**Step 1:** With the dimensions of each piece (three total), cut the lower frames out of the 1” by 2” wood. Hold them in place with clamps while drilling the screws to complete the frame. See Figure 1.

*NOTE* Measure twice and cut once is a great rule of thumb to abide by.

**Step 2:** After cutting each frame cut the cover out of the particle board and lay on top place screws approximately every 10” to 12” apart. See Figure 2.

*NOTE* Do not bolt the three pieces together at this point! Construction is much easier with the pieces separated. If the measurements and cutting was precise, there will be no need to ensure their fitting together at this point.

**Step 3:** Measure and cut out the entire mountain at this point. See Figure 3.

*NOTE* Ensure all angles and heights are correct prior to cutting.
Step 4: The completed Mountain Range should appear as such. See Figure 4.

*NOTE* Measuring the angles and heights at this point is highly encouraged.

Step 5: Measure the distance where the mountain will sit flush with the corresponding piece.

*NOTE* This will ensure the best fit possible between the two pieces coming together and get the best possible seem. See Figure 5.

Step 6: Prior to screwing the mountain into place ensure a proper fit for both doorways. See Figure 6.
Step 7: Place screws approximately 10” to 12” starting at the base corners to properly hold the doorways in place and creating a flush mounted mountain side. Illustrated in Figure 7.

Step 8: The end product should remain perpendicular to the ground under its own weight. See Figure 8.

Step 9: Take the 2” x 2”, cut out, and paint the trees for the forest section of the course. See Figure 9.

*NOTE* Not all sides must be covered, only the 5 sides that will be observed by the contestants. The same process was done on the dwarves and trolls for the course.
Step 10: The course in its entirety was assembled and bolted together. (STEP NOT SHOWN) The course was then painted prior to any other construction to ensure even coverage and uniformity in the color scheme. See Figure 10.

*NOTE* Take some time and be creative at this point. The “Cool Factor” will go a long way.

Step 11: The platform for the ramp was assembled. Gluing with a strong adhesive as well as counter sinking the screws in the corners was done. See Figure 11.

*NOTE* Ensure the counter sinking of the screw is done properly. It can be done too far down or not enough. Take the time to ensure it will fit properly since it will reflect on the outcome the product.

Step 12: Once the platform is in place, and the glue has had proper time to settle the back two pieces of the ramp may be put into place. Setting a spare piece of 1” x 2” underneath ensures that the ramp will not move. See Figure 12.

*NOTE* Take the time to ensure the ramps fit properly. This will create a better look and an overall better product. Have a group member hold it in place while attaching it.
Step 13: Mark out the location of the trees on the designated portion of the course with pencil and tape around them with low adhesive tape. See Figure 13.

*NOTE* Taking a little extra time in doing this step will help the judges on competition day for repeatability and this will also ensure that your measurements are correct.

Step 14: Taking a light coat of black spray paint and painting inside the designated places for the trees will ensure the proper placement of each tree after every competitor has gone. See Figure 14.

Step 15: After the paint has dried properly, measure out and ensure the trees will be in their correct places. See Figure 15.
Step 16: Measure out and mark in pencil the course outline. (Gray Path, Green Path, etc.) See Figure 16.

*NOTE* Marking out in pencil will help visualize the course prior to painting and it is not as permanent. A good rule of thumb is measure, mark-out, and refer to the drawing constantly. This improves accuracy and end product.

Step 17: Tape the outside edges of each individual course path and measure prior to painting. When applying the paint place a barrier such as white copy paper or scrap cardboard down to ensure there is no question to where the path is. See Figure 17.

Step 18: Leave tape on while the paint dries but, do not let the paint fully cure. This will make portions of
the tape stick to the course and add unwanted time and effort to remove the excess tape. See Figure 18.

*NOTE* Peel tape off after the paint has dried for half of the allotted amount of time a 45 degree angle towards the painted surface staying as close to the painted surface as possible.

**Step 19:** Cover platform and both ramps with a base coat of gray paint and then paint with textured paint to promote a surface that will be easy for the robots tires to grip when trying to navigate this portion of the course. See Figure 19.

*NOTE* The drying time for the texture paint is much longer than that of paint used in this course up to this point. Please read and follow all the product instructions.

**Step 20:** Use the remaining texture paint to give a unique look to the mountain range. See Figure 20.

**Step 21:** After allowing the paint to dry where the trees are to be placed. Set the trees over the black and ensure that the trees will cover the black portion of the course. See Figure 21.
Step 22: Taking a piece of copy paper and a few different colors take the time and add some layers of paint and have fun because you are just about done! See Figures 22 and 23.

Step 23: Follow the same procedure as described above for the trees but this time implement it on the portion of the course where the fire and the trolls are located. See Figure 24.
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*NOTE* Take your time and measure, mark-out in pencil, followed by tape, measure again to ensure proper placement, and then proceed to paint.

**Step 24:** When taping off the fire use numerous small pieces of low adhesive tape to go around the circle. Keep overlapping pieces of tape to ensure that the marked out portion of the fire will resemble a circle when painted. See Figure 25.

![Figure 25](image)

**Step 25:** Follow the same procedure outlined in Step 14 for taping, measuring, and painting the placements of the fire and trolls. See Figures 26 and 27.

![Figure 27](image)
Step 26: Paint “Green Path”, place all 2” x 2” blocks that represent the dwarves, and lay down the black vinyl and yellow vinyl electrical tape. See Figures 28, 29, and 30.