find out which pH these plants prefer

- Holly
- Broccoli
- Maple Trees
- Roses
- Blueberries
- Strawberries