

Cheese Blocks

Purpose:

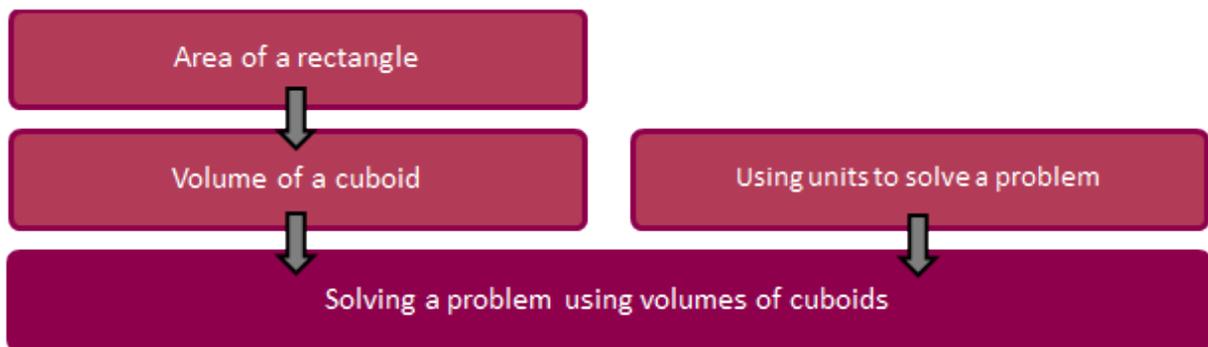
The purpose of this activity is to engage students in solving a problem involving volumes of cuboids.

Achievement Objectives:

GM3-2: Find areas of rectangles and volumes of cuboids by applying multiplication.

Description of mathematics:

The background knowledge and skills that need to be established before and/or during this task are outlined in the diagram below:



Area of a rectangle

Find the area of a rectangle with a base of 3 cm and a height of 2 cm.

Volume of a cuboid

Find the volume of a cuboid that has a base area of 25 cm^2 and a height of 3 cm.

Using units to solve a problem

The maximum load a lift should take is 800 kg. How many year six students (average mass of 40 kg) could fit in the lift before it is overloaded?

Solving a problem using volumes of cuboids

How many cuboid packets of dimensions $5 \times 5 \times 10 \text{ cm}^3$ can fit in a cube shaped carton with a capacity of 1000 cm^3 ?

This activity may be carried out with step by step guidance, or by allowing the student to follow their own method of solution. The approach should be chosen in sympathy with students' skills and depth of understanding.

Activity:

A cheesemaker exports 25 kg slabs of cheese with a base area of 1000 cm^2 .

If a 1 kg block of cheese has dimensions $15 \times 8 \times 4 \text{ cm}^3$, how high is each slab?



The procedural approach

The student is able to solve a problem involving volumes of cuboids and metric units, with guidance.

Prompts from the teacher could be:

1. What is the volume of a 1 kg block of cheese?
2. How many 1 kg blocks of cheese go into a 25 kg slab of cheese?
3. What is the volume of a 25 kg slab of cheese?
4. Knowing that for a cuboid, Volume = base area x height, find the height of the 25 kg slab of cheese.

Volume of 1 kg is 15 cm by 4 cm by 8 cm

$$15 \times 4 = 15 \times 2 \times 2 = 30 \times 2 = 60$$
$$60 \times 8 = 6 \times 8 \times 10 = 480$$

25 kg is $25 \times 480 = 25 \times 4 \times 120 = 100 \times 120 = 12000$

Base is 1000 cm^2 Volume is 12000 cm^3

Volume = Base x Height

so height is 12 cm.

Student gives unit of measurement within context, but shows only numbers in calculations

The conceptual approach

The student is able to solve a problem involving volumes of cuboids and metric units.

Prompts from the teacher could be:

1. What is the base area of a block of cheese?
2. How many 1 kg blocks of cheese make up a single layer of a 25 kg slab of cheese?
3. How many 1 kg blocks of cheese make up a 25 kg slab of cheese?
4. How many layers of 1 kg blocks of cheese make up a 25 kg slab?
5. How high is a 25 kg slab of cheese?

Base of cheese (1kg) is $15 \times 8 = 80 + 40 = 120 \text{ cm}^2$
 how many fit in 1000 cm^2

	120		
	120	240	
		120	360
			360
			720
			240
			960

base of slab is 4 cm high 8 $\frac{1}{3}$ kg blocks
 8 cm high 16 $\frac{2}{3}$ kg
 12 cm high 8 + 16 + 1 = 25 kg ! Result!!

40 / 120 = $\frac{1}{3}$

← need 40

answer

T: Talk me through these calculations.
 S: I like adding better than timesing, so I looked at how many blocks I could add until I got the base of the slab.
 T: And the fractions?
 S: Well, I needed to fit 40 cm^2 more of base and a whole block is 120 cm^2 so I worked out that's a third of a block.
 T: How did you know that this is the result you wanted?
 S: Well, a 25kg block must be made out of 25 one kilo blocks of cheese.