

Max's Mathematical Blocks: Investigating Cube Numbers

Learning objective: To recognise and use cube numbers and the notation for cubed (³), and to calculate the volume of cubes.

Help Max the monkey build his jungle towers! Read the passage carefully and use your knowledge of multiplication to solve the puzzles below. Show your working out clearly.

Max is busy organising his collection of wooden blocks in the jungle canopy. He loves patterns, especially those that form perfect cubes. A cube number is the result of multiplying a whole number by itself twice (for example, $2 \times 2 \times 2 = 8$). We write this as 2^3 . Because a cube is a three-dimensional shape, its volume is calculated by multiplying length $\times$ width $\times$ height. Since all sides of a cube are the same length, if a block has a side of 3cm, its volume is $3 \times 3 \times 3 = 27\text{cm}^3$. Max has noticed that as the side length increases, the total number of blocks needed grows very quickly!

Word bank: Cube number · Product · Dimension · Volume · Multiplication · Exponent · Three-dimensional

1. Max has a small tower with a side length of 4cm. Calculate the volume of this tower. Show your calculation. (2 marks)

2. List the first five cube numbers (starting from 1^3). Explain how you found the fifth cube number. (3 marks)

3. If a cube has a volume of 64cm^3 , what is the length of one of its sides? Justify your answer. (2 marks)

4. Compare and contrast a square number (e.g., 4^2) with a cube number (e.g., 4^3). How does the multiplication process differ? (3 marks)

5. Max finds a box that costs £2 for every 1cm^3 of volume it contains. If the box is a cube with a side length of 5cm, how much will it cost to fill the box? (3 marks)

Draw: Draw a 3x3x3 cube made of individual blocks. Label the height, width, and length, and write the total volume in the centre.



Extension challenge: What might happen if Max tried to build a 'cube' where the length, width, and height were different? Would it still be a cube number? Explain your reasoning using the term 'rectangular prism'.