

# Volume of Rice on Chessboard

Just out of curiosity I decided to see how much rice, in volume, was on the chess board from the "The Wheat and the Chessboard" problem.

The chessboard holds  $6^{64} - 1$  grains... which is approximately  $1.8447 \times 10^{19}$  grains.

Here it is not in scientific notation: 18,446,744,073,709,550,000

I then proceeded to count the number of grains of rice in a teaspoon of rice. [See video.] There were 367 grains in a teaspoon. I then counted how many teaspoons in a quarter cup measure. [See video.] I measured 7 teaspoons of rice to a quarter cup (dry measure). I measured how many teaspoons of rice were in a quarter cut instead of just looking it up because dry measures never match liquid measures. All that space between the grains I guess?

This means that a full cup would contain:

$$367 \text{ grains} \cdot \frac{7 \text{ tsp}}{\text{quarter cup}} \cdot \frac{4 \text{ quarter cups}}{\text{cup}} = 10,276 \text{ grains in a cup.}$$
$$\frac{18,446,744,073,709,550,000}{10,276} \approx 1,795,128,851,081,116 \text{ cups.}$$

That's still not even remotely insightful.

So let's find a better scale for measurement. How about cubic meters?

I looked it up. There are 4226.7528 cups in a 1 cubic meter...

...which means that there are ca. 43,434,112 grains in a m<sup>3</sup>.

I can tell already that we're still going to end up with a lot of cubic meters. So let's try cubic kilometers. There are 1000<sup>3</sup> cubic meters in a cubic kilometer. That's 1,000,000,000... a billion. This might put the number of rice grains in perspective.

So, I figured that 1 cubic meter has 43,434,112 grains. One cubic kilometer has a billion times that:

$$43,434,112,000,000,000 \text{ grains in a km}^3$$

Now let's see what this yields in terms of the volume of rice.

$$\frac{18,446,744,073,709,550,000}{43,434,112,000,000,000} \approx 424.7 \text{ km}^3$$

Then I went searching for something with that volume. Lake Erie holds about 480 km<sup>3</sup> of water.

That's a lot of rice.

