How to lose weight swimming

Pedro Hugo García Peláez

Dedicado a mi madre, con todo el cariño, allí donde quiera que esté

hugo117711@gmail.com

Prologue:

When I wrote this book. I thought it was not necessary to introduce complicated concepts such as differential equations, to justify the formula for the period of flotation of a body of square symmetry, or the equation of a simple harmonic motion because that would be subject of a physic book.

Perhaps some of my readers know the concept of derivative in mathematics, but if I also write the resolution of a differential equation probably they get bored and what I want is to reach all the public like a housewife, a professional of anything or a grandfather who is at home, whether they have college degrees or not.

Therefore, I have written a book based on physic science that can be read by everyone with a simple and clear language

The hardest thing you will have to solve is a square root. Things like root of nine equals three because three by three is nine.

$$\sqrt{9} = 3$$

With the help of calculators is not a problem.

Swimming resonance effects

I have a phrase:

"What cannot be measured is not useful".

This book gives you the characteristic time which you must swim depending on the characteristics of your own body.

In a simple system, obviously the mechanism is simpler because the pendulum resonates with itself, or your arm when moving in its natural frequency period resonates with itself, but even if they are simple systems for all purposes you are taking advantage of that amplitude which tends to infinity, as in the case of the soprano who breaks the cup with her voice.

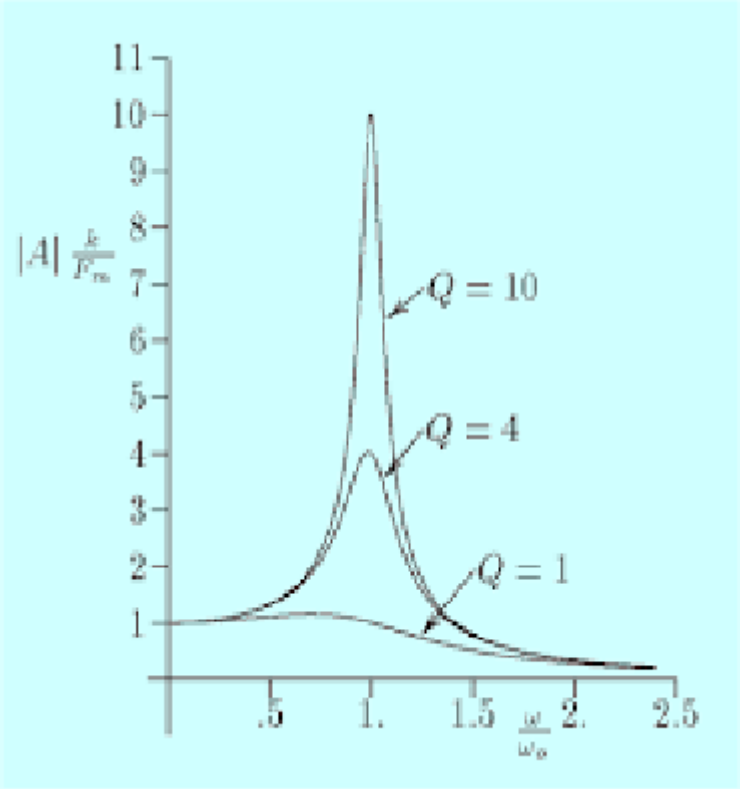
$$W_o$$

It is the natural frequency of oscillation of the house.

$$W$$

It is the frequency of the earthquake that made the earth vibrate.

when both frequencies are very similar amplitude tends to infinity.



We have seen that when entering resonance the amplitude increases considerably, a small earthquake can bring down a house if both systems enter in resonance

Another simple system would be a body of square symmetry floating into the water that begins to move up and down in the water, this is again a (m.a.s) as in the case of a pendulum. Only that the body of square symmetry now oscillates up and down in the water with a characteristic time, as in the case of a pendulum that have his own characteristic time of oscillation.

Simple harmonic motion = (m.a.s)

A few years ago an idea came out of the sky. It was September ... In January I had an exam of mechanics and waves. I spent the day doing problems, such was the skill he was having with the problems that almost intuited new variables. I practically dominated the exercises of my book, the truth is that I went to bed exhausted.

One morning when I woke up

I had an idea that could simplify calculations of how a human being should swim.

I do not know if the idea came to me by divine inspiration or because the enormous work that was being carried out by solving the problems.

The idea was to liken the human body to a body of square symmetry, when we float in the water without moving the human body is quite similar to a body of square symmetry.

It was November and the next day went to a Spa in Madrid, after measuring my natural frequency of floating, and then saw that fat accumulated in the stomach disappeared almost instantly, it was like putting the stomach in a centrifuge.

If we apply a vertical force on a body of square symmetry floating in the water, the body will go up and down in their own characteristic time also does not matter if we sink much or little that will do the path at the same time, obviously if we sink deeper will travel up and down faster since it must cover more space at the same time, this is an important feature, the amplitude that is the distance traveled is independent of its typical period.
Also, in the water there is less friction and the invention worked. A square body symmetry has the same natural oscillation period of a boat of square sides, like a tanker.

$$T = 2 * \pi * \sqrt{\frac{h}{g}}$$

The formula is: 2 * π * the square root of the weighted average of our side, divided by the square root of the acceleration of gravity that is 9.81 m/s_2

This formula is exact as the formula of a simple pendulum, now the length of the rope is the width of our own human side if we consider our body as a floating body of square symmetry.

The only variable in the formula is the width of the human side (h).

$$2 * \pi$$

It comes because the (m.a.s) of a floating body is connected with the circular motion, we all remember the formula of the length of a circumference, which is:

$$L = 2 * \pi * r$$

(g) is the acceleration of gravity on earth and comes after of simplify the weight of the swimmer and the urging force of the dislodged water, or Archimede´s principle.

And the variable width of human is because you have to take into account the density of the liquid, which is its mass divided by its volume, in the case of water is close to 1 kilogram per cubic meter, much like the human density.

$$\textbf{Density} = \frac{\textbf{Mass}}{\textbf{Volume}}$$

This is the cause that allows us to float on water.
And here comes the variable width of the sides that without this variable all men, boats, etc. would the same period of natural buoyancy.

We see that in the formula of natural oscillation of a body of square symmetry in the water, there is only one variable, so we can simplify and remains that:

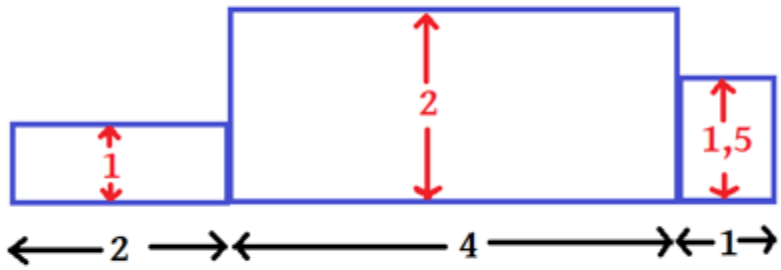
$$T = 2 * \pi * \frac{\sqrt{h}}{\sqrt{g}}$$

Constantes

Therefore, we multiply the square root of the weighted average width of our human side by 2 to find our natural floating period in seconds.

$$T = \frac{2 * \pi}{\sqrt{9,81}} * \sqrt{h} = 2 * \sqrt{h}$$

A weighted average is an estimate of different measures of the same body, for example in our chest the width it is greater than in our ankles, the thighs are wider than the ankles, but less than our chest.



A weighted average of the width of the image would be:

$$\textbf{Average} = \frac{(2*1)+(4*2)+(1*1,5)}{7} = 1,64$$

Moreover we are considering that:
(g) The acceleration of gravity is constant in all parts of the planet, unless you do the exercise in a pool at the peak of the Himalaya, and on the other hand is the (g) characteristic of Planet Earth, if you did in a pool at The Moon, have another (g) since in The Moon force of gravity is lower.

What we get with this? in principle two things, enter in phase with the force of gravity and the range of motion tends to infinity.

Thus we see that more obese person must swim more slowly because the variable of the human side is in the numerator and it makes longer period, and therefore must make full movement in longer and therefore more slowly.

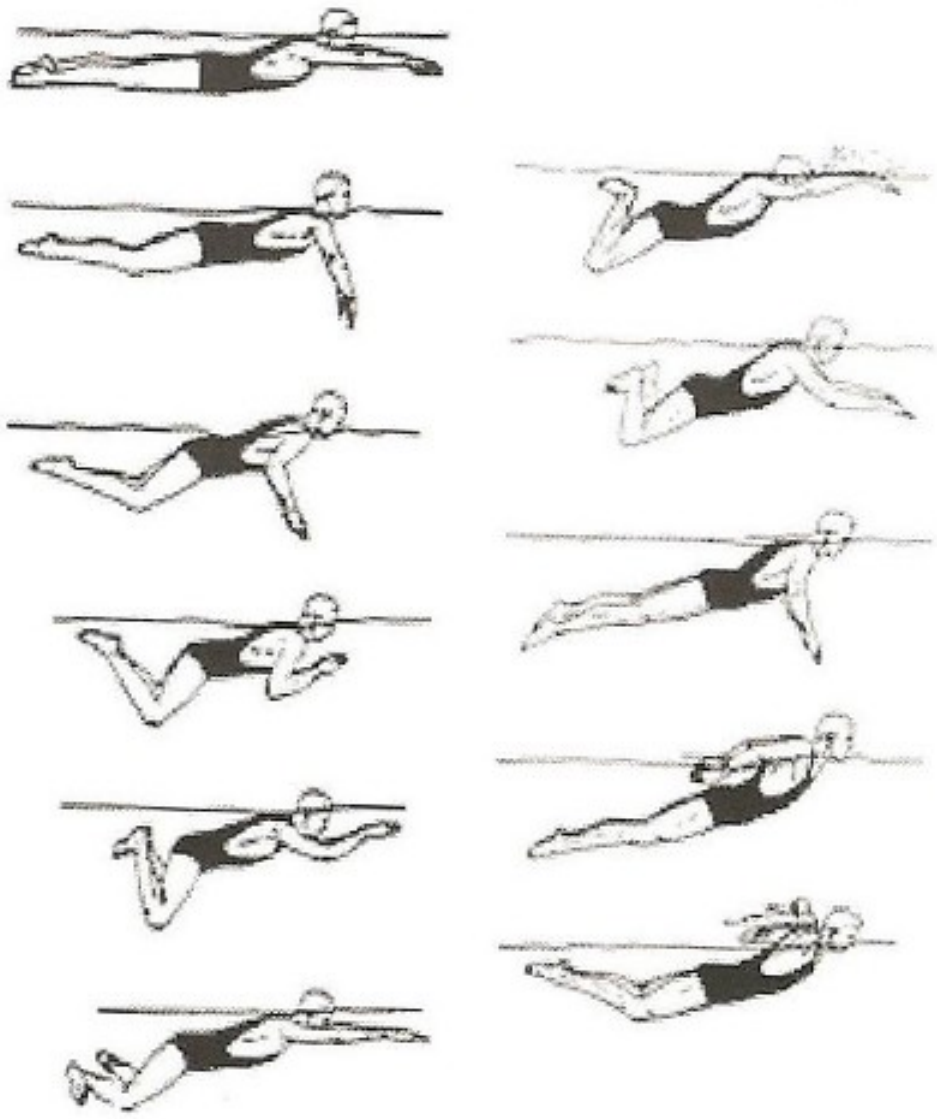
The period is the time in which the body must be in the same situation after going down and go up on the water.

If you do a weighted average of the human side it comes to be about 14 cm. (wider in the thighs, thinner in the ankles and most wider in the stomach).

* 1 inch = 0,0254 meters

Measuring this variable in your body, you can already measure the time in which you must make a swimming stroke, in the case of a side with an average width of 0.14 meters the period is 0.75 seconds.

This is the time when we must make a swimming stroke, (since we started to immerse ourselves and we back again to be in the same position).



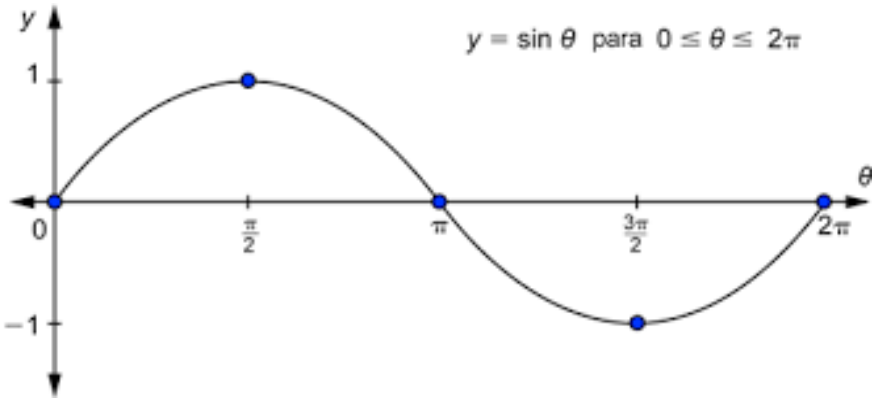
Thus we get the strength to develop this movement to get into resonance with the natural frequency of our own body to float.

It is curious that this time approaches to one second that is the time unit of the international system of measures.
The period of floating of a human being, generally ranges between 0.6 and 1 second, depending on whether the person is thin or obese.

Although it is best done in a large pool or in the sea, swimming 1/2 minute resting and returning to swim a total of about 10 minutes, about two or three times a week

also can be done in a small pool without much swin advance, though results are much less spectacular. So it can be done in a small pool, but I repeat that the results are much less spectacular.

If you want to see otherwise, your body should get to swim following a sine function of period 0.75 seconds.



⟵ Period of 0.75 seconds⟶

a.

b.

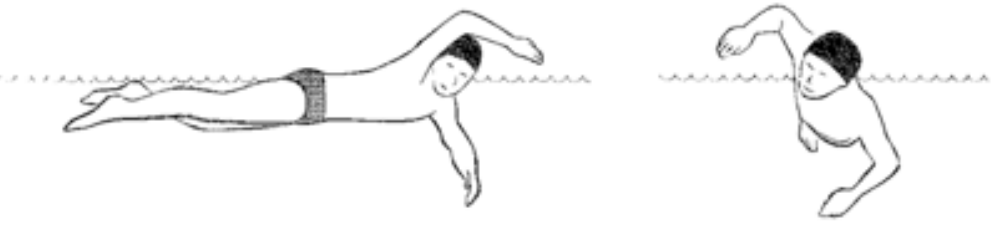
c.

d.

e.

f.

g.



We see that the position of the swimmer is repeated each certain time that is the period or time in which we make a swimming stroke.

It really is in the vertical movement up and down the swimmer where (m.a.s) occurs.

I have also tried at sea and the results are the same, but resonate at a time with the waves is another story because they have their own natural frequency, and it is difficult for two physical oscillators go into resonance (our body floating and the natural frequency of waves).

You should measure the period of the waves, which near the beach have a fairly constant period, if the oscillation period is about one second the approximation would be excellent, one second from start to form near the coast goes up and down until they disappear.

In this case we should swim perpendicular to the coast to take advantage of the rise and fall of the waves, although it should be about a second to take advantage of waves.

I repeat that the movement should be parallel to the coast, not perpendicular as do the surfers to harness their push because that is another story.

We see that the same formula for measuring the period of oscillation of a pendulum is used, and to measure the flotation period of a body similar like a square table

In a simple pendulum (h) is the string length, and in the case of swimming body (h) is the average width of our human side.

Finally consider that the human body is not like a square table, but an approximation of 80% is good enough in physics approximations are used continuously in many cases, as greatly simplify the calculations, and often are perfectly valid to solve problems that we face.