Contents

Exploring Diversity Through Sustainability

Chapter 1

The Scientific Endeavour

Science as an Inquiry

- **Science** is the study of natural things around us.
- The word "Science" comes from the latin word '**Scientia**', which means knowledge.
- Science is a **systematic approach** by which man tries to discover the truth about the world.
- The study and practice of Science involves three major elements – **attitudes, processes** or **methods** and **products**.

Attitudes

Science helps us to develop positive attitude, including the powerful curiosity. Some of the attitudes are:

- Curiosity
- Perseverance
- Positive approach to failure
- Open-mindedness
- Co-operation with others
- Tolerance
- Impartiality
- Healthy scepticism
- Integrity
- Refusal to believe in superstitions

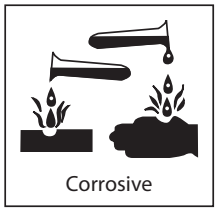
Learning Outcomes

- recognise that the study and practice of science involve three major elements: attitudes, processes or methods, and products
- recognise that the products of science are the tested data collected by scientists for centuries and explain with examples how people working with science have formulated concepts, principles and theories
- use scientific inquiry skills such as posing questions, designing investigations, evaluating experimental results and communicating learning
- show an appreciation that scientific inquiry requires attitudes such as curiosity, creativity, integrity, open-mindedness and perseverance
- discuss the uses and benefits of science and technology to society
- show an awareness of the limitations of science and technology in solving societal problems
- evaluate the benefits and limitations of science and technology
- communicate their ideas on the benefits and limitations of science through discussions and presentations

These substances involve a health risk or irritate the skin. **E.g.** chloroform, ammonia solution, bromine vapour

These substances catch fire when they come into contact with flammable substances.

These substances are explosive when heated or lit. **E.g.** mixture of hydrogen and air, ammonium nitrate



These substances destroy living tissues upon contact and cause burns. **E.g.** strong acids and alkalis

These substances are radioactive. Take safety precautions when handling these substances. **E.g.** uranium, plutonium and radioactive carbon

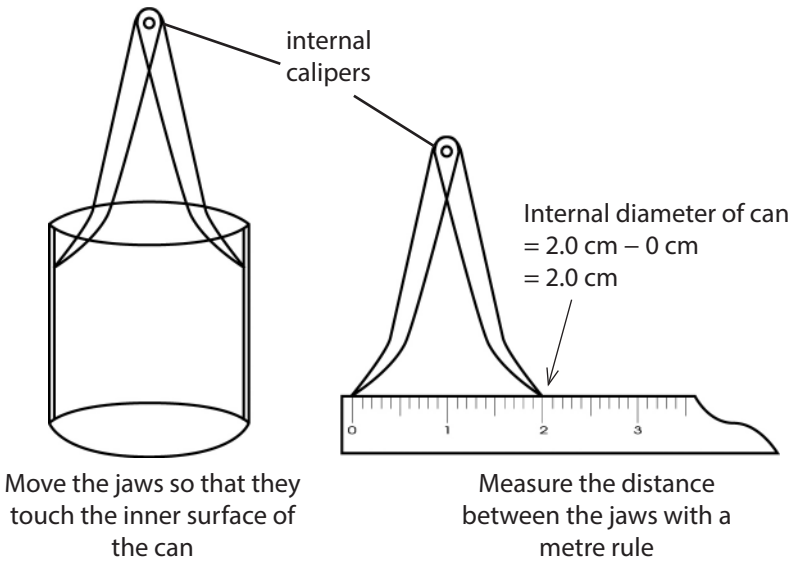
These substances are biohazards which pose a threat to our health. **E.g.** used needles, blood samples of infected persons

Base quantity	Symbol	Symbol for S.I. Unit
Length	l	m
Mass	m	kg
Time	t	s
Current	I	A
Temperature	t	K

- Base units are the simple measurements for length, mass, time, current and temperature.
- Derived units are made up of base units. **E.g.** a unit for density is kg/m^3.
- Other derived units are shown in the following formulae table.

Formulae Table

Derived quantity	Formula	Derived units	Name of derived unit
Area	length × width	m × m = m^2	square metre
Volume	length × width × height	m × m × m = m^3	metre cube
Density	$\frac{\text{mass}}{\text{volume}}\left(\rho = \frac{m}{V}\right)$	kg/m^3 (kg m^{-3}) g/cm^3 (g cm^{-3})	-



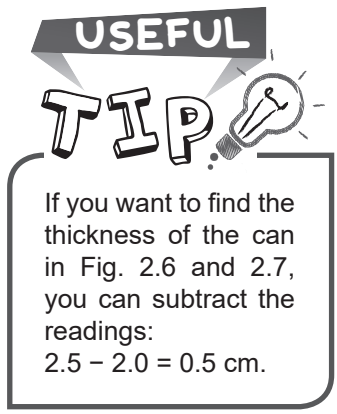


Fig. 2.7: Measuring the internal diameter of a can

However, when using these calipers, we can only measure accurately up to 0.1 cm using a ruler. For smaller lengths or for greater accuracy, we need special instruments like the Vernier calipers or the micrometer screw gauge.

(D) The Vernier caliper

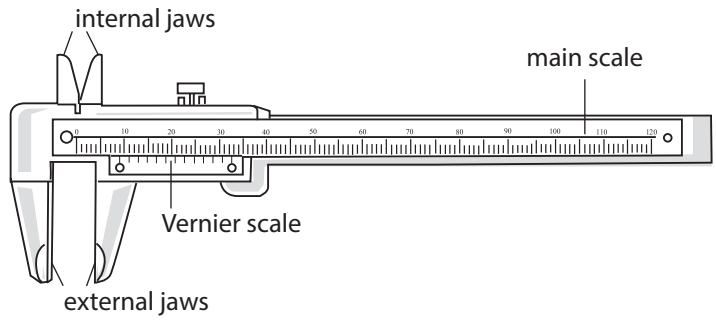


Fig. 2.8: A Vernier caliper

The metre scale enables us to measure lengths of up to the nearest millimetre only. Engineers and scientists need to measure much smaller distances accurately, such as up to 0.01 cm. Hence a special type of scale called the **Vernier scale** is used for these measurements.