



Problem of the Week

Problem C and Solution

Dollhouse

Problem

The first level of a dollhouse is in the shape of a rectangle. Its floor plan is shown in the following diagram.



Both the mudroom and the kitchen are square with areas of 400 cm^2 and 2500 cm^2 , respectively. The living room is rectangular with an area of 3000 cm^2 .

Determine the area of the rectangular storage room.

Solution

Let the width of a room be the vertical length of the room on the diagram. Let the length of a room be the horizontal length of the room on the diagram.

The kitchen is a square and has an area of 2500 cm^2 . Its length and width must both be 50 cm since $50 \times 50 = 2500 \text{ cm}^2$. The living room and kitchen have the same width. So the width of the living room must also be 50 cm . But the area of the living room is 3000 cm^2 , so the length of the living room is 60 cm since $50 \times 60 = 3000 \text{ cm}^2$.

The mudroom is a square and has an area of 400 cm^2 . Its length and width must both be 20 cm since $20 \times 20 = 400 \text{ cm}^2$. The mudroom and storage room have the same width. So the width of the storage room must also be 20 cm .

Now the length of the whole house can be calculated in two ways. We will equate these two expressions to find the length of the storage room.

$$\begin{aligned}\text{mudroom length} + \text{storage room length} &= \text{living room length} + \text{kitchen length} \\ 20 + \text{storage room length} &= 60 + 50 \\ 20 + \text{storage room length} &= 110 \\ \text{storage room length} &= 90 \text{ cm}\end{aligned}$$

Since the width of the storage room is 20 cm and the length of the storage room is 90 cm , the area of the storage room is $20 \times 90 = 1800 \text{ cm}^2$.