# Science 7–10 (2023): Investigations in science

## Practical investigations in science

A practical investigation in science refers to a research or experimentation process where students or researchers engage in hands-on activities to collect data and draw conclusions. It typically involves direct observations, measurements and experiments that are conducted in a controlled environment, such as a laboratory or field setting. Practical investigations aim to test hypotheses, gather empirical evidence and answer specific research questions. Some students with disability may require [adjustments](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/diversity-in-learning/special-education/adjustments) or additional support to participate in investigations.

Students learning English as an additional language or dialect (EAL/D) may have had prior knowledge about science, which should be built upon while conducting investigations. They may require support such as scaffolds and explicit teaching of language features such as prediction, comparison, and cause-and-effect to test hypotheses, collect data, and draw conclusions.

### Examples of practical investigations in the Science 7–10 Syllabus

* Conduct a practical investigation to test the effect of distance on the action of a magnet.
* Conduct a series of practical investigations to explore common techniques to separate mixtures.
* Conduct a practical investigation to demonstrate the law of conservation of mass in a chemical reaction.

### Key characteristics of practical investigations in science

* Involves active experimentation, data collection and the manipulation of variables.
* Requires the use of physical equipment and instruments, such as laboratory apparatus, sensors or measuring tools.
* Involves the application of the Working scientifically processes, including making observations, forming hypotheses, conducting experiments and analysing results.
* Often provides opportunities to gain a deep understanding of natural phenomena or scientific principles through first-hand experiences.
* Requires careful planning, data recording and adherence to safety and ethical guidelines.

## Conduct an investigation (practical or secondary-sourced)

‘Conduct an investigation’ or ‘investigate’ are broader terms that encompass a wide range of research activities, including practical investigations and investigations that rely on secondary sources of information. The term ‘investigation’ can refer to any systematic process of inquiry, analysis or exploration aimed at discovering, understanding or solving a problem. Investigations may take various forms depending on the nature of the inquiry.

### Examples of ‘conduct an investigation’ or ‘investigate’ in the Science 7–10 Syllabus

* Conduct a series of investigations to identify and compare the physical properties of metals, non-metals and metalloids.
* Conduct an investigation to determine the relationship between voltage , current and resistance , as described by Ohm’s law
* Investigate the Doppler effect of waves.

### Key characteristics of ‘conduct an investigation’

* Can encompass both practical investigations (hands-on experiments) and secondary-sourced investigations (such as literature reviews, data analysis, surveys, interviews).
* May involve the collection of data using a simulation.
* May involve the use or construction of a model to explain a phenomenon.
* May involve different research methods, such as qualitative or quantitative approaches, depending on the research question.
* Allows flexibility in choosing the most appropriate method based on the objectives, available resources and type of inquiry.
* Secondary-sourced investigations involve the collection and analysis of existing data, literature or information from published sources.
* Practical investigations often require the design of experimental procedures and data collection processes.

### Choice of investigation type

The choice of investigation type depends on several factors, including the syllabus content and/or research question, available resources, time constraints and the specific objectives of the inquiry.

* Research question: the nature of the research question plays a significant role in determining the type of investigation. Some questions may require hands-on experimentation, while others can be effectively addressed through data analysis or a literature review.
* Resources: the availability of equipment, materials and facilities can influence the choice of investigation type. Practical investigations may require specific resources that are not always accessible.
* Time constraints: the time available for the investigation is a critical factor. Practical investigations often require more time for planning, experimentation and data collection, compared to secondary-sourced investigations.
* Objectives: consider the goals of the investigation. If the aim is to test a hypothesis and generate new data, a practical investigation is likely the preferred choice. If the goal is to synthesise existing knowledge or explore historical trends, a secondary-sourced investigation may be suitable.

Practical investigations in science involve hands-on experimentation and data collection, while ‘conduct an investigation’ or ‘investigate’ can encompass both practical and secondary-sourced approaches. The choice of investigation type depends on the research question, available resources, time and specific research objectives. Teachers can select the most appropriate method based on these considerations to best address the content point.

## Participate in an investigation: Life Skills

The Science 7–10 Life Skills content provides opportunities for students to participate in an investigation. Practical and secondary-sourced investigations provide opportunities for students to work scientifically using the Working scientifically processes. Students may undertake various roles and participate in any part of an investigation.

Examples of students participating in an investigation include:

* using sentence starters to draft a research question or hypothesis, or selecting a suitable option from a list
* collaborating with peers by completing an assigned role, such as selecting appropriate equipment, recording data, or planning the whole or part of an investigation
* using the senses or scientific tools during an investigation to collect data while following appropriate procedures and safety rules
* seeking and offering feedback during the investigation process using their preferred communication form(s)
* selecting relevant data and information for an investigation
* recording and organising data using appropriate strategies
* selecting appropriate conclusions from a list
* communicating findings using their preferred communication form(s)