

## INSTRUCTIONS/RECOMMENDATIONS FOR TEACHERS

The **Research and Scientific Method** workshop/section consists of 5 parts. The *Saving My Territory* Guide explains the contents of each workshop/section in detail, and contains recommendations for classroom work.

This part/session is accompanied by 2 presentations:

1) **Presentation-guide: *Applying the scientific method for teachers***, with the instructions and recommendations required to teach each part/session in the classroom. The presentations include audiovisual content, discussion activities and other dynamics and challenges for working on the content presented. A timeframe to organise the session is provided, but teachers should adjust the time spent on each activity or audiovisual material at their discretion: as progress is made in the classroom, depending on the students' needs, or if they prefer to review some contents rather than others. There are also slides with characters providing a common theme, and suggesting the final task in each session.

2) **Presentation for students** to provide them with the key ideas in each part. The content of this presentation is taken from the teacher's presentation-guide.

The instructions and recommendations for teachers are shown in PURPLE text, like the text used here, so that they can be clearly identified as supplementary text. The activity slides have a grey background.

We hope you find the content interesting and useful.

# Saving my territory

## Research and Scientific Method Workshop

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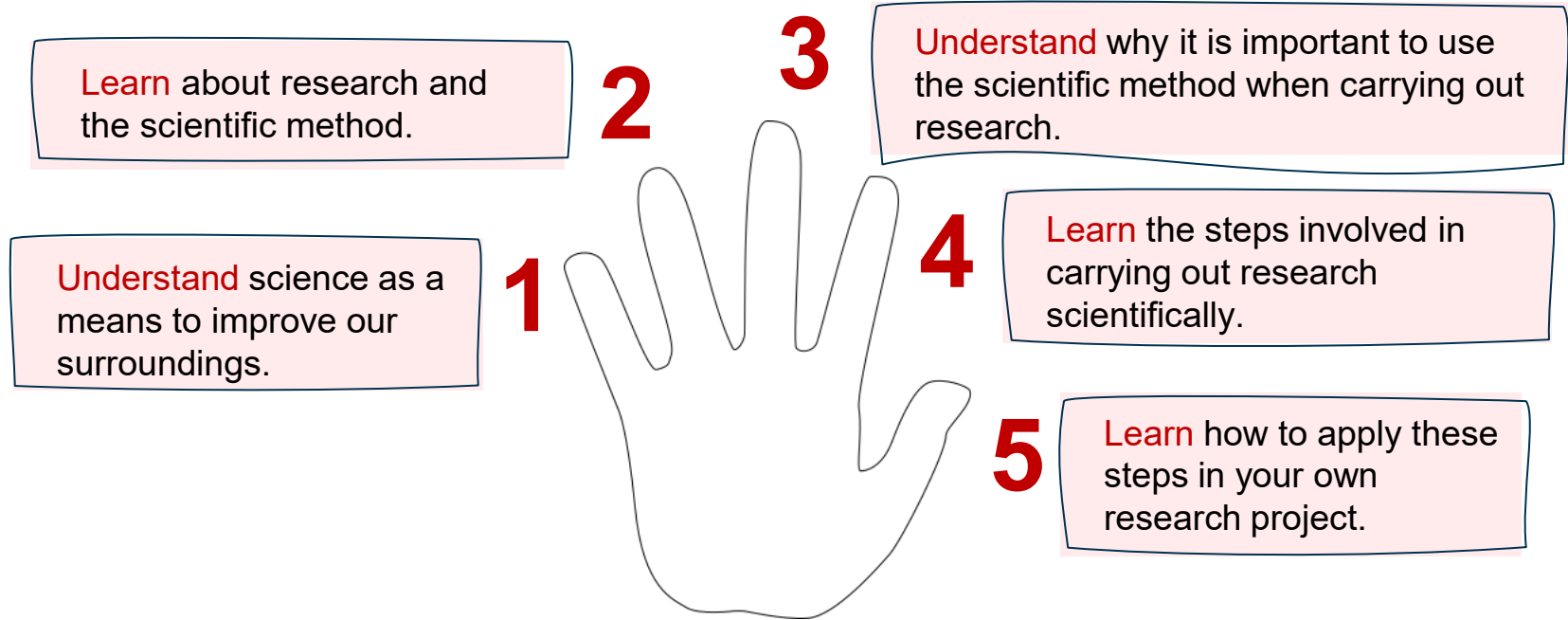


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# Research and the scientific method

## Objectives



# Research and the scientific method

## Summary

### Part I: Science for improving our surroundings

- 1.1. Science and Technology
  - 1.1.1. The importance of science and technology
  - 1.1.2. Definitions
- 1.2. Understanding our surroundings
  - 1.2.1. Reality is complicated
  - 1.2.2. Conflict of interests
- 1.3. The *Saving My Territory Project*

### Part II: Scientific activity

- 2.1. Scientific activity
  - 2.1.1. Research and development (R&D)
  - 2.1.2. Types of research
- 2.2. The *Saving My Territory Project*

### Part III: The scientific method

- 3.1. The scientific method
  - 3.1.1. What is the scientific method?
  - 3.1.2. Limitations
- 3.2. Outline of the scientific method
- 3.3. The *Saving My Territory Project*

### Part IV: Applying the Scientific Method (optional)

- 4.1. Applying the scientific method
- 4.2. The *Saving My Territory Project*

### Part V: Kit *Saving My Territory Project*

- 5.1. Scientific Method and Research Techniques Poster
- 5.2. Research project feasibility
- 5.3. Research project report

# Research and the scientific method

## Part IV

### Applying the scientific method

4.1. Applying the scientific method

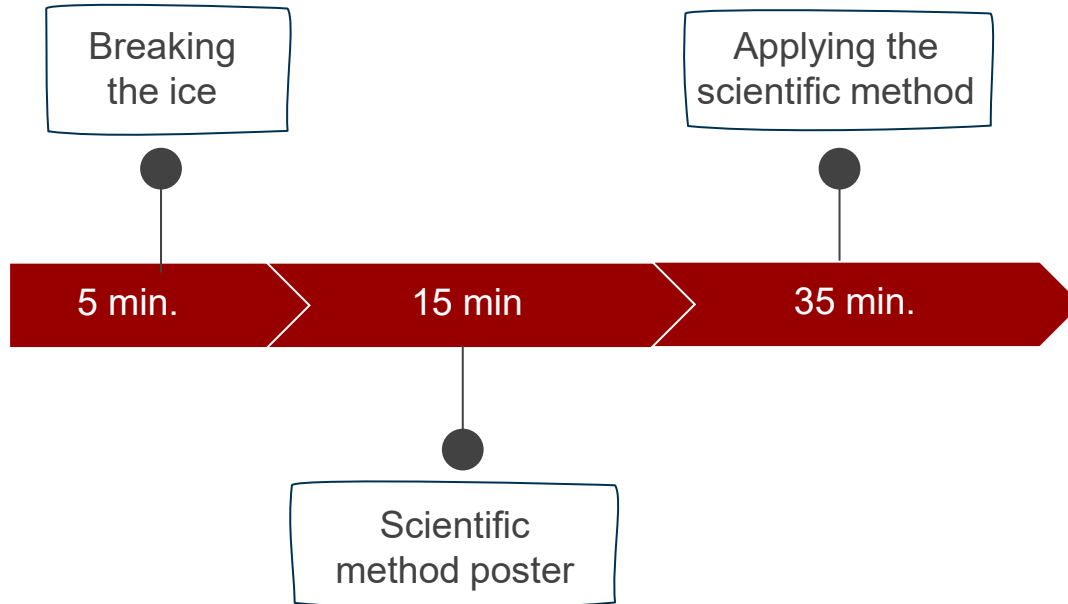
4.2. *Saving my territory...*

In this workshop, we look at science and technology, and learn how to use them to solve problems that we see around us.



# Applying the scientific method

## Timeframe



# Applying the scientific method

## 4.1. Applying the scientific method

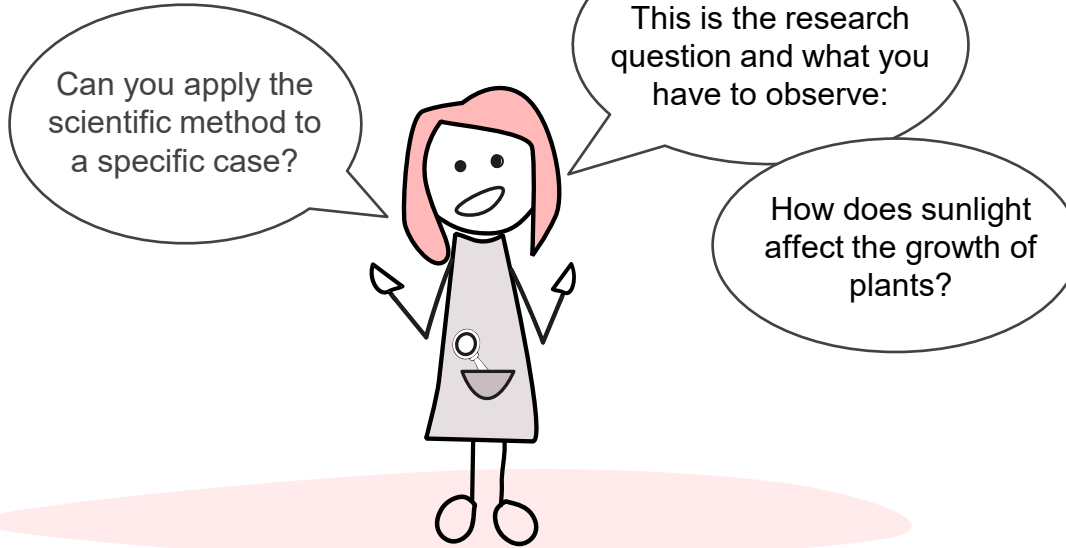
When working on this session, students should have a copy of the Scientific Method and Research Techniques poster to review the stages and become familiar with the methodology.

Work with the slides takes place after this review. This consists of the step-by-step application of the scientific method to a specific case. After asking the research question, each student should individually try to apply the stages in the scientific method for about 5-10 minutes. The students can then be organised into small groups to share their individual ideas. Finally, work can be done on each slide by pooling the group's work, and seeing if it is the same or if people have fresh ideas. Time for reflection and discussion should be set aside when working on each stage.

No variables are considered in this example.

# Applying the scientific method

Can you apply the scientific method to a specific case?



# Applying the scientific method

## 4.1. Applying the scientific method

### 1. Observation:

The students can see that some plants grow better in sunny places, while other plants grow in places receiving less light. This may spark their curiosity about how sunlight affects plant growth. As a result of the observation, the research question is posed:

**What effect does the amount of sunlight have on plant growth?**

What would the hypothesis be?

# Applying the scientific method

## 4.1. Applying the scientific method

### 2. Hypothesis:

Plants that receive more sunlight will grow faster and taller than those that receive less light.

How can this hypothesis be tested?  
What are the steps that have to be followed?  
How will the data be collected?

# Applying the scientific method

## 4.1. Applying the scientific method

### 3. Experimentation:

We need to design an experiment (methodology) to test the hypothesis.

The following material resources and spaces will be needed:

- 3 identical pots with the same amount of soil.
- 3 plants of the same type, at the same stage of growth.
- A ruler for measuring the plants' growth.
- Some water.
- Somewhere with access to sunlight, and somewhere shady.

# Applying the scientific method

## 4.1. Applying the scientific method

### 3. Experimentation:

The plants' growth is measured every two days for two weeks. Los datos a recolectar pueden ser:

- The height of the plant.
- The number of new leaves.
- The colour of the leaves (if any change is observed).

What do these data mean?

# Applying the scientific method

## 4.1. Applying the scientific method

### 4. Analysis of results:

The data are recorded in tables and graphs to show differences in growth between plants exposed to different levels of sunlight.

The data may show that:

- The plant with lots of light grows faster and taller.
- The plant with not much light grows, but more slowly and it's smaller.
- The plant in total darkness or under artificial light does not grow or grows very little, and may show signs of stress, such as yellowing leaves.

Was the hypothesis correct?

# Applying the scientific method

## 4.1. Applying the scientific method

### 5. Conclusion:

Depending on the results obtained, we can conclude whether the hypothesis was correct or incorrect (or whether the experiment needs to be repeated under other conditions).

In this case, we can conclude that sunlight is essential for optimal plant growth and that plants that receive more light grow more quickly.

What can we do with these results?  
Can the scientific community use them for  
other research?

# Applying the scientific method

## 4.1. Applying the scientific method

### 6. Communication of Results:

The conclusions and methodologies used can be presented in the form of a report, article or presentation.

This must include:

- The initial question.
- The hypothesis.
- The procedure.
- The data collected (with graphs or as clearly as possible).
- The conclusions.

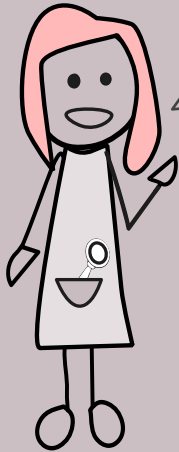
# Applying the scientific method

## 4.2. *Saving my territory...*

For the next session, ask them to observe their surroundings again, and identify possible problems that they want to work on in their project. The idea is that based on the information so far, they will be more open-minded and look at their surroundings from a different perspective. In the next session, the final idea for the research project will be chosen, and its feasibility will be evaluated.

# Applying the scientific method

## Saving my territory...



For the next session, look at your surroundings again and choose a problem for undertaking your research project.

1

Write a list of proposals/problems you see in your surroundings

2

Consider possible solutions

3

Explain how these solutions could be carried out

4

Explain the pros and cons of each proposed solution



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# Workshop on Research and the Scientific Method

## Thank you

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