

Max's Magnificent Volume Challenge

Learning objective: To calculate the volume of cubes and cuboids by counting unit cubes and using the formula (length $\times$ width $\times$ height).

Max the monkey has been busy building towers and storage boxes for his jungle supplies. Help him solve these volume puzzles to ensure everything fits perfectly. Read each question carefully and show your working out.

Answer Key: 1.C, 2.True, 3.12, 4.B, 5.False, 6.24, 7.A, 8.True, 9.18, 10.C. Working out: Volume is found by multiplying length $\times$ width $\times$ height. For shapes made of unit cubes, simply count the total cubes.

Word bank: Volume · Capacity · Cuboid · Unit cube · Dimensions · Formula · Space · Calculate

1. 1. Max builds a box that is 3cm long, 2cm wide, and 2cm high. What is the total volume in cm^3 ? A) 7cm^3 , B) 10cm^3 , C) 12cm^3 , D) 8cm^3 (1 mark)

2. 2. True or False: The volume of a shape is the total amount of 3D space it occupies. (1 mark)

3. 3. A stack of wooden blocks is 4 cubes long, 3 cubes wide, and 1 cube high. How many unit cubes are there in total? (1 mark)

4. 4. Which formula correctly calculates the volume of a cuboid? A) Length + Width + Height, B) Length $\times$ Width $\times$ Height*, C) Length $\times$ Width, D) (Length $\times$ 2) + (Width $\times$ 2) (1 mark)

5. 5. True or False: If two shapes have the same volume, they must look exactly the same. (1 mark)

6. 6. A container holds 24cm^3 . If the length is 4cm and the width is 3cm, what is the height? (1 mark)

7. 7. Max has a box with a volume of 60cm^3 . If he fills it with cubes worth £2 each, what is the total cost of the cubes? A) £120*, B) £60, C) £30, D) £180 (1 mark)

8. 8. True or False: Volume is measured in cubic units (e.g., cm^3). (1 mark)

9. 9. A rectangular prism has a base area of 9cm^2 and a height of 2cm . What is its volume? (1 mark)

10. 10. Which is larger? A) 10cm^3 , B) A cuboid $2\text{cm} \times 2\text{cm} \times 2\text{cm}$, C) A cuboid $3\text{cm} \times 3\text{cm} \times 2\text{cm}$, D) 15cm^3 (1 mark)

Draw: Draw a cuboid made of 12 unit cubes. Label the length, width, and height clearly on your drawing.



Extension challenge: 1. Explain why a shape with a larger surface area does not always have a larger volume. 2. Compare and contrast the volume of a $3\text{cm} \times 3\text{cm} \times 3\text{cm}$ cube with a $4\text{cm} \times 4\text{cm} \times 1\text{cm}$ cuboid. Which is greater? 3. Justify your answer: If you double the height of a box, what happens to the total volume? 4. What might happen if Max tried to fit a 30cm^3 object into a box with a capacity of 25cm^3 ? 5. Create your own word problem involving a cuboid and a price in pounds (£) for a friend to solve. 6. Design a 'net' for a cuboid that has a volume of 8cm^3 .