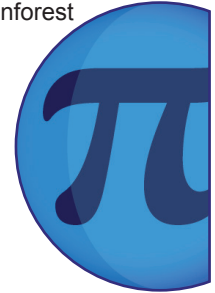




Venn Diagrams: Global Habitats

Key Learning Content

This film introduces Venn diagrams through a comparison of the extreme environments of a tropical rainforest and a desert. Common locations of South America, Africa and Asia fall in the intersection of the two sets, while locations particular to one and not to the other lie outside their intersection. The distinction is further illustrated using other characteristics of the two environments. The set notation \cup and \cap is used throughout.



Familiarity with the concept of a set would be useful prior to watching the film.

Core Outcomes

Learning Points

- Be able to understand the definition of a set of numbers.
- Be able to use Venn diagrams to represent sets and the number of elements in sets.
- Be able to use the set notation \cup , \cap and \in .
- Be able to understand the concept of the universal set and its symbols E or ξ .

Suggested Activities

- Describe ideas and concepts using Venn diagrams.
- Solve problems involving intersection and union of sets.
- Describe, using set notation alone, different parts of a Venn diagram showing intersecting sets.

Extension Outcomes

Learning Points

- Be able to define sets algebraically.
- Be able to understand and use de Morgan's laws, showing the relationships between the intersection, union and complement of sets.
- Be able to use the logic symbols \forall ('for all') and \exists ('there exists').

Suggested Activities

- Match sets with their algebraic definitions.
- Discover de Morgan's laws by considering shadings of a Venn diagram.
- Express logical statements using set language.



The relationship between data from the two environments can be shown in a Venn diagram.

Related Films

To use before the lesson plan:

Numbers: Life Without Numbers

This film examines the argument that the idea of sets or collections of objects is more basic than the idea of numbers, and asks whether we need numbers at all.

Set Theory: Cantor

This film introduces the basic concepts of Set Theory using the idea of an orchestra as a set of musicians.

To use after the lesson plan:

Sets: Infinity

This film looks at how Set Theory can be used to make sense of different types of infinity.

Guide Lesson Plan

Introduction

Ask students how their cohort compares with the cohort below. Record what they say using a Venn diagram, in terms of shared and distinct characteristics, but without explaining what the diagram is. Get them to agree with your summary and then ask them if they know what sort of diagram you have drawn.

Show Film

Venn Diagrams: Global Habitats

Main Activity

Foundation

Recap the main ideas of the film then get students to draw Venn diagrams showing two countries, e.g. England and France, or two types of music, or two political parties. Extend to three overlapping concepts or ideas. Then use Venn diagrams, with the number of elements recorded in each distinct area, to solve simple problems, e.g. in a school, 60 students study maths and/or physics, 33 study maths and 54 study physics; how many study both maths and physics?

Advanced

Explain how sets can be defined algebraically, e.g.

$$X = \{x : x \in \mathbb{Z}, x^2 < 10\} = \{0, 1, 2, 3\}$$

Then give students lists of algebraic definitions and set listings, and get them to match the definitions with their sets. Next give students the elements of a set and get them to write an algebraic definition for the set. Introduce \forall ('for all') and \exists ('there exists'), and write logical statements using set notation, e.g. 'All natural numbers are real numbers'.

Extension Activity

Draw a Venn diagram showing three overlapping sets and describe each distinct area of the diagram using set notation, e.g. $A \cap B \cap C$, $A \cap (B \cup C)$. Get students to shade e.g. $(A \cup B)'$ and $A' \cap B'$ and ask if they can see a connection. State de Morgan's laws and check it works using Venn diagrams.

Optional Extra

Draw a Venn diagram showing four overlapping sets. Work out how many distinct areas it should contain. Describe each area using set notation.

