# Why Do We Count in Tens?

Key Learning Content

The film gives a thorough overview of the decimal system, from decimal place value to metric measurements. The merits of a base 60 system, used in minutes and seconds, are explored in terms of the many factors of 60, which make division easier. The use of body parts for counting throughout history is given as a justification for our base 10 system. No prior knowledge is required to understand the film.
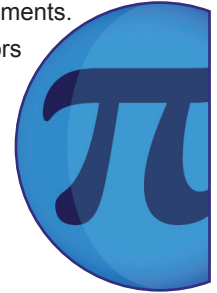
Core Outcomes

Learning Points

- Be able to use decimal notation.
- Be able to use the terms factor and multiple.
- Be able to carry out calculations using standard metric units.

Suggested Activities

- Carry out calculations using place values and multiplication and division by factors of 10.
- Convert between metric units.
- List the factors of numbers from 1 to 20.

Extension Outcomes

Learning Points

- Be able to understand that the decimal number system is one of many alternative number systems.
- Be able to carry out calculations using alternative bases.
- Be able to carry out calculations using logarithms.

Suggested Activities

- Identify examples from the real world where bases other than base 10 are used.
- Use prime factor decomposition to identify attractive alternative bases.

Before most people could write, they used their bodies to count.

Related Films

To use before the lesson plan:

Numbers: The Discovery of Zero

This film demonstrates that we could not use base 10 without zero. However, the concept of zero was discovered – or even invented – by mathematicians quite late in history.

Numbers: Life Without Numbers

This film explores the possibility of living without using any numbers at all, with the exception of the number 1.

To use after the lesson plan:

Decimals: Decimal Day

This film documents the major changes in money and measurement systems introduced in the 1970s in the United Kingdom.

How Long Is a Metre?

This film shows that while the metre is the foundation stone of the metric measurement system, its exact properties are surprisingly difficult to establish.

Binary: What is Binary?

This film provides an introduction to one of the most commonly used base systems in everyday life: the binary system.

The Richter Scale

This film explains the number system used for measuring earthquakes on the Richter Scale.

Guide Lesson Plan

Introduction

Tell the students that you have decided to make this a cookery lesson, and that they will work in groups to boil an egg. Ask them why it would be much more sensible for you to bring a dozen eggs rather than 10.

Show Film

Why Do We Count in Tens?

Main Activity

Foundation

Begin with basic arithmetic practice, testing knowledge of place value and multiplication or division by powers of 10. Agree that working in base 10 is a very natural and intuitive thing to do.

Next, ask the students to list all the factors of whole numbers from 1 to 20, and compare the number of factors that each number has. Discuss why eggs are sold in packs of 6 and 12.

Main Activity cont ...

Advanced

Ask the students how they would decide which base to use if beginning from nothing. By considering prime factors, get the students to work out the smallest numbers exactly divisible by 2, 3 and 4; by 2, 3, 4 and 5; and by 2, 3, 4, 5 and 6. Show by example that dividing 12 and 60 into parts can be easier than dividing 10 or 100.

Set arithmetic problems in base 6, base 12 and base 60.

Extension Activity

Ask students to brainstorm and list all the examples they can think of in the real world where bases other than base 10 are used. Encourage them to look back in history at alternative measuring and currency systems. Is it possible to find a mathematical reason why these alternative bases may have been used?

Optional Extra

Research the Babylonian number system, and explain how it relates to the way we still measure time and angles. Was it a pure base 60 system, or did it have elements of another base inside this (for example, base 10 within base 60)?
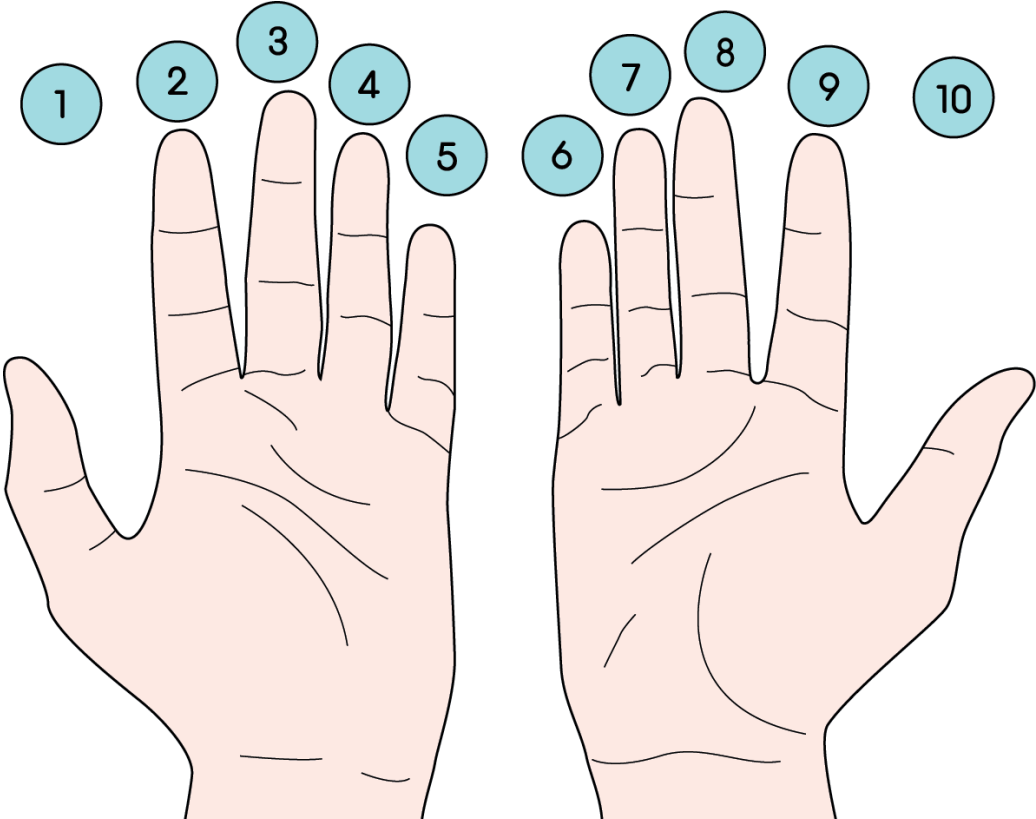
Our numeric system is based on multiples of 10, which is probably because we have 10 fingers.