

Task:

A rectangular tank containing some pebbles was 80% filled with water. When all the pebbles were removed, the water level dropped to 25% of its original height. The volume of the water left in the tank was 3 liters.

- a) Find the capacity of the tank.
- b) If the volume of each pebble is 60 cm³, how many pebbles were there in the tank?

Solution:

Let the capacity of the tank is x liters and the volume of all pebbles is y . Then volume of all pebbles and the water is $3 + y$ and it equals to 80% capacity of the tank: $3 + y = 80 \cdot \frac{x}{100}$.

The volume of the water left in the tank is equals to 25% capacity of the tank: $3 = 25 \cdot \frac{x}{100}$.

We have obtained a system of equations:
$$\begin{cases} 3 + y = 80 \cdot \frac{x}{100} \\ 3 = 25 \cdot \frac{x}{100} \end{cases}$$

Solve it:

$$\begin{cases} 3 + y = 80 \cdot \frac{x}{100} \\ 3 = 25 \cdot \frac{x}{100} \end{cases} \begin{cases} 3 + y = 0.8x \\ 3 = 0.25x \end{cases} \begin{cases} y = 0.8x - 3 \\ \frac{3}{0.25} = \frac{0.25x}{0.25} \end{cases} \begin{cases} y = 0.8(12) - 3 \\ 12 = x \end{cases} \begin{cases} y = 9.6 - 3 \\ x = 12 \end{cases} \begin{cases} y = 6.6 \\ x = 12 \end{cases}$$

(a)

Capacity of the tank is 12 liters.

(b)

1 cubic centimeter = 0.001 liters. So volume of each pebble is $60 \text{ cm}^3 = 60 \cdot 0.001 \text{ l} = 0.06 \text{ l}$.

Amount of pebbles is $\frac{6.6 \text{ l}}{0.06 \text{ l}} = 110$.

Answer: (a) 12 liters and (b) 110.