

Max's Magnificent Volume Investigation

Learning objective: To calculate and compare the volume of 3D shapes using the formula: length $\times$ width $\times$ height, and to understand the concept of cubic centimetres (cm³).

Max the monkey is building storage crates for his jungle equipment. He needs your expertise to calculate the volume of his wooden containers. Use the formula: Volume = length $\times$ width $\times$ height. Remember to write your answers in cubic centimetres (cm³).

Word bank: Volume · Cubic centimetres · Dimensions · Formula · Capacity · Rectangular prism · Calculation · Estimate

1. Max has a crate that is 5cm long, 3cm wide, and 2cm high. Calculate the total volume of this crate. Show your working out. (2 marks)

2. A second crate has a volume of 48cm³. If the length is 6cm and the width is 4cm, what is the height of the crate? Explain how you found your answer. (3 marks)

3. Compare and contrast two crates: Crate A (4cm x 4cm x 4cm) and Crate B (8cm x 2cm x 4cm). Do they have the same volume? Justify your answer using mathematical reasoning. (3 marks)

4. Max wants to build a new crate with a volume of exactly 100cm³. Suggest two different sets of dimensions (length, width, and height) he could use. (2 marks)

5. What might happen if Max doubled the length, width, and height of his crate simultaneously? Would the volume also double? Explain your prediction. (3 marks)

6. If Max buys wood costing £0.50 per square centimetre for the base of his crate (5cm x 3cm), how much will the base cost him? Show your calculation. (2 marks)

Draw: Draw a 3D rectangular prism on isometric paper. Label the length as 6cm, the width as 2cm, and the height as 3cm. Clearly mark the volume on the inside of your drawing.



Extension challenge: Design a 'storage solution' for Max. Create a blueprint for a crate that holds exactly 120cm^3 . Write a short persuasive paragraph explaining why your dimensions are the most efficient for storing Max's favourite climbing ropes.