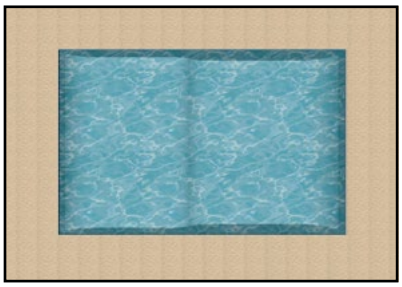
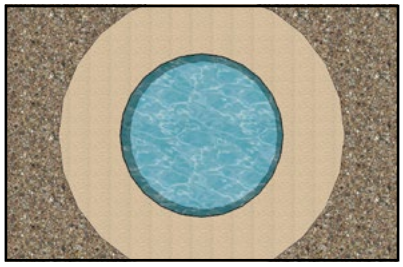
Calculating Pool Volumes

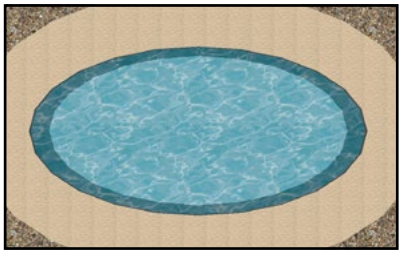
onBalance - Que Hales, Doug Latta and Kim Skinner



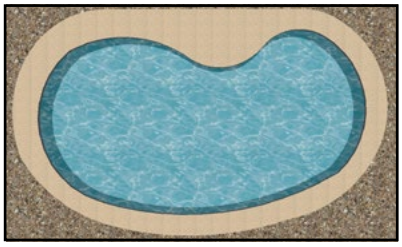
Square or Rectangular Pools:
Volume = length x width x average depth x 7.5



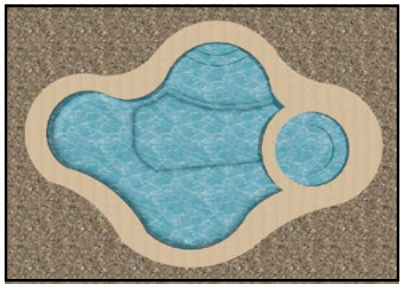
Circular Pools:
Volume = π x radius^2 x average depth x 7.5



Oval Pools:
Volume = π x 1/2 length x 1/2 width x average depth x 7.5



Kidney Pools:
Volume = average width x greatest length x average depth x 7.5



Freeform Pools:
Volume = you can try to break into geometric forms, solve for those, add them together, and you will have a ballpark figure

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Calculating Pool Water Volume Using Chemistry

- Take a water sample of 10 times the normal amount from the pool for testing. Set it aside.
- Add acid, soda ash, baking soda or another chemical which alters total alkalinity in the pool. Add enough to make a noticeable shift in total alkalinity – at least 10 to 20 ppm. Write down exactly how much chemical you added to the pool.
- Wait for the chemical to completely blend throughout the water. (This time will vary from 45 minutes to several hours depending on the method of addition, the circulation, etc.)
- Take a second "10 times" water sample from the pool.
- Test the total alkalinity of the two samples using the Dilution Method: Using a glass containing 10 times the normal sample size for a total alkalinity test, add enough color indicator to see it well. (Using more or less color indicator will not change the results of the test – it just helps you see the endpoint, or color transition better.) Then start adding the drops of titrant – but now each drop is 1 ppm instead of 10! This will obviously use up more titrant, but you only do this once per pool.
- Find the formula number for the chemical you used from the chart below.
- Apply the following formula (using the appropriate formula number depending on which chemical was used):

$$\frac{(formula\ number)(amount\ of\ chemical\ used\ in\ quarts\ or\ pounds)}{(number\ in\ ppm\ that\ the\ TA\ changed)} = Pool\ Volume$$

Round off to the nearest 1,000 gallons

Here are a couple of examples. First, if you add 5 pounds of sodium bicarbonate to a pool, and the starting TA was 100 ppm and the ending TA was 116 ppm, then:

$$\frac{(71{,}400\ for\ baking\ soda)(5\ pounds)}{(16\ ppm)} \approx 22{,}000\ gallon\ pool$$

Or if you add 2 quarts of acid to a pool and the alkalinity drops 12 ppm:

$$\frac{(125{,}000\ for\ muriatic\ acid)(2\ quarts)}{(12\ ppm)} \approx 21{,}000\ gallon\ pool$$

Raising Alkalinity	**Formula Number**	**Chemical Formula**	**Strength**
Sodium Bicarbonate (baking soda)	71,400	$NaHCO_3$	100%
Sodium Carbonate (soda ash)	113,200	Na_2CO_3	100%

Lowering Alkalinity	**Formula Number**	**Chemical Formula**	**Strength**
Muriatic Acid	125,000	HCl in solution	31.45%
Sulfuric Acid	126,700	H_2SO_4	38.50%
Sodium Bisulfate	47,000	$NaHSO_4$	94.50%