



You will conduct your own investigation to find out whether sunlight, water, minerals and CO<sub>2</sub> (carbon dioxide) are required for a plant to survive.

The performance of your investigation will be assessed. A rubric will be used for that.

## Practical investigation 1

Date:

**Aim:** To investigate what plants need to grow.

**Apparatus:**

- Seedlings (e.g. tomato) which you can buy from a nursery.  
(You could also plant your own radish seeds, maize or bean seeds.)
- A bell jar
- A glass plate
- A small bowl with sodium hydroxide solution
- Two small glass beakers
- A roll of masking tape
- A marking pen

**Method:**

1. The plants must all be approximately equal in size when you start your experiment.
2. Cut the different containers in the plastic tray loose from each other. Or the plants can be planted in five equally sized bowls.  
The soil in all the bowls must be the same.
3. Stick a piece of masking tape on each bowl and then write the number on it. Number the bowls from 1 to 5.
4. Measure how long each plant is and write it down.
5. Bowl 1 will be the control.  
This bowl will stand in a sunny spot for ten days.  
It must get a little bit of water every second day.
6. Bowls 2 to 5 will be the trials.
7. Place bowl 2 in a dark cupboard for ten days. It must also get the same amount of water as bowl 1 every second day.
8. Bowl 3 must be in the same sunny spot as bowl 1. It must not get any water for the next ten days.
9. Place bowl 4 on the glass plate. Also put a small glass bowl with sodium hydroxide solution on the glass plate.  
Cover the plant and the bowl with a bell jar. Seal the sides of the bell jar on the glass plate with *Vaseline*. The sodium hydroxide solution absorbs CO<sub>2</sub> from the air.
10. Remove the plant from bowl 5 and carefully rinse the roots under a tap with running water. Place this plant in a beaker with water and number it as 5.
11. After ten days, compare the plants to each other.  
Measure again how tall each plant is and record your observations.





**Questions:**

1. Give an investigative question for this experiment. That is, formulate the question that led to this investigation being conducted.  
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2. Give the hypothesis of this experiment. (Remember a hypothesis is always a statement and is a possible answer to the investigative question.) The hypothesis cannot start with words like “I think ...” or “Maybe ...”.  
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3. Describe the appearance of each plant after ten days. Also compare how much each plant has grown in ten days. Give the table a descriptive heading.  
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Plant	Description of the plant after ten days
Plant 1: Control plant	
Plant 2: In the dark cupboard	
Plant 3: No water	
Plant 4: No CO <sub>2</sub>	
Plant 5: No minerals	

- 4 Use your observations in Question 3 and say what you could deduce about the necessity of each of the following factors for photosynthesis:
  - 4.1 Water  
\_\_\_\_\_
  - 4.2 CO<sub>2</sub>  
\_\_\_\_\_
  - 4.3 Sunlight  
\_\_\_\_\_
  - 4.4 Mineral salts  
\_\_\_\_\_



5. Was your hypothesis correct or incorrect?

6. Now use your findings from the experiment above and explain why flowers in a vase filled with water, standing in the sun, will eventually wither and die.

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\_\_\_\_\_



Rubric:

Table with 5 columns: Levels of Performance, 1, 2, 3, 4. Rows include Laboratory technique and Report of results (Question 3).

Note
This experiment can also be done by planting bean seeds or maize in the separate bowls. Allow two to three weeks for the seeds to germinate under the different conditions. Measure the length of the seedlings at the end of the allowed time and then answer the questions in the exercise above.