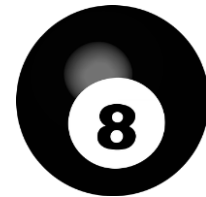
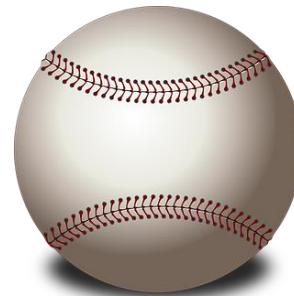

Scientific Experiments

What is an Experiment?

Fair Testing

What is a Fair Test?

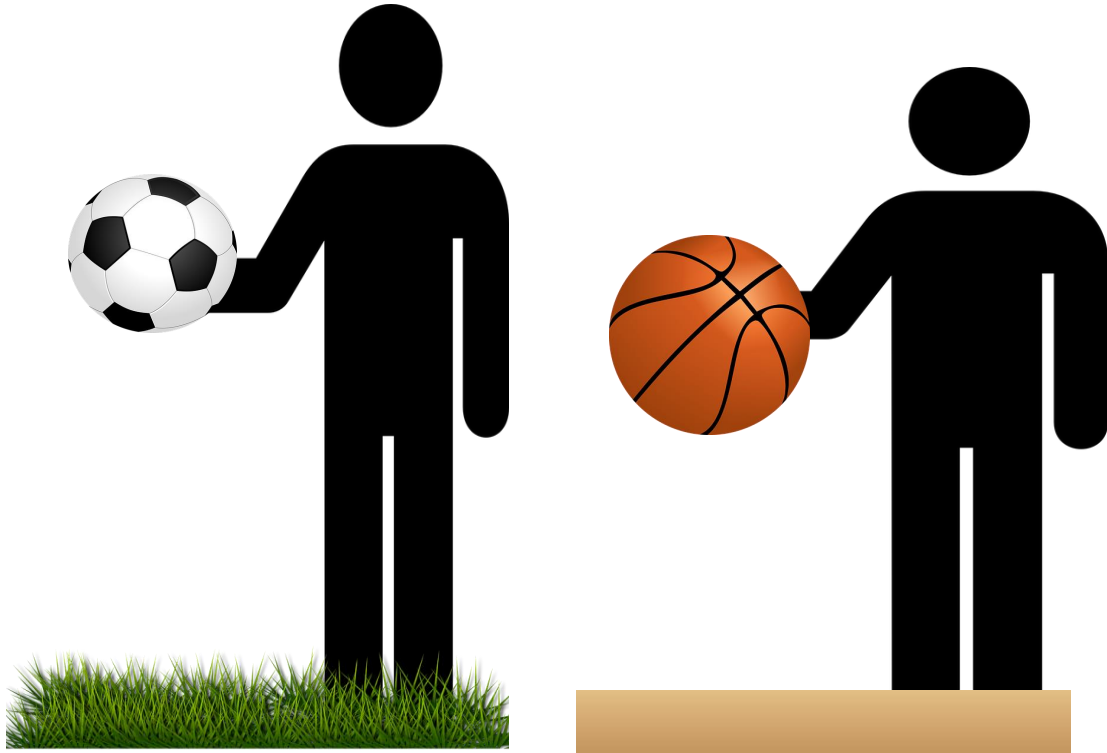
Which Ball Bounces the Highest?



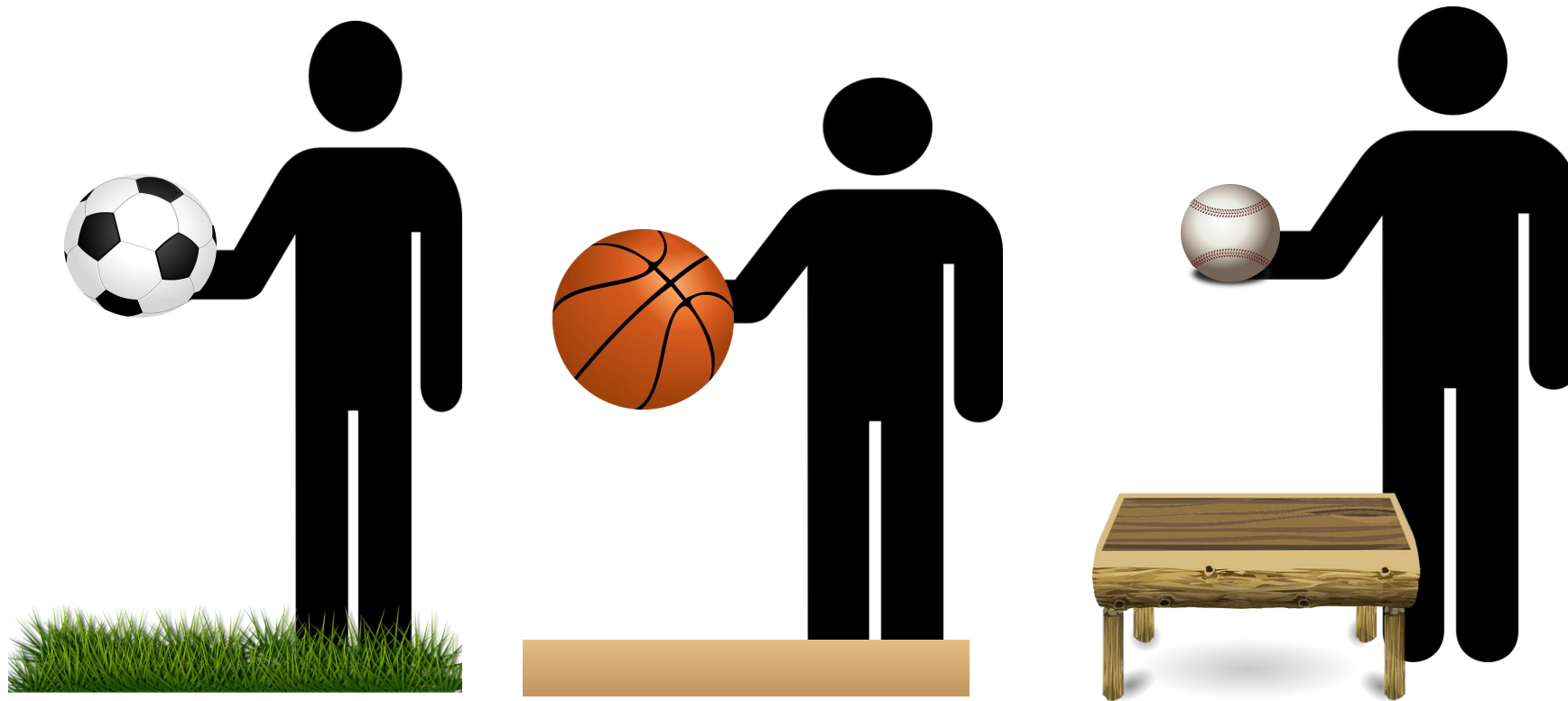
Which Ball Bounces the Highest?



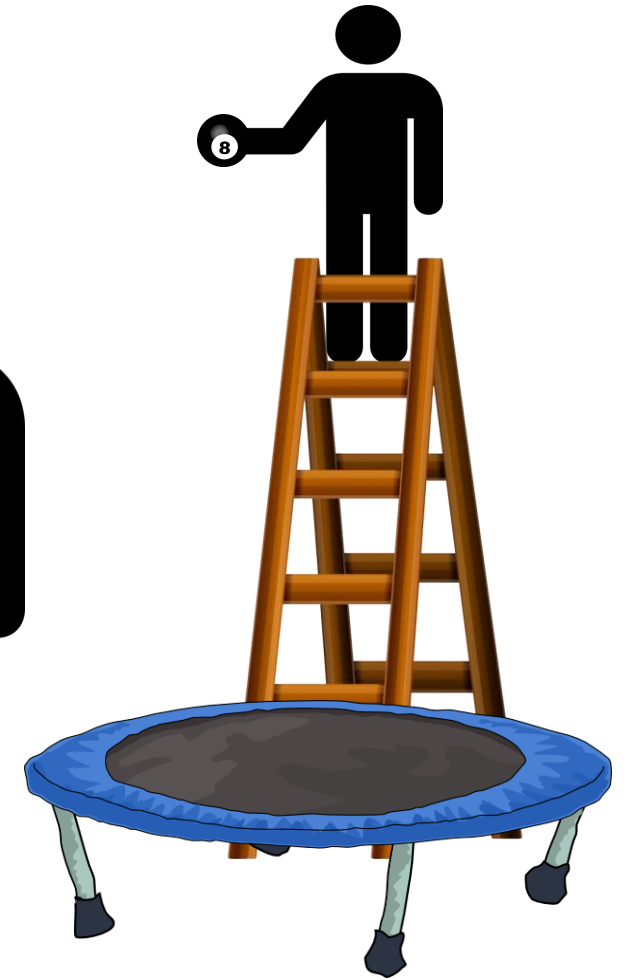
Which Ball Bounces the Highest?



Which Ball Bounces the Highest?



Which Ball Bounces the Highest?



How can we make this a Fair Test?



How can we make this a Fair Test?

Always drop the ball from the same height

Drop onto the same surface

Measure the bounce the same way

Use suitable measuring equipment

Repeat the test

How can we make this a Fair Test?

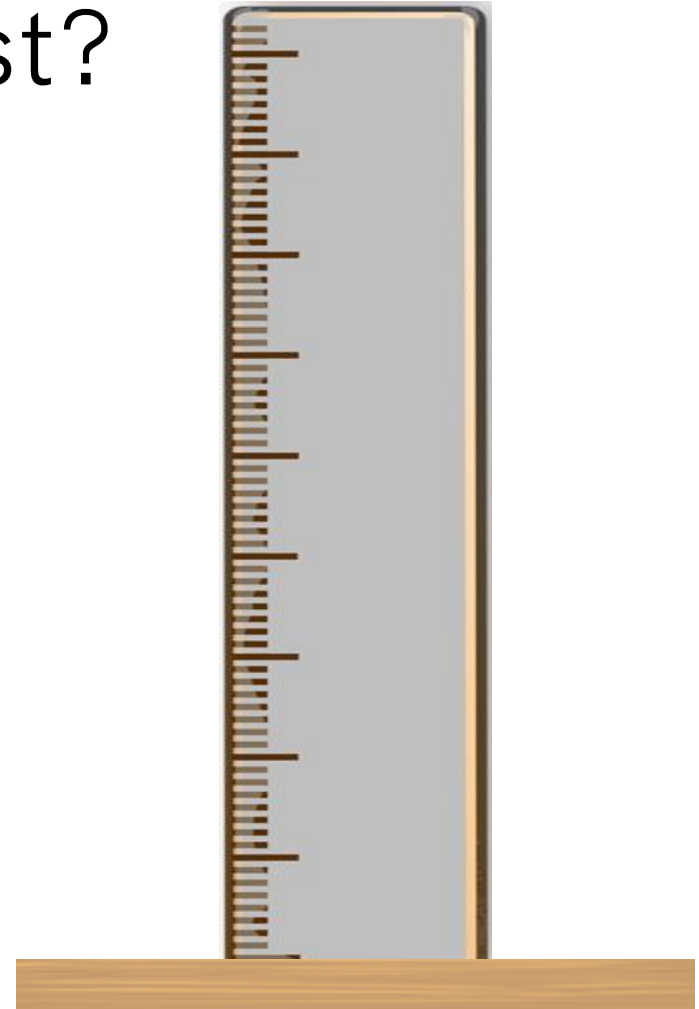
Always drop the ball from the same height

Drop onto the same surface

Measure the bounce the same way

Use suitable measuring equipment

Repeat the test



How can we make this a Fair Test?

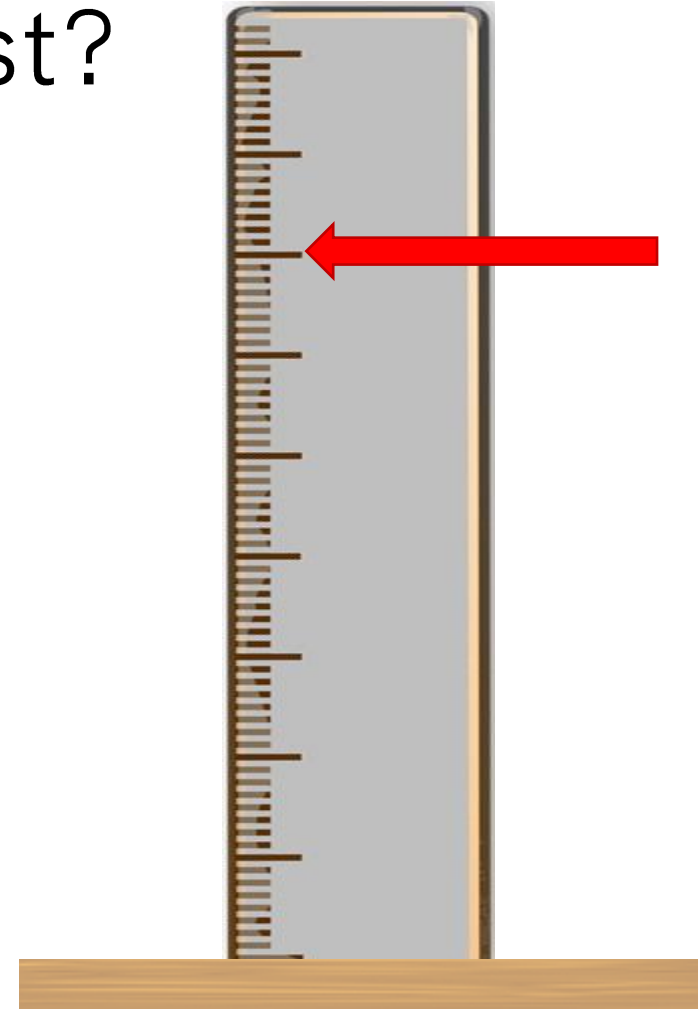
Always drop the ball from the same height

Drop onto the same surface

Measure the bounce the same way

Use suitable measuring equipment

Repeat the test



How can we make this a Fair Test?

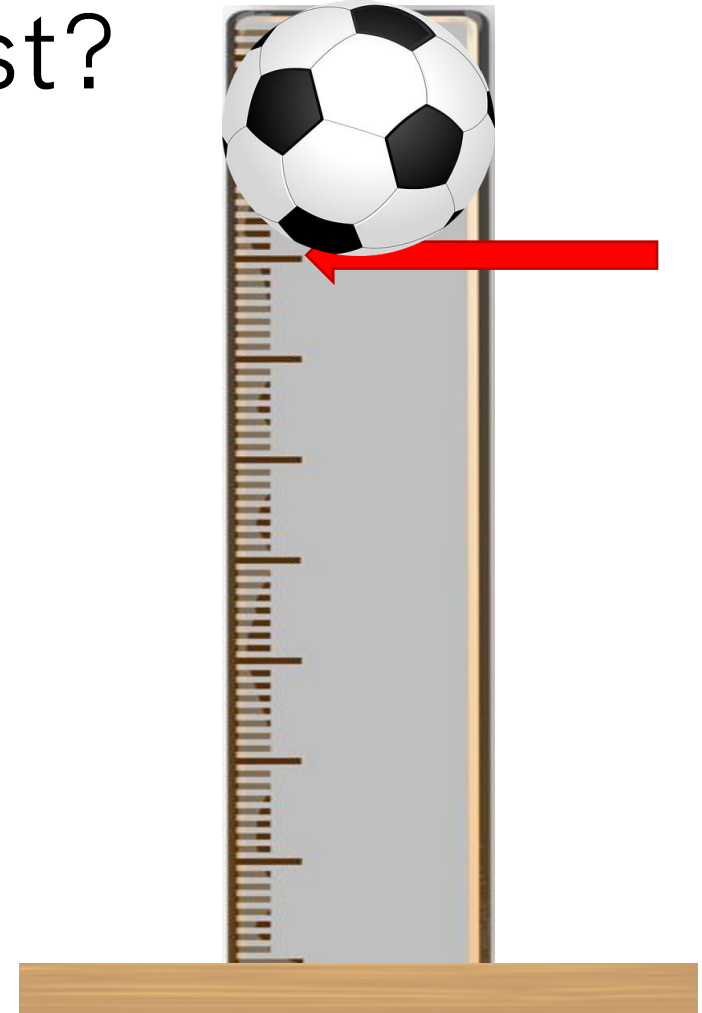
Always drop the ball from the same height

Drop onto the same surface

Measure the bounce the same way

Use suitable measuring equipment

Repeat the test



Main Rules of a Fair Test

Only one thing should be changing between tests

Everything else must remain the same

Use the correct measuring device for the job

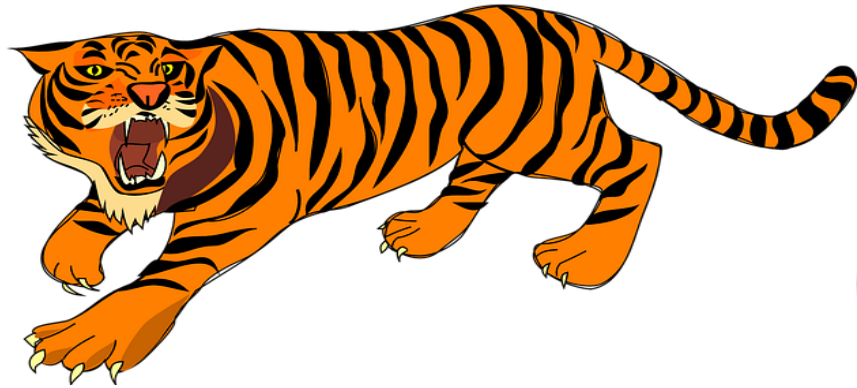
Repeat the experiment

Think about this test:

Who is the Tallest in the Class?

Think about this test:

Who is Fastest?



Think about this test:

A class want to test different ways to stop an egg from breaking when falling from a height.

Think about this test:

How to find out which day in November has the most rain

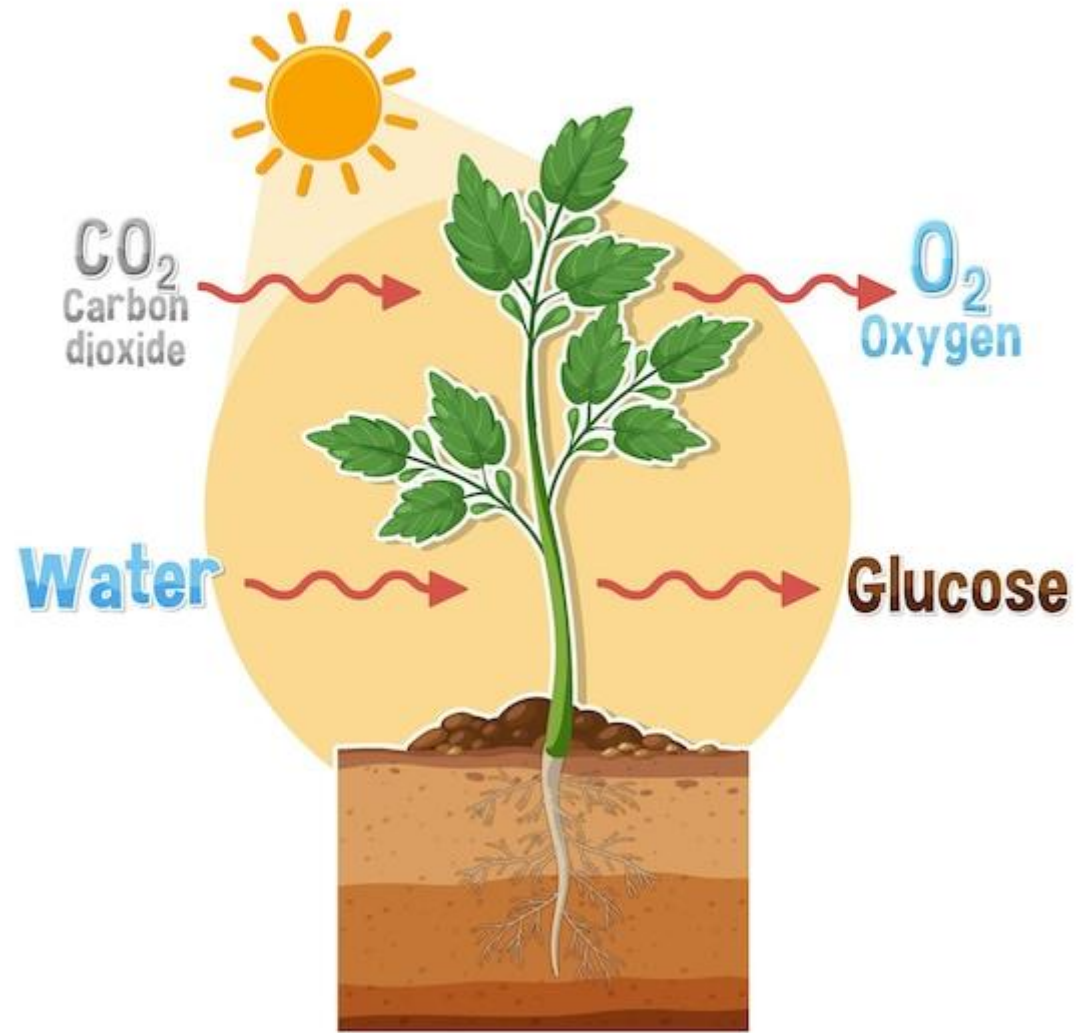
Planning an Experiment

We want you to investigate what plants need to grow healthily.

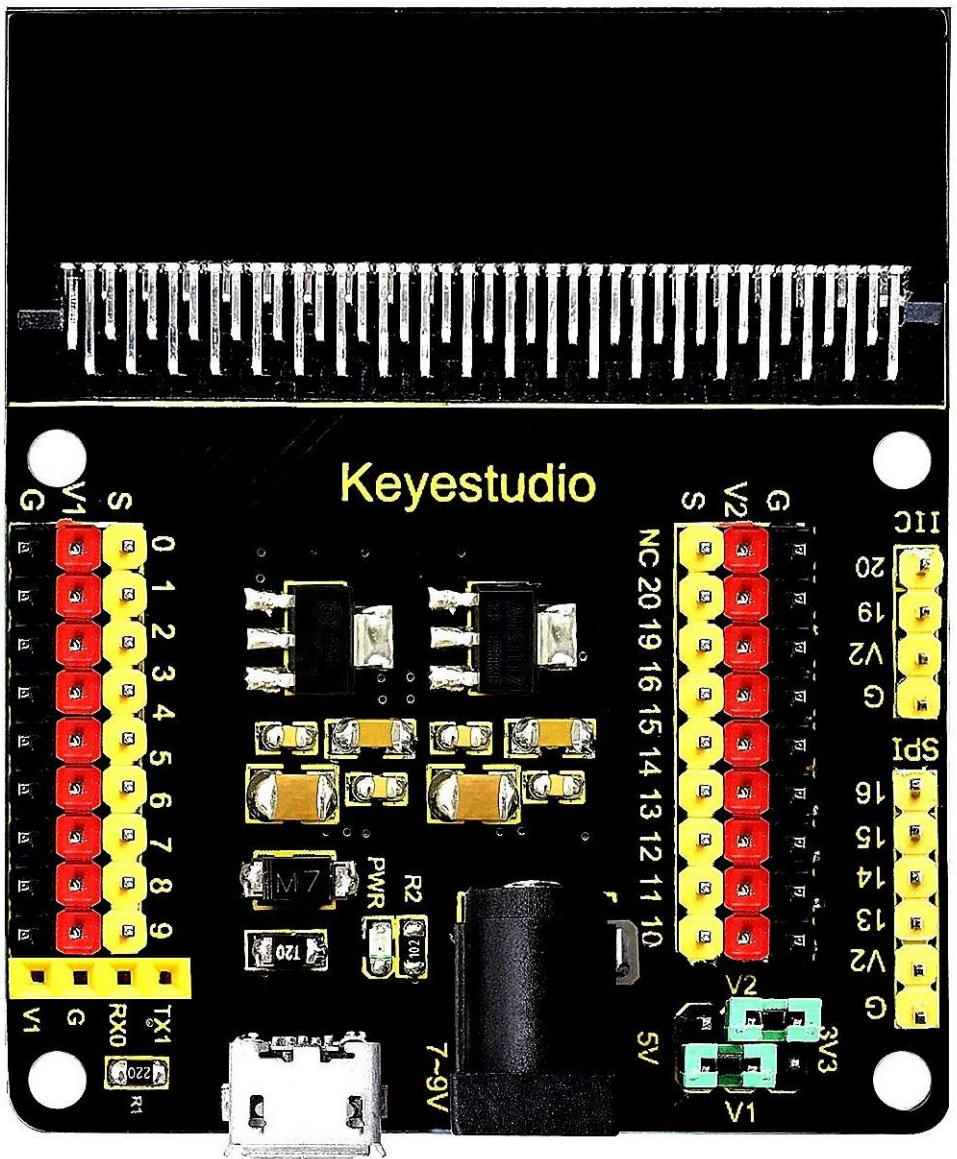
Step One: Research

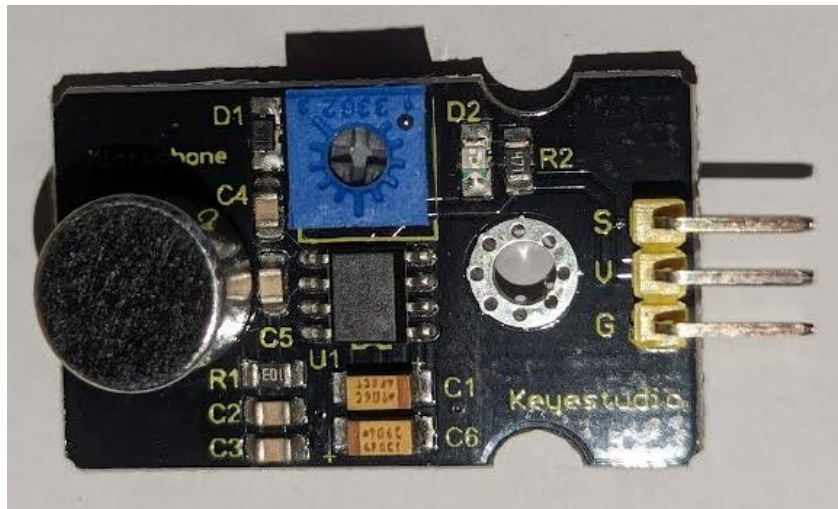
What do plants need?

PHOTOSYNTHESIS



Equipment Available





New Sensors

Different Ranges



Step Two: Method

What is a Method?

Creating a Method:

- What are you testing?

Ideas:

How much light does a plant need?

How much water does a plant need?

At what temperature does a plant grow best?

Creating a Method:

- What are you testing?
- What equipment do you need?

Make an equipment list of everything you need to do this experiment.

Creating a Method:

- What are you testing?
- What equipment do you need?
- How are you going to set up the experiment?

Create a labelled diagram of how to set up the experiment and write a list of instructions.

Creating a Method:

- What are you testing?
- What equipment do you need?
- How are you going to set up the experiment?
- How will you make it a fair test?

What have you done to make sure your test is fair?

Creating a Method:

- What are you testing?
- What equipment do you need?
- How are you going to set up the experiment?
- How will you make it a fair test?
- What measurements will you take?

Explain what measurements you will be taking, how and with what equipment.

Creating a Method:

- What are you testing?
- What equipment do you need?
- How are you going to set up the experiment?
- How will you make it a fair test?
- What measurements will you take?
- When will you take the measurements?

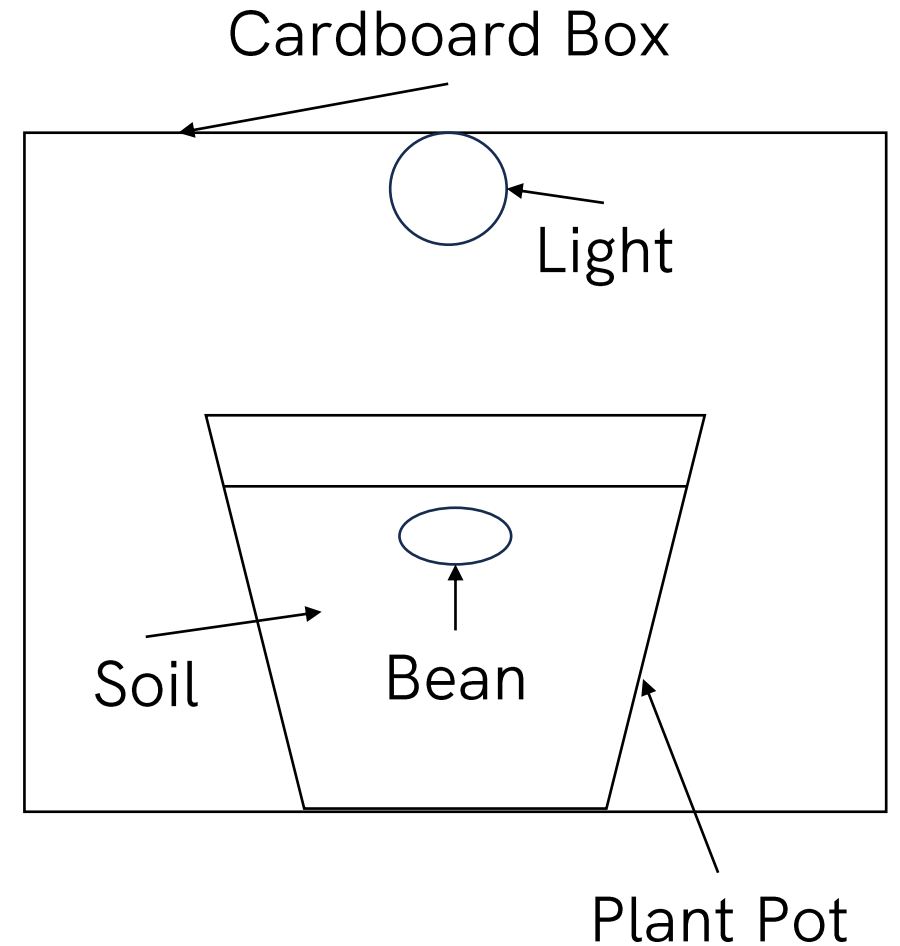
How often and at what times will you take any measurements?

Example:

In our experiment, we will be looking at how different lights change a plant's growth.

Equipment list:

- 5 French Dwarf Runner Beans
- 5 Identical plant pots
- Soil
- Tray
- Water
- Measuring cylinder
- LEDs: Red, White, Super-bright.
- Scales to measure weight
- Ruler to measure plant height
- Power supply
- Micro:Bit, breakout board, and light sensor.
- 4 Cardboard boxes with air holes



Set-up:

Use the scales to put the same amount of soil in each plant pot.

Carefully press one bean into the soil of each plant pot.

Give all 5 pots the same amount of water.

Place the pots on trays to stop the water from leaking.

Make sure the boxes have small air holes – put these around the bottom so as the light from outside doesn't reach the plant.

One pot does not have a box – this will use the light in the room.

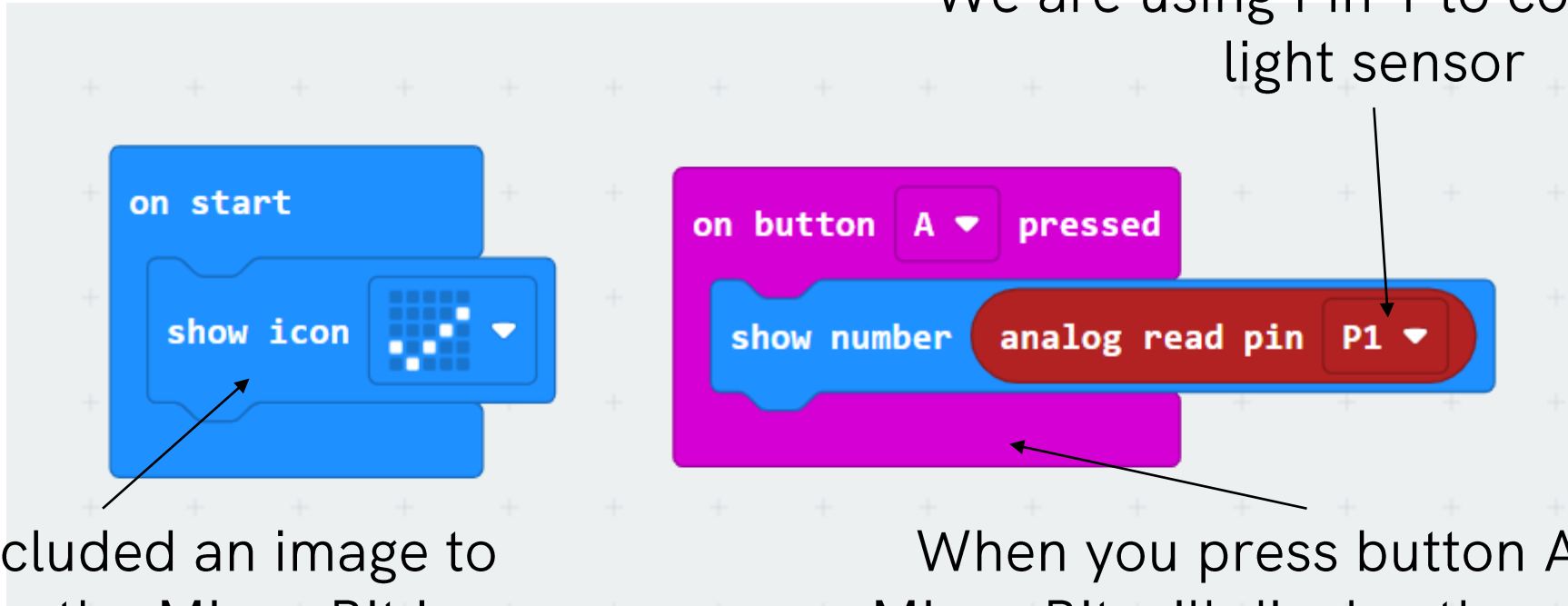
One box has no light at all. One has a red LED. One has a white LED. One has a super-bright LED.

Place a light sensor in each of the boxes, and one in the room.

Repeats:

Due to the length of the experiment, instead of repeating 3 times, we will use 3 beans in each pot.

Program:



We are using Pin 1 to connect the light sensor

We have included an image to show when the Micro:Bit is turned on

When you press button A, the Micro:Bit will display the value of the light level on its screen

Fair Testing:

We have set up this experiment fairly as all the seeds are the same and have the same amount of soil and water.

Plants also need carbon dioxide for photosynthesis, so we've put air holes around the base of the box. These are low down to stop the light coming through those holes from reaching the seed.

Collecting results:

Every day, record the light level readings from all the sensors using a Micro:Bit.

At the end of the experiment, use a ruler to measure the height of each seedling.

Step Three: Results

Results Tables

Plant	Day 1 Sensor Reading	Day 2 Sensor Reading	Day 3 Sensor Reading	Day 4 Sensor Reading	Day 5 Sensor Reading	Day 6 Sensor Reading	Total Growth (cm)
1							
2							
3							

Design your results table before you start the experiment.

Step Four: Analysis

What do your results tell you?

Step Five: Evaluation

What problems did you have?

How could you improve your experiment?

Would you do anything differently? Why?

Your Experiments

How much light do plants need?

How much water do plants need?

What colour light do plants best grow in?

How much soil do plants need?

What is the best temperature to grow plants?

