How Long is a Metre?

Key Learning Content

This film tells the story of how the metre has come to be precisely defined. Beginning with the ancient Egyptians and their standard royal cubit, the film moves on to 18th-century France and its 800 or more different names for measures. The metre was created to provide one universally recognised standard of measurement, and was originally defined as a fraction of the Earth's circumference. Seeking even greater precision, scientists today define the metre in terms of the distance that light travels in a vacuum in a set interval of time.

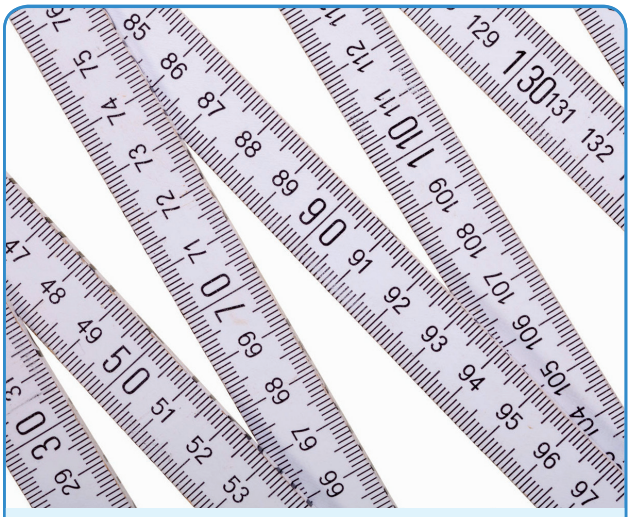
Core Outcomes

Learning Points

- Be able to use decimal notation.
- Be able to interpret scales on a range of measuring instruments.
- Be able to carry out calculations using standard metric units.

Suggested Activities

- Measure objects and give answers to a specified level of accuracy.
- Convert between metric and other measures.



The metre is the base unit of length used around the world.

Extension Outcomes

Learning Points

- Be able to understand decimal place values and order decimals.
- Be able to convert measurements within the metric system to include linear, area and volume units $cm^2 \rightarrow m^2$ and vice versa, $cm^3 \rightarrow$ litres and vice versa.

Suggested Activities

- Learn equivalences within the metric measurement system, including measures of volume.
- Solve practical problems with amounts given in different units, requiring conversion to a single unit of measure.

Related Films

To use before the lesson plan:

Why Do We Count in Tens?	This film gives an introduction to decimals, showing why we use base 10 despite other bases perhaps being more attractive mathematically.

To use after the lesson plan:

Rounding: Snails vs Rockets	This film discusses the use of extreme precision in very large or small numbers.
Jai Singh	This film explains how ancient astronomers managed to make incredibly accurate measurements using only basic instruments.
The Egyptians and Multiplication	This film contains an in-depth account of how the Egyptians made precise measurements when building the pyramids.
Heptathlon	This film shows how scoring the seven events in the heptathlon requires a range of metric measurements and a complex algorithm to calculate the winner.
Decimal Places: Photofinish	This film shows why, after a closely fought 60m sprint, athletes' times need to be measured to hundredths of a second.

Guide Lesson Plan

Introduction

Tell students to take a blank sheet of paper and a ruler, and then draw as accurately as they can a line which is either 10 or 11mm long – they can choose either length, but must not tell anyone their choice. Ask students to swap papers with the person next to them and measure their line, writing the measured length on the paper. Hand the papers back and check how many students got the correct answer. Agree that accurate measurement is not easy, even with high quality factory-produced rulers.

Show Film

How Long is a Metre?

Main Activity

Foundation

Give students a list of equivalences of metric and other units (e.g. centimetres to inches, kilograms to pounds). Set exercises to convert between given measures. Then set measurement problems involving division, multiplication, addition and subtraction in both metric and non-metric units (e.g seven relay runners run a mile, how far does each run, to the nearest centimetre?)

Advanced

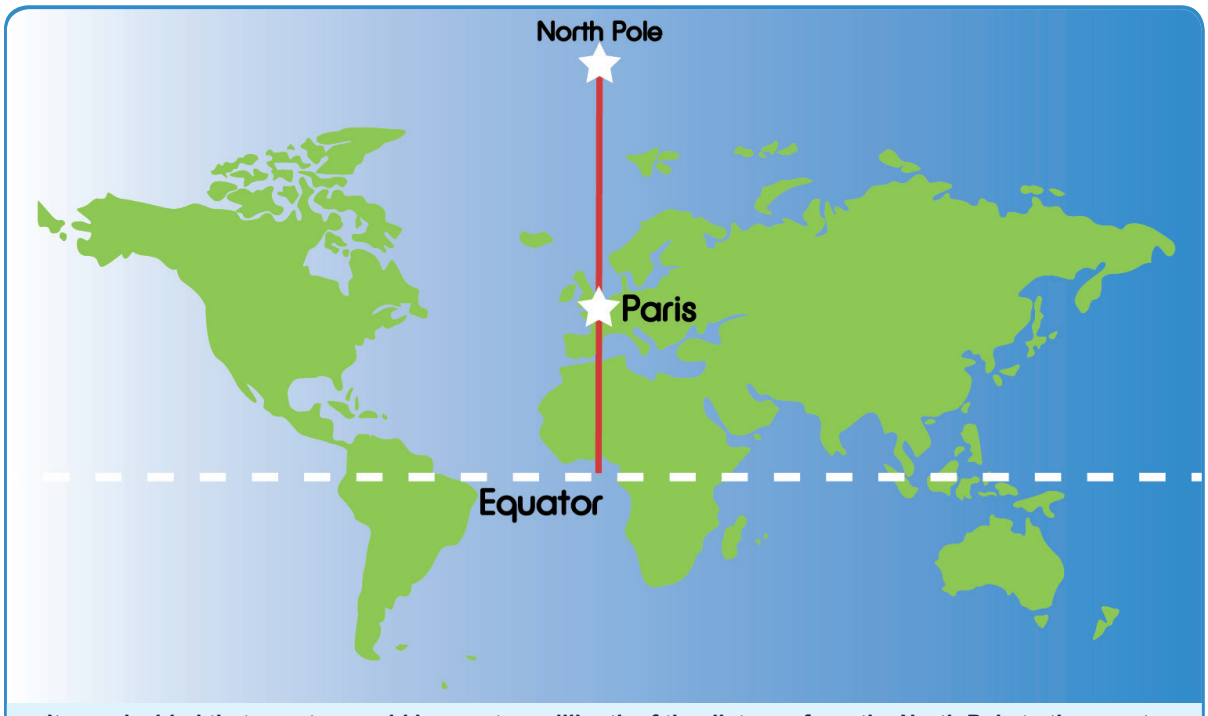
Give students a list of equivalent volume measures (e.g. litres to cubic centimetres, pints to litres). Set question involving conversion between units (e.g. a bath fills at a rate of 190cm^3 per minute, if 87 litres are needed for a comfortable bath, then how many seconds does it take for the bath to be ready?)

Extension Activity

Get a large bowl of water, a jug and several plastic cups, together with an accurate measuring flask for millilitres of water. Ask students to come up and pour 10cm^3 of water into a cup by eye. Measure and tabulate their results.

Optional Extra

In 1791 the metre was originally defined as one ten millionth of the distance from the north pole to the equator. Suppose you were the French scientist charged with working out what this distance actually was: how would you do it? (i.e. How would you work out what the distance was from the north pole to the equator?) List all the practical difficulties you would face in completing this task.



It was decided that a metre would be one ten-millionth of the distance from the North Pole to the equator. This was calculated using trigonometry. An official metre bar was created in Paris in 1795.