

Max's Mathematical Cube Challenge

Learning objective: To recognise, calculate, and apply knowledge of cube numbers up to 10^3 .

Max the monkey is organising his collection of wooden blocks. Help him solve these puzzles by calculating the volume of his structures and identifying patterns in cube numbers.

A cube number is the result of multiplying a whole number by itself twice (e.g., $2 \times 2 \times 2 = 8$). We write this as 2^3 .

Word bank: cube number · product · base · dimension · volume · multiplication · integer · equivalent

1. Max has a cube made of smaller blocks that measures 4cm by 4cm by 4cm. Calculate the total volume of this cube in cubic centimetres (cm^3). Show your working out. (2 marks)

2. List the first five cube numbers starting from 1^3 . Explain the pattern you notice as the base number increases. (3 marks)

3. If a cube has a volume of 125cm^3 , what is the length of one of its sides? Justify your answer using your knowledge of multiplication. (2 marks)

4. Max bought a set of decorative crystal cubes. Each cube costs £3. If he buys a structure consisting of 3^3 individual crystal cubes, how much does he spend in total? Show your calculation. (3 marks)

5. Compare and contrast a square number and a cube number. Explain why a cube number is sometimes called a 'three-dimensional' number. (3 marks)

6. What might happen to the volume of a cube if you were to double the length of each of its sides? Provide an example to support your hypothesis. (3 marks)

Draw: Draw a 3x3x3 cube structure and label the dimensions clearly. Use shading to show the depth of the object.



Extension challenge: Investigate the sum of consecutive cube numbers. Does the sum of $1^3 + 2^3 + 3^3$ result in a square number? Explore this for the first four cubes and write a brief report on your findings.