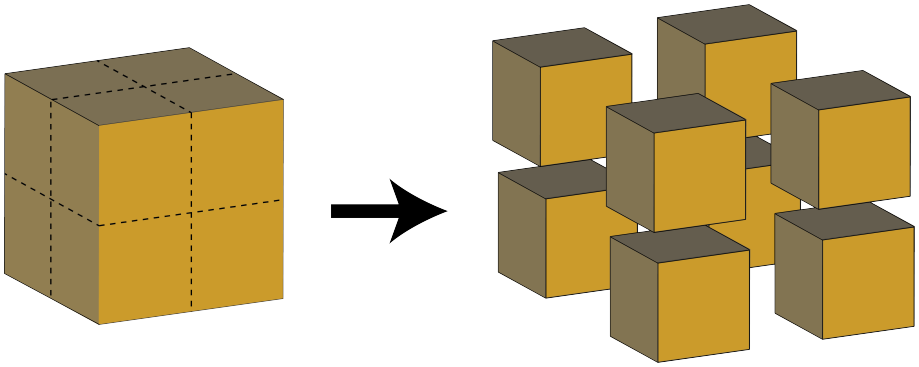
Problem of the Week
Problem C and Solution
I Want More Cubes

Problem

Rashid has a wooden cube with a side length of 10 cm. He makes three cuts parallel to the faces of the cube in order to create 8 identical smaller cubes, as shown.



What is the difference between the surface area of the original cube and the total surface area of the 8 smaller cubes?

Solution

Solution 1

Each face on the original cube has an area of $10 \times 10 = 100$ cm^2. Since there are 6 faces on a cube, the surface area of the original cube is $100 \times 6 = 600$ cm^2.

Each of the smaller cubes has a side length of 5 cm. So the surface area of each smaller cube is $5 \times 5 \times 6 = 150$ cm^2. There are 8 smaller cubes, so the total surface area of the smaller cubes is $8 \times 150 = 1200$ cm^2.

Therefore, the difference in surface area is $1200 - 600 = 600$ cm^2.

Solution 2

Each cut increases the surface area by two 10 cm $\times$ 10 cm squares, or $2 \times 10 \times 10 = 200$ cm^2.

Since there are three cuts, the increase in surface area is 3×200 cm^2 $= 600$ cm^2.