Assembly Instructions for the 2x2 Ra Connector Kit

Please note: These connector pieces are made from 100% all-natural plant-based PLA plastic. While able to handle being outside in the weather just fine, they could potentially warp in extremely hot weather if exposed to the direct sun for prolonged periods of time. Partial shade should be fine.

You will need eight 2x2s. 2x2s are actually 1.5” x 1.5” in thickness after milling and drying. If you are on the metric system, they should be about 38mm x 38mm. Ask at your lumber store what their true size is, because just like in the United States, it might be different from what they are labeled as.

Try to get your 2x2s as straight as possible by looking down their lengths or by placing them on a flat floor. The most important thing is that they have *no twist*. You should be able to tell by looking down their lengths. If you have a hard, flat floor, you can also place them on it and try to rock the pieces back and forth. If there is not much twist, they will hardly move at all. If there is a lot, they will noticeably rock back and forth. They could be straight, but if they have significant twist, you can't use them because it could prevent them from going into the holes when you set up your pyramid.

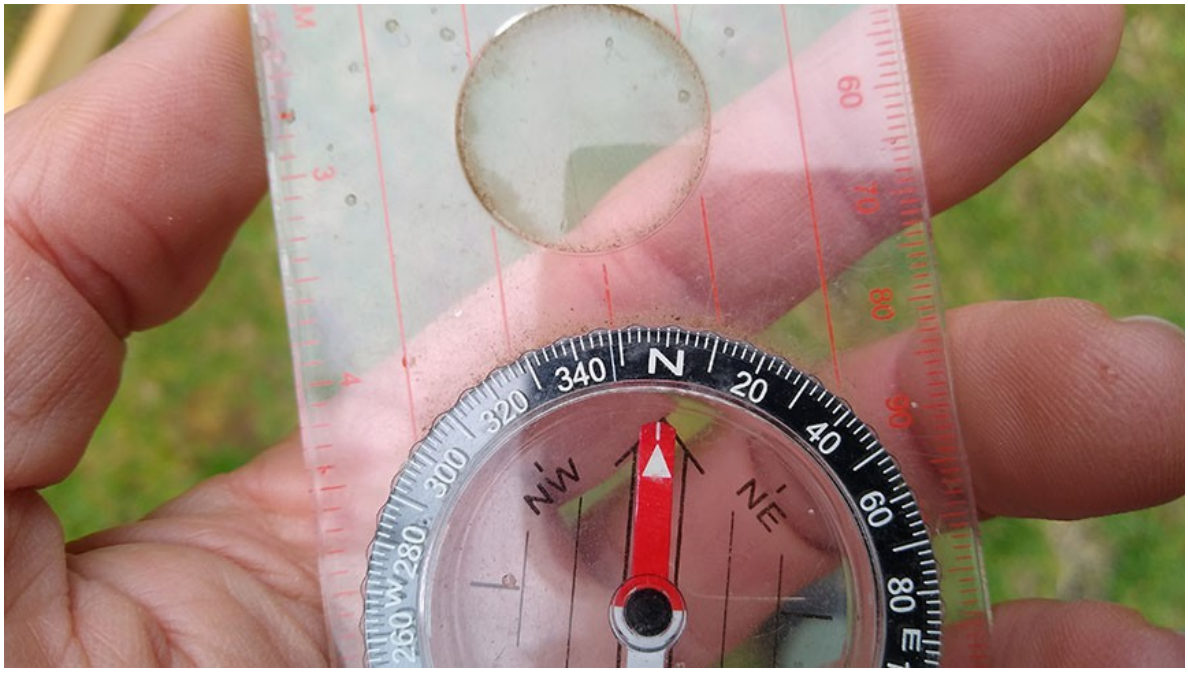
The rising 2x2s will be slightly longer than your bottom 2x2s. Once you have their lengths, to calculate the lengths of your bottom 2x2s, first subtract 2” (51mm). Then divide that length by 1.115. So for example, if you were using 8-foot (96”) 2x2s for your rising legs, then first you would subtract 2”: 96” - 2” = 94”. Then divide: 94” / 1.115 = 84.305” (or about 84+5/16”). **So if your rising 2x2s are 96” long, then your bottom 2x2s will be 84+5/16” long.** When it is fully set up, your pyramid will be 5+5/8” (143mm) wider than whatever length you cut the bottom 2x2s to. So if your bottom 2x2s are 84+5/16” long, then your pyramid, from corner to corner, will be 89+15/16” wide. Keep in mind that 2x2s can often be as much as 1/2” longer than 8 feet. You will want to cut the rising 2x2s to the length of your shortest rising 2x2 so they are all the same length. If have four rising 2x2s that are each exactly 96.5”, then you can leave them at that length, and then to calculate the length of your bottom 2x2s, divide 94.5” by 1.115 instead of 94”. To cut your 2x2s, use a miter saw or cut them by hand, whichever is easiest.

Ideally, set up your pyramid aligned to either true north or magnetic north. After you have cut your 2x2s to the right length, the easiest way to align it is to insert two of the bottom corner pieces on each end of one of the 2x2s.

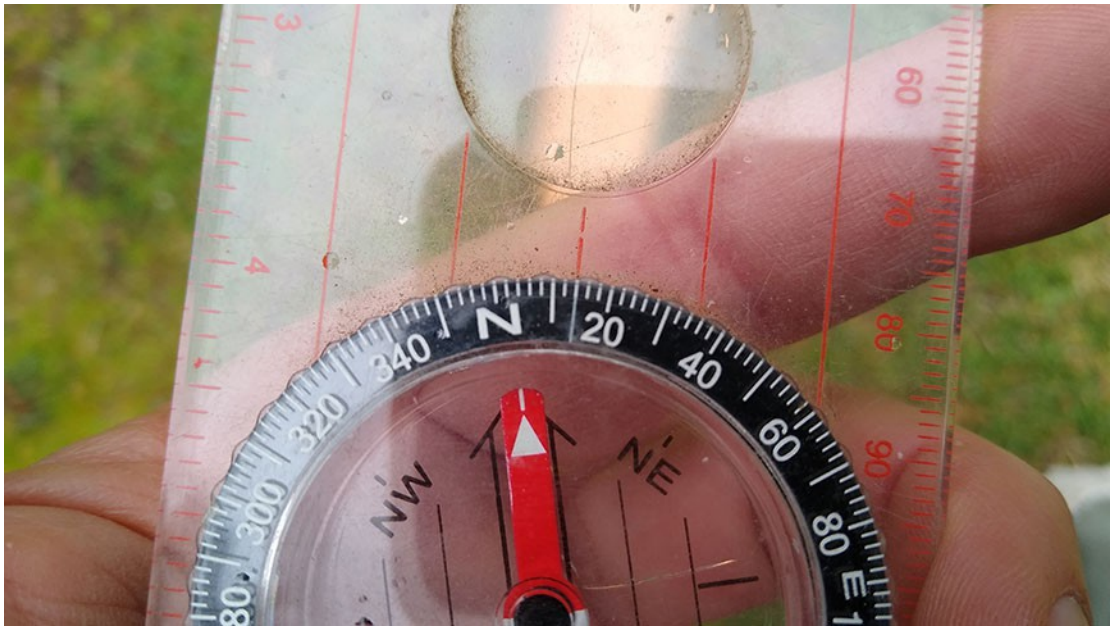
2x2s are almost never straight, and when you set up your pyramid, you will want each 2x2 oriented so that any bow will be going up in the middle. That way, gravity will help to counteract it. The same should be done with this 2x2:

If you want to align the pyramid to magnetic north, set the bezel ring of the compass to 0°. You can see the thin white line going through the “N” on my compass in the picture below:

If you want to align it to true north, go to www.magnetic-declination.com to find your declination. If it is, for example, +12°E, then rotate the bezel 12° *to the right, or clockwise.* In the picture on the next page, you can see that after rotating the bezel to the right, the little white line of my compass is 12° *to the left* of the N, at 348°. (The bezel is in 2° increments, so six ticks to the left of “N”.)



As another example, if it is -14°W, then rotate the bezel 14° *to the left, or counterclockwise:*



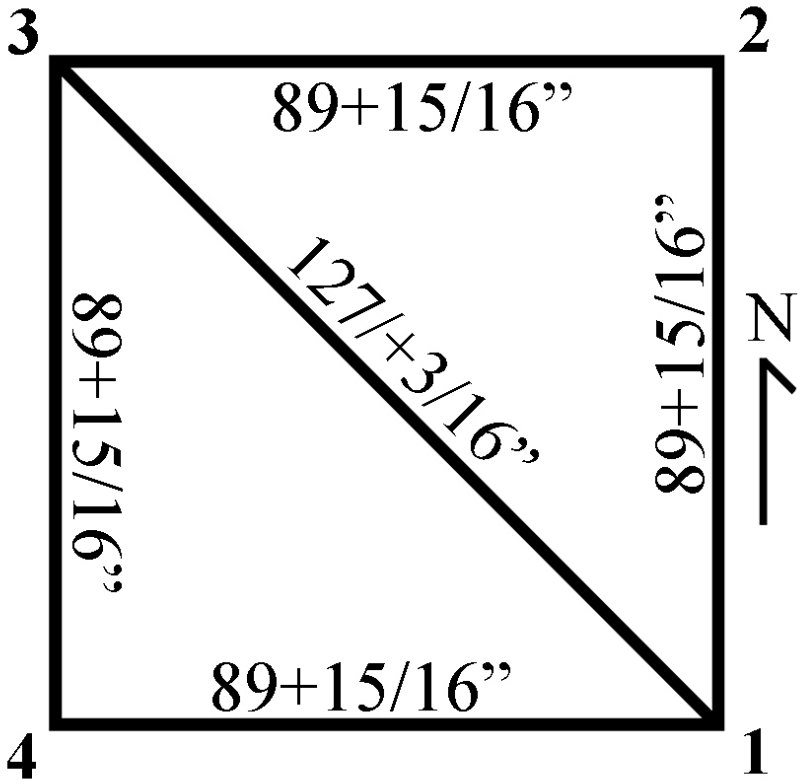
Next, pushing the baseplate of the compass against against your 2x2, align it so that the red magnetic needle matches the arrow on the baseplate. Make sure there is no metal within 6 feet of the compass, including phones, watches, jewelry, glasses, keys, etc. In the example on the next page, the compass is set to +14°E:

For more specific instructions on how to align your pyramid, go to www.PrecisionPyramids.com and click the “Alignment” link at the top. Also, here is a link to a decent, inexpensive compass if you should need one: https://amzn.to/3E6qxc6

With your 2x2 aligned to true or magnetic north, you now have the location for the first two corners of your pyramid. If it is inside, mark them with masking tape. If it is outside, use nails (which should be pushed all of the way into the ground so as to not get in the way of the pieces while setting up your pyramid):

If your pyramid will be outside on uneven ground, you will need to find your remaining two corners and then level them all. If your pyramid is inside or it is outside on extremely level ground, you can skip the following steps and go to the > on page 6.

After your first two corners are marked, to find Corner #3, you will need to measure off of Corner #1 the diagonal length with a tape measure, which is 1.414 times the width of your pyramid. First, measure the corner-to-corner distance of the 2x2 with the two bottom pieces. If you are using 8-foot 2x2s for your rising legs and your bottom 2x2s are 84+5/16" long, then your measurement should be somewhere near 89+15/16" (2284mm). If it is significantly longer than that, then that probably means you need to push your bottom pieces into the 2x2 more. If you feel you pushed them in all of the way, and the measurement isn't more than 1/4" longer than what it would be calculated to be, then that is fine. Using 89+15/16" as an example, the diagonal length would be 127+3/16" (3231mm). To find and mark the location of Corner #3, place your 2x2 with the bottom pieces going from Corner #2 towards Corner #3, and intersecting with your diagonal measurement *on the outside corner* of the bottom piece:



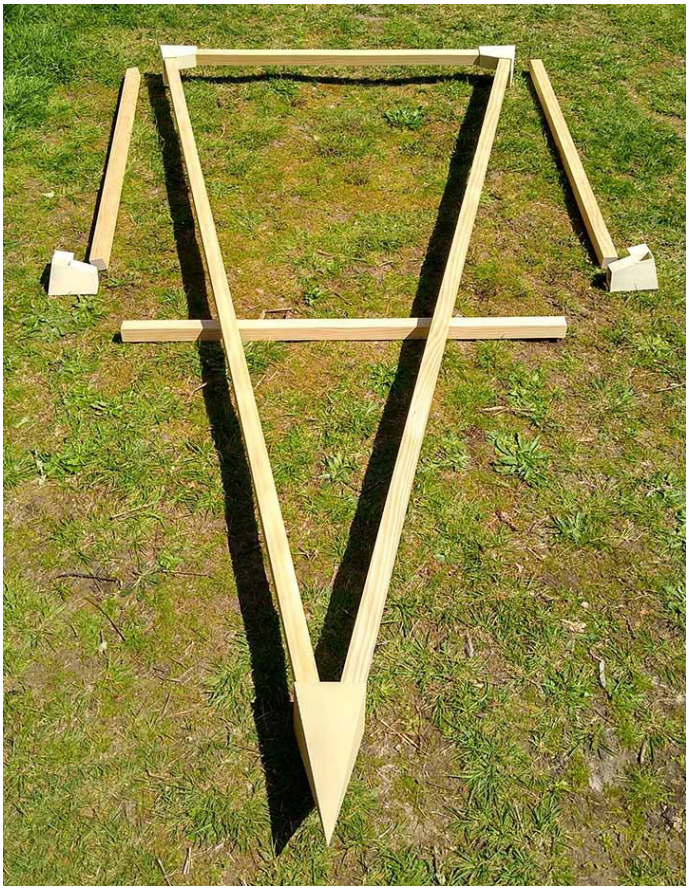
For Corner #4, measure your pyramid's width (89+15/16" in this example) off of the two nearest corners (#1 and #3) using your 2x2 with the bottom corners for one side and your tape measure for the other side and insert a nail where they meet. Then measure the opposite diagonal to see how close it is to the first diagonal. If it is within 1/4" (6mm), that is well done.

Next, you will need to level all four corners to the height of the highest corner. You can use your 2x2 with the two bottom pieces placing a level on the center of the 2x2, or you can use a 2x4 that is at least as long as one of your sides. If you don't have to raise a corner more than 2" (50mm), shims, stone tiles, and blocks of wood are fine, but if it is more than that, I recommend using patio and/or cinder blocks for more stability.

>Once your four corners are level and marked (for those pyramids outside on uneven ground), it is time to set up your pyramid (whether it is inside or outside). You will want to have a helper for this part of the process.

Using three of your 2x2s along with the one with the bottom pieces, make a rough square of where your pyramid will be with the 2x2 with the bottom pieces connected to it matching up with the first two corner marks. If you skipped the alignment step earlier, then set up the rough square wherever is most convenient with one of the 2x2s having the two bottom pieces attached on each end. The rough square does not have to be perfect. (The pictures on the following pages are for the Russian pyramid, but the concept is still the same regardless of which type of pyramid it is.)

Next, place two more 2x2s along with the apex piece matching up with the 2x2 with the bottom pieces. Have your helper rotate that 2x2 up so she or he can partially insert the other two 2x2s forming a triangle while you partially insert the apex piece into your end of the 2x2s. Remember to insert the 2x2s so that any bow will be going up in the middle once the pyramid is set up. Once both ends of both 2x2s are partially in, you and your helper can push towards each other to push them all of the way in.



Next, have your helper raise up the triangle at the apex piece. His/her job is to keep the apex raised up and to make sure none of the 2x2s fall out while you are connecting the rest of the pyramid together.

With the triangle raised up, check to make sure it still lines up with your first two corner marks (if you have any). Next, raise up and *partially* insert the third rising 2x2 while your helper holds it in place. You need to have the bottom of the 2x2 in the right place, in line with one of the corners of your rough square in order for it to go in. It won't go in if it is at the wrong angle. If you are having difficulty, carefully adjust the position of the bottom of the 2x2 while your assistant holds the top until you find the right angle and it wants to go in. Remember, only partially insert the 2x2 into the apex piece, and make sure your helper is holding it in place so it doesn't fall out.

Next, partially insert the fourth 2x2 in the same manner with the bottom in line with the fourth corner in the rough square. Once it is in the right position and both 2x2s want to go in, insert them both all of the way in.

For the next step, both you and your helper will be inserting the two remaining bottom pieces, both at the same time. You will each carefully lift up one of the two 2x2s, one at one corner, and the other at the other corner. Lifting up from the bottom of the 2x2s, give a countdown (3...2...1...lift) and you each slowly and carefully lift up just enough to be able to slide your bottom corner piece under the 2x2. *Do not excessively torque the 2x2s by moving them left or right or forward or backward.* Once you each have your corner piece right under each 2x2, do another countdown and slowly lower the 2x2s into the middle hole of the bottom corner pieces. If either of you have any trouble getting their 2x2 to go into the hole, tell your partner to hold their 2x2 in place without moving it while the other tries to get it into their hole. If you follow the instructions above, however, they should both easily slide into the holes without any issues.

Now that all four bottom pieces are inserted into the 2x2s, check to make sure the 2x2s are all fully inserted into the apex piece at the top and then have your helper hold them in place again, making sure they don't fall out as you insert the remaining bottom 2x2s. First insert the 2x2 across from the 2x2 already inserted into the first triangle (the rest of the pictures are of the Ra pyramid):

After inserting that 2x2 into one of the bottom pieces, you may find that you have to move the other bottom piece back a little bit while it is still inserted in the apex piece up above in order to get it into the other hole. That is OK as long as you don't torque too hard on the bottom of the 2x2. Make sure your helper is monitoring the 2x2s up above and holding them in place while you do this.

Next, insert the two side 2x2s in the same manner while your helper is making sure they stay in place up at the apex. After the pyramid is fully assembled, check to make sure the 2x2s are fully in at all five corners, starting with the apex. For the bottom corners, have your helper push on a corner from one end while you push on the other end for all four sides.

If your pyramid is outside and you have used nails to mark your corners, I would recommend replacing them with either toothpicks or wooden skewers, as metal could interfere with the energy. Whether inside or outside, it can be a good idea to have your corners marked so you will

know if it accidentally gets bumped out of alignment or if you wish to take it down for some reason, you will be able to easily set it back up properly aligned. Also, the bottom 2x2s will be 1/8” (3mm) off of the ground after the pyramid is set up, so if it is inside or on perfectly flat and level ground, you may wish to insert a 1/8” (3mm) shim underneath the middle of each bottom 2x2 to prevent them from sagging over time. And in the future, if you do wish to take down your pyramid, follow these exact steps in reverse order, or damage could result to it.

Congratulations! Your pyramid is set up and ready to go. May you have magical adventures. If you should have any experiences or experiments you would like to share, please join our community forum at www.PrecisionPyramids.com/forum

And please be sure to recycle any packaging. If it came in plastic bubble wrap, including the envelope, they can be recycled with plastic bags at local grocery stores like Walmart and Safeway.