Conventional numbers

Definition based on counts of items

Count objects from a count of 1 upwards and assign numbers to the counts, being the natural numbers

Define zero as no items (as 4 – 4 for example, i.e. 4 - 4 = 0)

Negative numbers as a number with an associated negative indictor, indicating a deficit

Operations addition (based on counts of items, larger numbers by multiple-digit algorithm), subtraction, exponentiation, multiplication (group of x items repeated y times) and division

Real numbers as partial counts (e.g 3.25 oranges)

Alternative definitions

1 as 1

2 as 1 + 1

3 as 1 + 1 + 1

2 + 3 as (1+1) +( 1+1+1) = 1+1+1+1+1 = 5

2-dimensional numbers

Number representations: decimal (base 2, base 10 etc), fractional representation ( 1/3 etc), roman numerals

Area defined as the number of small tiles placed on a surface, taking the limit to infinitesimally small tiles, cubes for volume

Geometric derivations for the area of a circle, square, triangle and the volume of a pyramid (divide into ‘n’ segments stacked on each other, determine the volume of each segment assuming vertical sides, take the limit), cone and sphere (geodesic dome object as the base of the derivation)

Area of circle

Radius r

Segments n

Internal angle 2π/n

Segment area