Knowing the Metric System

Overview

In this activity a short discussion with the class leads into a description of the origins of the metric system, and how the units within it fit together as a cohesive whole. It also contains information sheets for students to keep as a record of these facts.

This discussion and information session is best held after students have participated in one or more of the activities which encourage sharing of existing knowledge, for example '*Matching Metrics*', '*Metric True or False*', '*The One Most Likely*' or '*Sorting and Ordering Metric Units*'.

Skills and Knowledge

- Units of the metric system
- Relationship between metric units
- Meaning of metric prefixes

Preparation and Materials

- Photocopy Activity Sheets 1 & 2 (1 per student)
- A couple of large MAB cubes (optional)
- A handful of small MAB cubes (optional)

Most primary schools have sets of MAB blocks for teaching arithmetic. For adults these are a great aid to visualising the units of the metric system. If you do not have any, see if the local primary school will loan you some.

Suggested Procedure

This discussion should ideally follow on from another activity in which students have exchanged some of their knowledge of metric units and what they are used to measure. If this is the case there will be a particular starting point for the following.

Origins of the Metric System

Ask questions such as:

- *Are you aware that Australia didn't always use the metric system of measurement?*
- *Do you know when we started to use it?*
- *Do you know when and where the metric system was invented?*
- *Does anyone have any idea why it was created?*
- *What sorts of measurements do you think were used before the metric system?*

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- *If you come from another country, do you know what measurement system they use there?*
- *Are you aware of any other systems of measurement?*

The discussion should cover the following.

- *Australia started using the Metric System in 1970.*
- *Before that we used the British Imperial System of feet, inches, yards, pounds, stones etc.*

- *We had to learn a lot of really complex facts about the connections between the measurements, for example*:
  - 14 pounds = 1 stone
  - 12 inches = 1 foot
  - 3 feet = 1 yard
  - 2,240 yards = 1 mile.

- *There was not a lot of connection between the units so it was a very complicated system.*
- *The Metric System was invented in the 18th Century by the French.*
- *This was the time of the famous French Revolution when the political system was changing from old to new. They decided it was a good time to change to a new system of measurements as well.*
- *The system was created by scientists so that all of the units fitted together to form an interconnected system.*
- *The only numbers you now need to remember to convert between units are 10, 100, 1 000.*

Distribute **Activity Sheet 1** : *The Metric System.*

Talk through the logic of the system with the students.

Clarifying Prefixes

Ensure that you emphasise the meaning of the prefix **'centi'** in centimetres as you go.

See *'Exploring Decimals and Hundredths with Money'* and *'Sorting and Ordering Metric Units'* for discussion of this.

Ask students if they know the other prefixes used in the system and what they mean.

Distribute *Activity Sheet 2 : Metric Prefixes.*

Modelling the units

If available, it is useful to have a couple of large MAB cubes handy for this discussion since they are exactly the size and shape of one litre.

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It is also possible to see the small (1 cm) cubes which are marked into the outer surfaces, so that students can see there are 10 x 10 x 10 = 1 000 of these cubic centimetres (cc) in the litre.

The small MAB cubes are 1 cubic centimetre in size and it is also useful to have a handful of these available to be better able to visualise 1 millilitre.

Most people are not aware that 1 millilitre is equivalent of 1 cubic centimetre, so this is an interesting observation. It is also a good time to explore where students have heard about cc's and to explain to them that they are not a measure of how much petrol goes into a motor bike or car, but a measure of the size of the engine. The more cc's the greater the power of the vehicle.

The other metric prefixes

Refer to *Activity Sheet 2: 'The Metric Prefixes'* and talk through the meaning of the other prefixes with students so that they can see how easy it is to remember facts in the Metric System, as compared to the old British Imperial System.

Follow up

It is important that, as well as knowing facts about the metric system, students gain some appreciation of the actual size of the units and so develop some skills in estimating lengths, weights and volumes using common metric units. They should also gain practice at using relevant measuring instruments such as scales, tapes, measuring jugs and the like.

One activity for follow up with beginning numeracy learners is *'What do we use this for?'* which explores a range of units and the properties and products they are typically used to measure.

Activities involving estimating and measuring in metric units are highly recommended to follow this activity. These include: *'Estimating Lengths in Metric Units'*, *'How Heavy is that?'*, *'What does this hold?'*

If particular measuring units other than those commonly used in the metric system, are relevant to learners' work or future employment, then these should be a focus also during subsequent sessions. There are many internet sites that list equivalences between units and perform instant conversions. More advanced numeracy students will benefit from being introduced to these sites (in addition to encouraging them to practise conversions with a calculator).

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Knowing the metric system

Activity Sheet 1

The metric system was devised in the Eighteenth Century by the French, at a time of great political and social upheaval know as the French Revolution. As an outdated political system gave way to a new one, so did a new system of measurement replace the old.

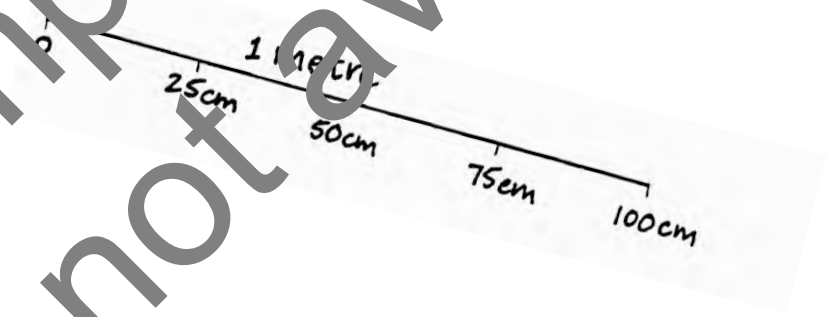
Australia adopted the metric measurement system in 1970.

Unlike the old Imperial units, metric units are totally interconnected and logical.

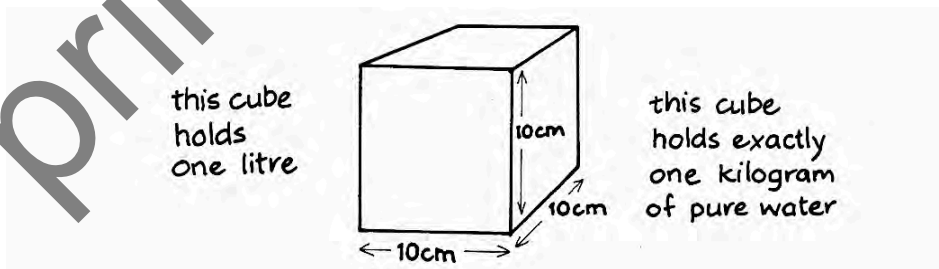
They were devised as follows:

The **metre** was defined as one ten millionth ($\frac{1}{10\,000\,000}$) of the distance from the equator to the north pole (through Paris, of course!)

The metre was then divided into **100 parts**, which were called **centimetres**.



The **litre** was then defined as the volume of a cube **10 cm** by **10 cm**.



The **Kilogram** was defined as the weight of one litre **of pure water.**

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Metric Prefixes

Kilo means **one thousand** (1 000) of

e.g.	**kilo**metre (km)	is one thousand	**metres** (m)
	kilolitre (kl)	is one thousand	**litres** (l)
	kilogram (kg)	is one thousand	**grams** (g)

Milli means **one thousandth** ($\frac{1}{1\,000}$) part of

e.g.	**milli**metre (mm)	is one thousandth part of a	**metre**
	millilitre (ml)	is one thousandth part of a	**litre**
	milligram (mg)	is one thousandth part of a	**gram**

Centi means one hundredth ($\frac{1}{100}$) part of

e.g.	**centi**metre (cm)	is one hundredth part of	**metre**
	cent (c)	is one hundredth part of a	**dollar**

A few helpful facts:

- **1 metric cup** holds **250 ml**
- **1 level teaspoon** holds **5 ml**
- 1 centimetre looks like this
- There are **10 mm** in 1 **cm**

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