

Notes on The Swimming Calculator and its use

~ The Swimming Calculator was developed by Ryan Woodruff (ryan.d.woodruff@gmail.com). It is provided for your use free of charge. All I ask is that you give me proper credit and refer interested coaches to The Swimming Wizard at swimmingwizard.com

~ This excel spreadsheet was developed for coaches to show their athletes the impact that strategically skill-oriented changes can have on their competitive times. For instance, with a SCY 1650 swimmer, it is eye-opening to some to see what a difference it makes changing from poor turns to elite turns.

~The Swimming Calculator operates on the understanding that a swimming race can be divided into mathematically separate components - the start component, the underwater component, the swimming component, and the finish component. The swimming component can be further broken down into a function of cycle length and cycle tempo.

~The Swimming Calculator is intended to help coaches and athletes determine the most effective means of improvement - whether it be increasing tempo, lengthening one's stroke, improving turns, or kicking

~The Swimming Calculator is still a work in progress. I am seeking ways to refine and improve it, specifically in the components of dolphin kicking speed and turn speed, which are difficult to measure and quantify. Estimates of these measurements for use in the swimming calculator were based on data from my own Sectional and Junior-National caliber athletes. I would appreciate any feedback anyone has on ideas or suggestions for the Swimming Calculator's function.

~ The Swimming Calculator's accuracy works on the assumption that these variables are constant throughout a swimming race. Of course, we know that this is not true. Thus, we must work with averages. For instance, a 200 breaststroke swimmer may use 5 cycles per length early in the race and may use 7 cycles per length at the conclusion of the race. In this case it would be most accurate to use 6 as the cycle input.

~Though it has shown to be quite accurate at estimating a swimmer's race time when using actual race data, it is not meant to precisely predict performance.

~The Swimming Calculator uses only CYCLES (two hand hits = 1 cycle), rather than strokes. Thus, for breaststroke and butterfly cycles must be in whole-number form. For backstroke and freestyle, cycles in increments of 0.5 may be used.

~The input box for Cycles is configured to prevent irrationally high or low cycle count numbers from being entered. Likewise, the input box for Tempo is configured to prevent irrationally high or low tempos from being used.

~The Name input box is only present to aid in the identification of the swimmer when printing the Calculator page.

~When manipulating cycle count, tempo, and underwater (UW) distance, it is important to understand that these variables are largely interdependent. For example, it is reasonable to expect that Johnny might take 10 cycles per length while kicking 5m off the wall at 1.00 s/cycle. However, it is not reasonable for Johnny to swim at 10 cycles at 1.00 s/cycle if he kicks 15m off the wall. This would mean that his cycles would be extremely short.

~There are some kinks to work out in the Swimming Calculator regarding breaststroke. For Underwater Kick/Streamline Ability for a breaststroke race, think "pullout ability."

~The units for distance in the Swimming Calculator are all in **meters** for ease of calculation.

~The units for tempo in the Swimming Calculator are all in **seconds per cycle** as I find this to be the easiest to measure during a race. If you prefer to use cycles per minute, simply use a factor of 60 to convert between the two.

~The units for swimmer height are in feet and inches. This data is used to account for differences in the actual distance that a swimmer swims and the actual distance that a swimmer turns from the wall. For instance, a 6-6 swimmer will not have to swim as far as a 4-6 swimmer because he will turn at a greater distance from the wall. Thus, leaving all other variables equal and increasing a swimmer's height will result in the calculated time getting faster.

~The text "#DIV/0?" will be displayed until all variables have been filled in the calculator.

~For all input boxes except Swimmer Name, Cycle Count, Tempo, and Average Kicking Ability, the user will be asked to pick from a pre-determined list of choices. Click on the cell and choose from the drop down menu by clicking on the arrow to the right of the input box.

~Don't have the appropriate data on your swimmers but want to test out the Swimming Calculator? Just punch in some numbers, or if you are a USA Swimming coach member, log in to www.usaswimming.org and go to the Coach tab to look at the USA Swimming Race Analysis Database.

~Turn speed during a race is highly dependent on swimming speed. However, I do not have turns calculated this way in the Swimming Calculator. Turns are calculated using a constant based on the selection of turn performance using the drop-down menu.

~Underwater Kicking/Streamlining Ability is factored as a constant based on the selection of speed using the drop-down menu. The options in that menu represent the range of speed that I have observed swimmers kicking during a controlled test set. Thus, it would be unreasonable to expect a 1650 free swimmer to kick UW at "World Class" speed. This option would likely only be reached by truly elite sprinters in events 100 m and shorter.

~If you have any questions, please email me at ryan.d.woodruff@gmail.com
