

## The atomic structure of lithium: Johnstone's triangle

### Learning objectives

- 1 Describe macroscopic properties of a substance.
- 2 Describe the arrangement of subatomic particles within an atom.
- 3 Calculate the number of protons, neutrons and electrons present for a given element.

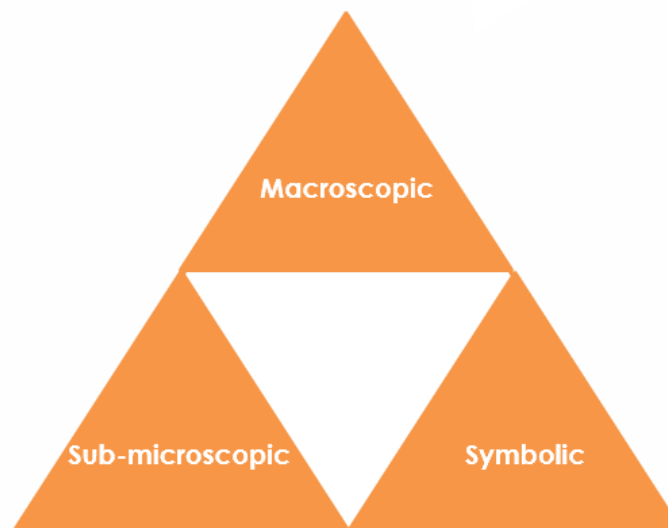
### Introduction

Lithium is an element with a small number of subatomic particles that we can use to think about the structure of an atom.

### Johnstone's triangle

In chemistry we make sense of the things that we can see by representing what we can't see using formulas, equations, diagrams and models.

Johnstone's triangle is a way of thinking about these different concepts as different corners of a triangle:

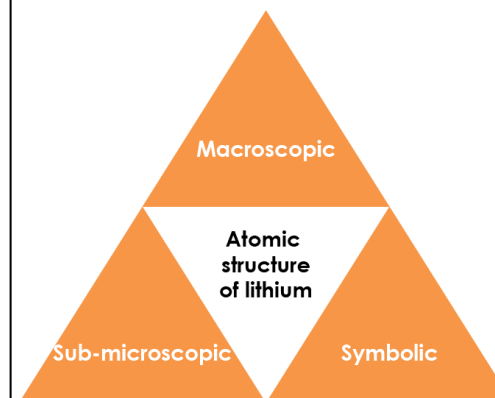


- Macroscopic – what we can see. Think about the properties we can observe, measure and record.
- Sub-microscopic – smaller than we can see. Think about the particle or atomic level.
- Symbolic – representations. Think about how we represent chemical ideas, including symbols and diagrams.

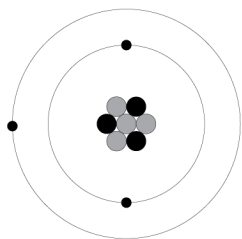
Being able to connect and move between these three different levels is important for scientific understanding.

**Macroscopic – what we can see**

The image shows lithium metal. It is made from lithium atoms. Using the image and your prior knowledge, list some macroscopic properties of lithium:

**Sub-microscopic – smaller than we can see**

A lithium atom can be represented as:



Describe where in an atom of lithium each type of subatomic particle is found:

Proton: \_\_\_\_\_

Neutron: \_\_\_\_\_

Electron: \_\_\_\_\_

Suggest a connection between the number of protons and number of electrons:

**Symbolic – representations**

Lithium is shown in the periodic table as:



The atomic number gives the number of protons and electrons. State the number of:

<b>Protons</b>	
<b>Electrons</b>	

The number of neutrons is found from:  
= mass number – atomic number

Calculate the number of neutrons:

<b>Neutrons</b>	
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