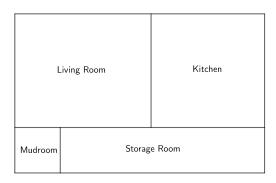


Problem of the Week Problem C and Solution Dollhouse

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 cm² and 2500 cm², respectively. The living room is rectangular with an area of 3000 cm².

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 cm². 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 cm², 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 cm². 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.

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\operatorname{mudroom} length + storage room length = living room length + kitchen length
     20 + \text{storage room length} = 60 + 50
     20 + \text{storage room length} = 110
           storage room length = 90 \text{ cm}
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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 $20 \times 90 = 1800 \text{ cm}^2$.