

How much pee is in your pool?



Well, you know that pools are treated with chlorine to keep them bacteria free and safe. It has always been hard to measure how much of each kind of pollutant might be in pool water.

A chemist at the University of Alberta, Xing-Fang Li, has found a marker that stays present in the pool water (even after it is chlorinated) that can be used to measure the presence of urine in the water.

There is an artificial sweetener, acesulfame potassium (shortened to Ace-K) that is designed to not be digested and to flow right through your body and consequently not cause calories to be absorbed or weight gain. That sweetener is in soups, yogurt, and all kinds of common foods and it can be measured in pool solutions.

The scientists calculated that one 220,000-gallon, commercial-size swimming pool contained 18.5 gallons of urine. Yech!

We started wondering how much pee was in the swimming pools that we frequented.

1. Do you feel worried about how much urine is in the pools or lakes where you swim? What are your thoughts or concerns?
2. If there are 18.5 gallons of urine in one 220,000-gallon pool, what would be a good ratio to use in our calculations?
3. Technically, if we could separate the water into urine and water, there would really be about 18.5 gallons of urine and only $(220,000 - 18.5)$ 219,981.5 gallons of water. Do you think that those two ratios will make much of a difference in our calculations? Please explain your thoughts and show any of your calculations.

In the summer I swim at the Wayland Community Pool. This is a typical high school short course rectangular pool. Its length is 25 yards, width is 60 feet and the depth varies from the shallow end = 3 feet to the deep end = 7 feet.

3. Label my picture with the length, width, and *average depth* using the same units for all.

(Evidently to deal with the different depths between the shallow end and the deep end you simply average the two depths.)



We are going to need to find the volume of water in this pool. By using the average depth and your notions about the volume of a rectangular prism, try to answer the following questions.

4. In cubic feet of water, what is the volume of my summer pool?

There are 7.48 gallons of water in one cubic foot of water.

5. How many gallons of water are in my pool?
6. How much urine is probably in this pool? Please show all of your work.

My friend Patrice lives in an apartment complex that has its own swimming pool. This is a smaller pool with a length of 12.5 yards; a width of 10 yards; and a depth that varies between 1.5 feet and 6 feet. (There is no diving board.)

7. About how many gallons of water and pee are in Patrice's pool?
8. Actually there are a ton of children and babies that use Patrice's pool. How much do you guess that the ratio of pure water to pee is changed by all of those babies and kids?

This is a pretty common backyard pool. This pool is 16 feet across and 48 inches deep.

9. How much pee do you suppose is in this pool? Show your work.



10. Can you create a formula or explain in words a process for figuring out how much pee is in any volume of pool water?

Source: <http://www.npr.org/sections/health-shots/2017/03/01/517785902/just-how-much-pee-is-in-that-pool>

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