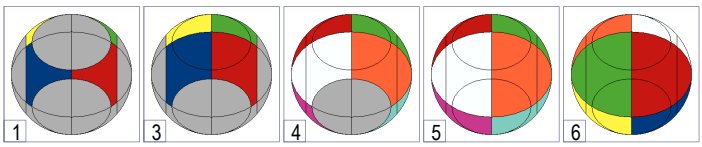
**MARUSENKO SPHERE DESCRIPTION**

A 3D rotational and sequential spheric puzzle, ***Designed***, ***Engineered*** and ***Manufactured*** with ***100% European Quality.*** During the assembling process, no glue nor any metallic element such as springs, screws or washers are used. Actually, all of its 54 pieces are built with high quality and 100 % recyclable plastic. New, original, quiet and well defined movements, with the guarantee of a longwearing product. Surface of the Marusenko sphere has 24 triangles (arranged in 6 poles) and 8 stars (leaving a total of **32 moving pieces**). Its 2,279,626,699,712,199,018,518,937,600,000 positions (around $2.3 \times 10^{30}$) and all of its potencial color configuration led us to present the sphere in 5 different designs, offering different levels of creativity and complexity. We hope that this challenge will be to your liking and we sincerely appreciate your purchase.




# Triangular Sphere — Level 5 Tutorial

## Standard Method Summary:

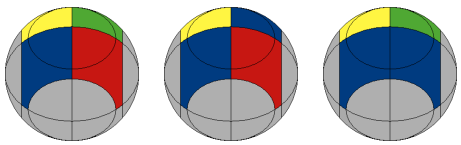
**We solve the sphere from north to south through the following steps:**

**0**.-Basic Concepts: solved Pole concept, movements, orientation and grey color meaning.
**1**.-Orient the sphere: Noth Pole (as active pole) and Front Pole (as auxiliary pole).
**2**.-Learn how to bring a trianngle to the Front Pole (auxiliary step, when necessary).
**3**.-Solve 1st North Pole: match 4 internal triangles with their surounding respective stars
**4**.-Repeat Step #3 to solve Side Poles in North Pole position, ( the 2nd, 3rd, 4th and 5th Poles)
**5**.-Solve the 6th Pole according to its color layout of triangles.
**6**.-Check all the poles and arrange the macro-triangles

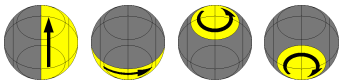
The Triangular sphere represents level 5 among the 5 levels that Marusenko offers. This method is not unique nor the fastest one but it is an step-by-step approach in order to solve the sphere from any of its 620.590.250.933.452.800.000 ( *6,2 x $10^{20}$* ) *possible positions*. This method consists in solving the 5 first Poles, pole by pole and with the same method: One by one, select and fix each of them as the ***"north pole"***, then select each time as the ***"front pole"*** any of the unresolved Side Poles. Finally, to solve the 6th pole an specific sequence of twists will be required, depending on the case got: ***"adjacent-triangle swap"*** *or "****opposite-triangle swap****"*. After this first contact with this standard method, you will soon come up with your own trick and shortcuts, which leads to your own fast and smart solution.

## CONCEPTS: Solved Pole Concept, movements and re-orientation.

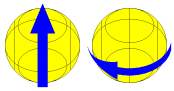
A pole is considered solved when all of its 4 triangles match up in colour with its 4 respectivelly adjacent stars. Any of the three spheres shown in the right pictures are considered as to have the **"north pole solved"**.



We need to focus on getting 5 poles solved first, whatever the overall position of the stars is. (There are 2 stars of each of the 4 colours).



**Movements:** Half Right, Equatorial, or Polar movements mean 90º, 180º o 270º twists.

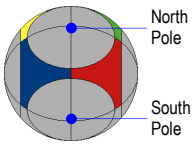


**Re-orientation** of the sphere

**NOTE:** ***"clear grey coloured pieces"*** mean that during that step these pieces could be from any colour.

## STEP #1: Orienting the Sphere: choosing-viewing the North Pole, Frontal Pole and 1st Reference Star.

We choose ***any*** star as the ***"Front Upper Left star"***, (in this example we choose a ***"blue star"***), and hold the sphere leaving this star in the desired position. In this way, our ***"North Pole"*** and our ***"Front Pole"*** are determined.

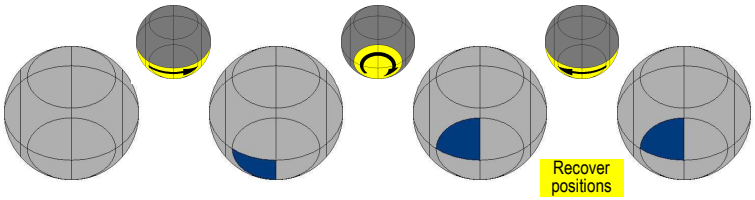



The remaining other 3 stars of the North Pole, could have any colour. In this examle: ***"yellow"*** for the *top left back star*, ***"green"*** for the *top right back star* and ***"red"*** for the *top right front star*. The goal now will be to place triangles in the North Pole (Pole to be solved) bringing them from the Front Pole (unsolved Pole, yet). If no triangle is available in the Front Pole, use the method described in Step #2 to bring one from any other unsolved Pole (Side Pole or South Pole).

## STEP #2: Learning to bring a triangle to the Front Pole. (AUXILIARY STEP: useful when we are executing 3rd and subsequent steps).

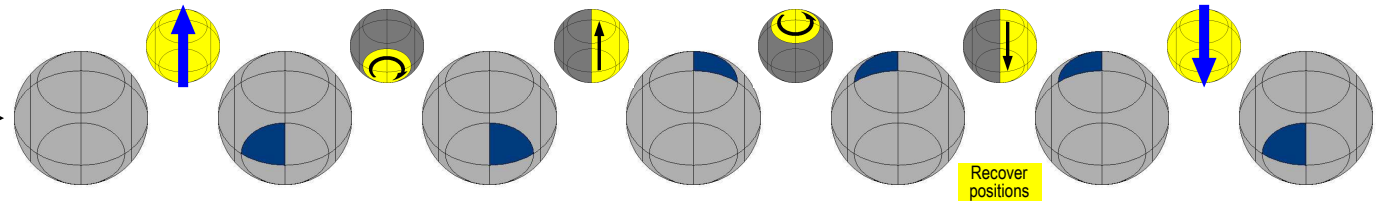
Next steps, when we are solving the North Pole in one color, triangles of this color should rest in the Front Pole before placing them in their position in the North Pole (Step #3 and following ones). Therefore we will now learn this ***auxiliary step,*** that is to bring any triangle to our Front Pole ***without undoing the position of the stars already resolved***. We execute this example with a **"blue triangle"**. Remind that ***"clear grey coloured pieces"*** mean that during that step these pieces could be from any colour. Two situations can take place:

**1.– Bring a triangle to the *"Front Pole"* from *"any Side Pole"***




**2.– Bring a triangle to the *"Front Pole"* from the *"South Pole"***

Not all the intermediate steps are always necessary.



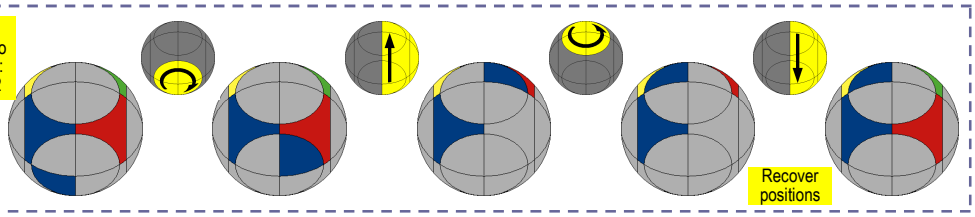

## STEP #3: Solving the North Pole.

Join 4 triangles in the North Pole with their respective stars corresponding to the 4 stars are surrounding the North Pole. Bring one-by-one 4 appropiate triangles from the Front Pole (unsolved Pole at this stage) to the North Pole.

If no triangle is available in the Front Pole, use the method described in Step #2 to bring one from any other pole. This operation is indicated using a yellow-coloured rectangle.

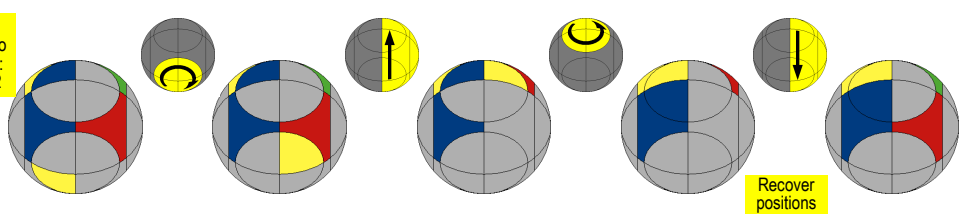
Blue triangle to the front: Step # 2

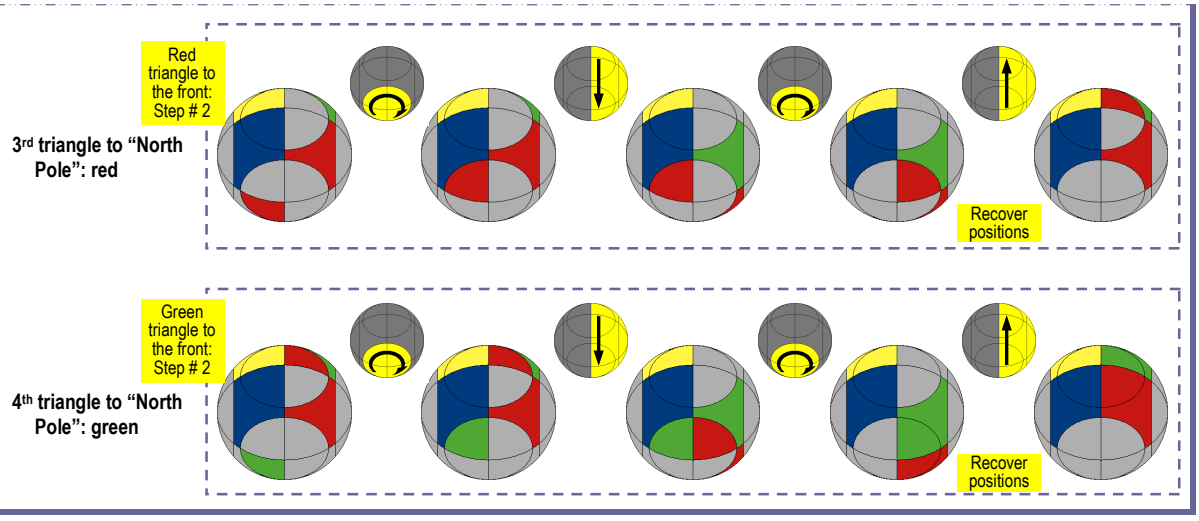
**1st triangle to "North Pole": blue**




Yellow triangle to the front: Step # 2

**2nd triangle to "North Pole": yellow**



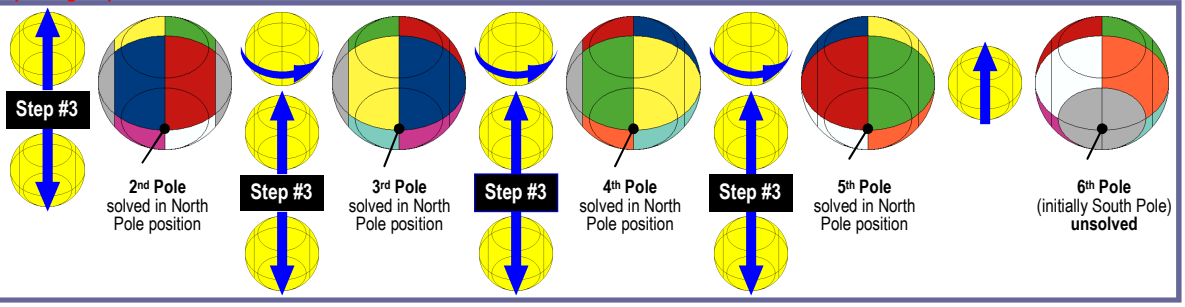



## STEP #4: Solving the Side Poles repeating step #3:

Orientate and hold the sphere leaving the chosen new pole to be solved as our new **"North Pole"**. Be careful **to use an unsolved pole as Front Pole**.

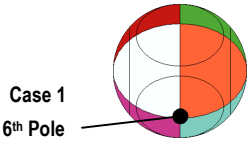
Notice that our new Front Pole will be the oposite of the first pole we solved in step #1.

Repeat the Step #3 for each of the remaining 4 poles until having completed 5 poles in total.

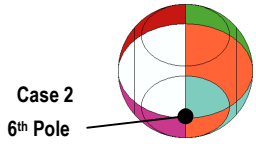



## STEP #5: Solve the 6th Pole.

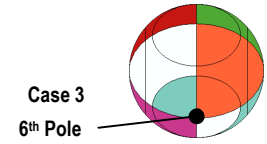
Once the 5th pole is solved, only three possible **Cases** can occur with the 6th Pole:




**Pole Solved** by luck
Go to Step #6




**"Adjacent-Triangle-Swap"**
***Light blue*** and ***orange*** **adjacent** tirangles are swapped. Perform **sequence 5.1** and the pole will be solved.

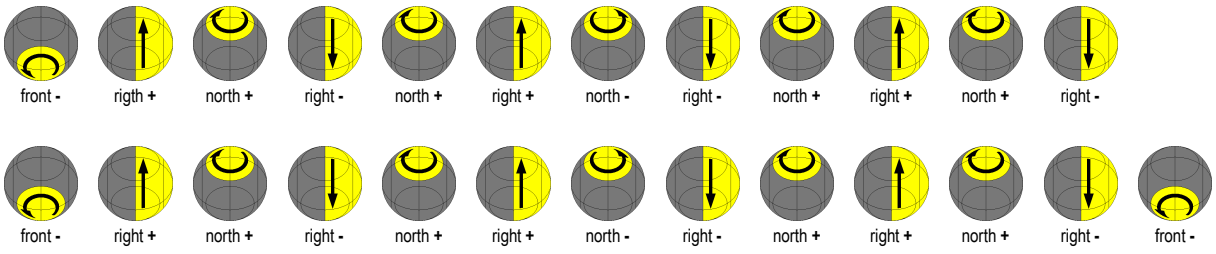



**"Opposite-Triangle-Swap"**
***Light blue*** and **white opposite** triangles are swapped. Perform **sequence 5.1** and **Case 2** will appear. Perfom **sequence 5.1** again and the pole will be solved.

**The 6th pole could not be configured in any of the above descrived three Cases. In such case, the pole must be rotated until one them is obtained.**

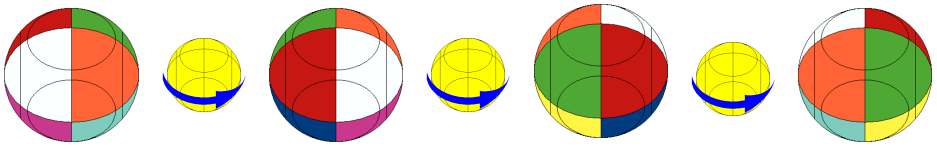
### SEQUENCE 5.1:

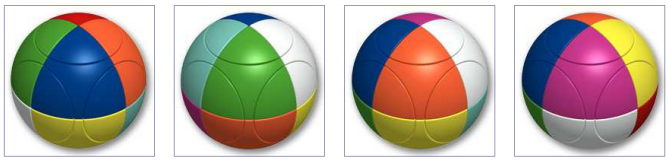
Sequence to swap two adjacent triangles as shown in Case 2 (executing it just once) or to swap to oposite-adjacent triangles as shown in Case 3 (executing it twice).




## STEP #6: CHECK THE POLES AND ARRANGE THEM.

All the stars should now rest attached to three triangles from its same colour. Try to get the configurations shown beneath these lines.





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