

Max's Mathematical Cube Challenge

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

Read the information below about Max's workspace and answer the questions. Remember that a cube number is a number multiplied by itself and then by itself again (e.g., $3^3 = 3 \times 3 \times 3$).

Max the monkey is organising his collection of wooden blocks. He loves to arrange them into perfect cubes to solve math puzzles. Max knows that to find the volume of a cube, he must multiply the length by the width by the height. Because all sides of a cube are the same length, he uses the 'cubed' symbol (³). For example, a cube with a side length of 2cm has a volume of $2 \times 2 \times 2 = 8\text{cm}^3$. Max currently has a special tower that is 5cm tall, 5cm wide, and 5cm deep. He is also saving his pocket money, which totals £4³, to buy a new set of geometric shapes for his collection.

Word bank: cube number · base · exponent · volume · multiply · product

1. Using Max's method, what is the value of 4³? Show your working out. (2 marks)

2. If Max has a block tower with a side length of 3cm, what is its volume in cm³? (1 mark)

3. Max is saving £4³ in his jar. How much money does he have in total? (2 marks)

4. Is 27 a cube number? Explain how you know by showing the calculation. (2 marks)

5. If a cube has a volume of 64cm³, what is the length of one of its sides? (2 marks)

Draw: Draw a 3D cube on your paper. Label one side as '3cm'. Next to it, write the equation to show how you would calculate its volume.

Extension challenge: Max wants to build a larger cube with a volume of 216cm^3 . Can you work out what the side length of this cube must be?