# Numbers: Animal Maths

Key Learning Content

This film begins by introducing a parrot that has been taught to count. It then poses the question: Are humans the only species capable of doing maths? Experiments measuring the attention span of monkeys and babies show that both groups are aware when objects are added or removed unexpectedly from their sight, suggesting an ability to count. While an understanding of quantity may be a prerequisite for survival in the animal world, more complex mathematical capabilities appear to belong to humans only.
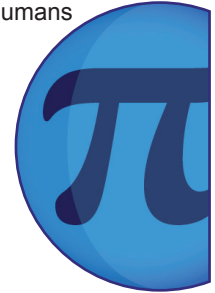
Core Outcomes

Learning Points

- Be able to understand and use integers (positive, negative and zero) both as positions and translations on a number line.
- Be able to use directed numbers in practical situations, such as temperature and sea-level.
- Be able to order integers.

Suggested Activities

- Practise addition and subtraction of positive integers.
- Practise subtraction of negative integers, and multiplication and division of negative integers.

Extension Outcomes

Learning Points

- Be able to use addition, subtraction, multiplication and division.
- Be able to understand the priority of operations in arithmetic.

Suggested Activities

- Practise mental maths.
- Practise applying the rules of BODMAS or BIDMAS.

All animals, including humans, need some understanding of quantity to survive.

Related Films

To use before the lesson plan:

Most Popular Pet

This film takes a light-hearted look at the animal which is the most popular family pet.

To use after the lesson plan:

Numbers: Life Without Numbers

This film asks: Although humans may have mastered mathematics, is it necessary for a civilised life? The experience of some communities suggests not.

Percentages: Feeding the Nutcracker

This film shows that the behaviour of a particular bird suggests a grasp not only of numbers, but also of probability.

Primed for Survival

This film demonstrates that the life-cycles of cicadas are designed around prime numbers, which enhances their chances of survival.

Bees and their Hives

This film describes how bees use tessellations to optimise their use of wax to store the maximum amount of honey.

Guide Lesson Plan

Introduction

Ask students how intelligent they think animals are. Swap stories about talented animals such as guide dogs, search dogs, homing pigeons and dolphins; then ask if students think animals can count.

Show Film

Numbers: Animal Maths

Main Activity

Foundation

Tell the students that you are going to give them increasingly complicated sums to do; and that after they have done the sums they should judge whether a very intelligent animal might be able to do them (in the context of how it lives). Begin with addition of positive integers less than 100, then less than 1,000, and less than 10,000. Do the same with subtraction. Next, set questions involving the subtraction of negatives, e.g. $12 - (-9) = 21$. Then move on to multiplication and division, increasing the complexity until the questions involve negatives again, e.g. $-5 \times -3 = +15$. Ask if an animal could do this. Ask the students to justify why we say that (for example) $-5 \times -3 = +15$.

Main Activity cont ...

Advanced

Recap the rules of BODMAS/BIDMAS. Then give increasingly complex sums with compound arithmetic, e.g. 3 + 7 x 2; 4 x 6 - 7; $(3 - 6)^2$ x -2 - (-2). Then ask students: why are the rules as they are? Why do we say that 7 - 4 + 2 = 5 and not 1? Return to the question of whether animals can do maths and ask: What would count as evidence for this, given that we cannot expect them to know the arbitrary conventions that we use in arithmetic?

Extension Activity

Give a mental arithmetic test, then go through the answers and discuss shortcuts or tricks to help find the answer, e.g. to multiply by 9, add a zero to the number and subtract the original number; to multiply by 25, divide by 4 and add two zeros to the answer. Make a list of shortcuts that students use.

Optional Extra

The Greeks believed that we are all born with knowledge inside us, which intelligent questioning could reveal. Read Plato's account of a conversation between Socrates and the slave boy in his work, Meno, and discuss the Greek belief that we are all born with the square root of two locked inside our heads.

Rhesus monkeys have the capacity to do simple mathematics.