FTC 2015-2016 DIY Mountain Build Guide

Assembly Instructions

Check out the DIY2015-2016 Prints and BoM for individual part details.

Release 1.0 9/10/15

This guide and Bill of Materials are for constructing one *Mountain.* A full field needs 2 base *Mountains* as shown.

Safety *FIRST* ! Wear appropriate safety gear and use safe construction practices.

STOP!

Read all of the instructions before you start! Be sure that you have all of the materials from the Bill of Materials. See the included tools list for suggested tools.

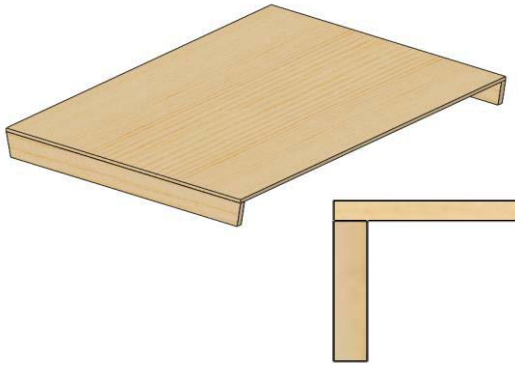
Cut out Each Part

Using the Material Usage and Part drawings, cut out and shape each of the needed pieces.

Comments

The Rescue Beacon (am-3011) is sold separately from the full field and there are no DIY instructions.

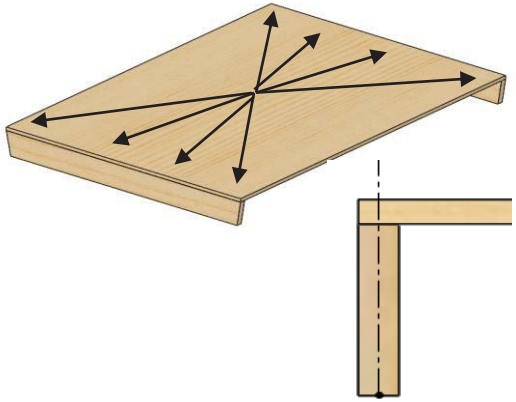
Step 1



Sub 1-1

Using clamps, hold the *Lower Mountain Panel* on top of the *Lower Mountain Sides* (2). You may want to clamp this directly to a table or work bench. Be sure that the corners are flush.

Step 2



Sub 1-2

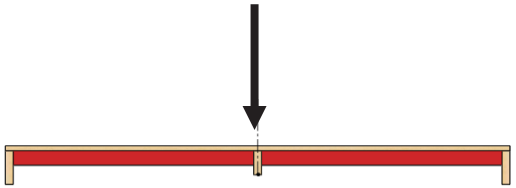
Using a drill bit, pre-drill holes for screws. Using (8) evenly spaced, 1.625" screws, secure the *Lower Mountain Sides* to the *Lower Mountain Panel.* Be sure the screws go in straight and centered in the board.

Step 3

Sub 1-3

Using the clamps, hold the *Lower Mountain Center* to the center of the *Lower Mountain Panel.* You can use (4) of the *Lower Hurdles* to help verify the board is properly centered and straight. Do not screw these *Hurdles* in place yet.

Step 4



Sub 1-4

From the *Panel* side pre-drill, and secure with (4) 1.625" screws, evenly spaced along the length of the *Lower Mountain Center.* Once the *Center* is secure, remove the *Hurdles.*

Comments

For all screws in the *Mountain,* pre-drilling the holes with a 7/64" or 3/32" drill bit may be helpful to prevent the wood from splitting.

Step 5

Sub 1-5

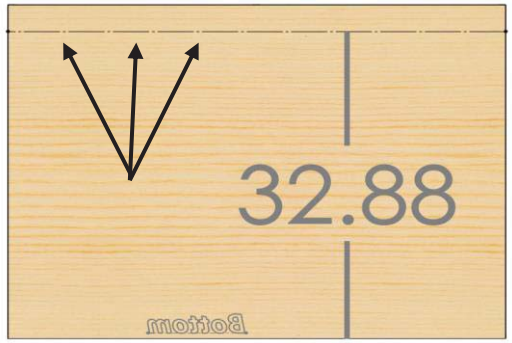
Find the 60 degree cut on the *Lower Mountain Center.* This is the bottom of the *Lower Mountain,* mark it as the bottom.

Step 6

Sub 1-6

Measure 32.50" up from the bottom of the *Lower Mountain,* and position the lower edge of the top most *Lower Hurdle* here. The *Hurdle* should be parallel to the bottom edge of the *Mountain.* Using (2) 1.625" screws secure the *Hurdle* to the *Lower Mountain Side* (see Arrow).

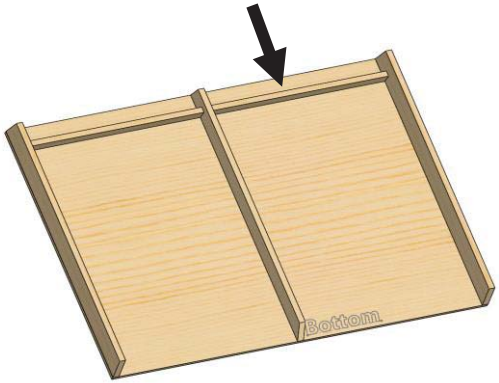
Step 7



Sub 1-7

On the back side of the *Mountain Panel,* measure 32.875" up from the bottom and mark a line from left to right. This is the center line of the *Hurdle* from Step 6. When securing the *Hurdle* be sure its properly located and have not shifted after measuring. Drill and secure with (3) evenly spaced 1.625" screws.

Step 8



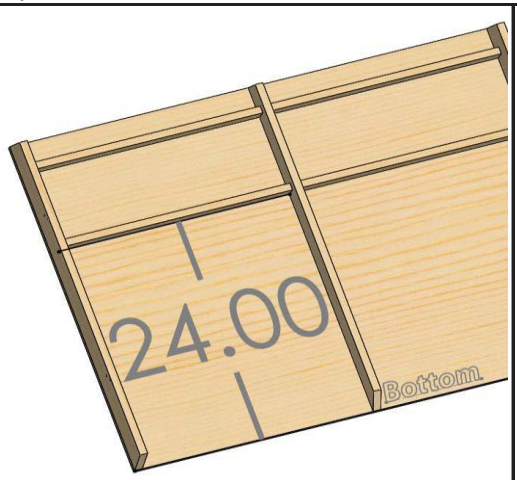
Sub 1-8

Repeat Steps 6 thru 7 for the other top most *Lower Hurdle.*

Comments

When securing each *Hurdle* be sure they are properly located and have not shifted after measuring.

Step 9



Sub 1-9

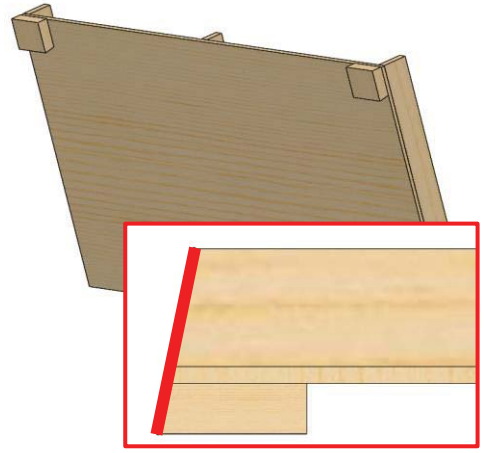
The second row of *Lower Hurdles* is positioned 24.00 inches from the bottom edge. The center line is 24.375" from the bottom edge. Use the process from the first set of *Hurdles* to install the second set.

Step 10

Sub 1-10

The third row of *Lower Hurdles* is 17.50" from the bottom edge. The center line is 17.875" from the bottom edge. Repeat the process from the previous *Hurdles.*

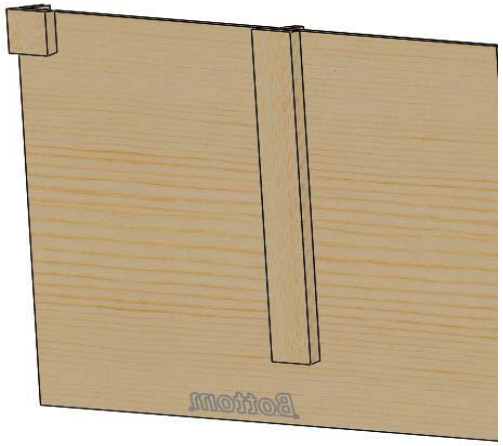
Step 11



Sub 1-11

Using (4) 1.625" screws each, secure the *Outside Connectors* (2) to the top corners of the *Lower Mountain.* Be sure all the edges line up and are flush with each other. The sloped edge should line up with the slope on the *Lower Mountain Side* (red). Screw from the *Panel* side into the *Outside Connector.*

Step 12



Sub 1-12

Add the *Inside Connector* to the top, center of the *Lower Mountain Center.* As before, be sure that the sloped faces line up at the top. Secure with (6) 1.625" screws.

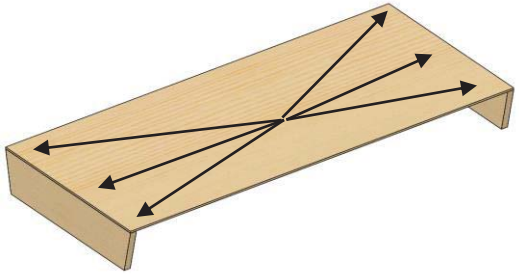
Comments

When securing each *Hurdle* be sure they are properly located and have not shifted after measuring.

Step 13 | Sub 2-1

Start on the *Upper Mountain* by clamping the *Upper Mountain Sides* to the *Upper Mountain Panel.* Be sure that all of the edges are flush and line up.

Step 14 | Sub 2-2

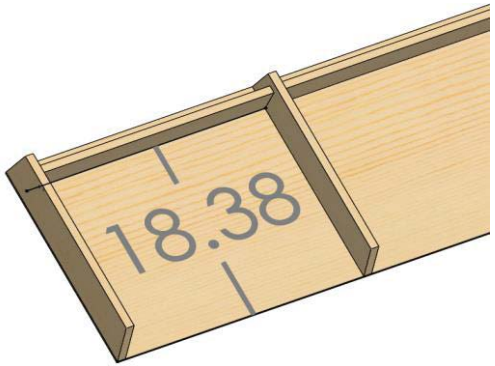


Pre-drill, and screw the *Upper Mountain Side* to the *Panel* with (6) evenly spaced 1.625" screws.

Step 15 | Sub 2-3

Add the *Upper Mountain Center,* with (3) 1.625" screws. It should be centered on the *Upper Mountain Panel* and flush with either end. You can use (4) of the *Upper Hurdles* to help verify the board is properly centered and straight. Do not screw these *Hurdles* in place yet.

Step 16 | Sub 2-4

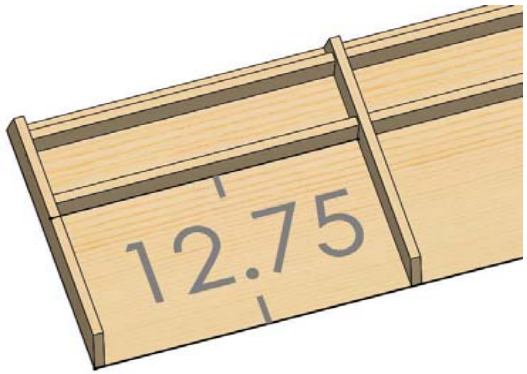


Working from the top of the *Upper Mountain,* install the first *Upper Hurdles* (2). The bottom edges should be 18.375" from the bottom edge of the *Upper Mountain.* Secure with (4) 1.625" screws through the *Upper Mountain Side,* and (6) 1.625" evenly spaced screws through the *Upper Mountain Panel.*

Comments

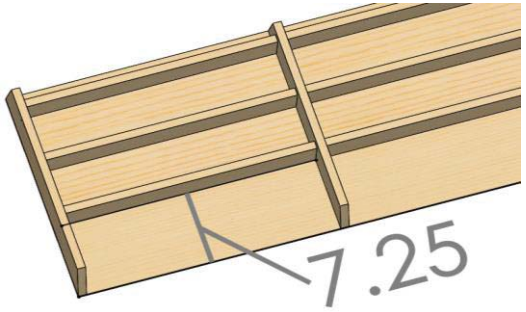
For each *Upper Hurdle* the center line is 3/8" farther from the bottom edge of the *Upper Mountain,* than the dimensioned edge.

Step 17 | Sub 2-5



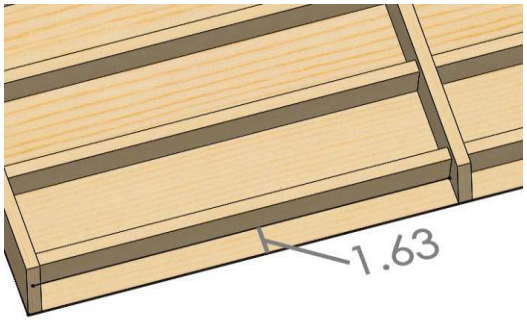
Repeat this construction method for each of the next lowest *Hurdles.* The 2nd *Hurdles* should be 12.75" from the bottom edge.

Step 18 | Sub 2-6



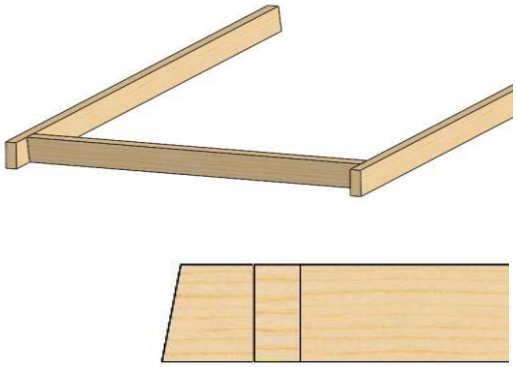
Repeat this construction method for each of the next lowest *Hurdles.* The 3rd *Hurdles* should be 7.25" from the bottom edge.

Step 19 | Sub 2-7



Repeat this construction method for each of the next lowest *Hurdles.* The 4th *Hurdle* should be 1.625" from the bottom edge.

Step 20 | Sub 3-1



Combine the *Arch Support Legs* and the *Arch Lower Cross Member.* The *Cross Member* should be roughly 2.5" from the angled end of the *Arch Supports.*

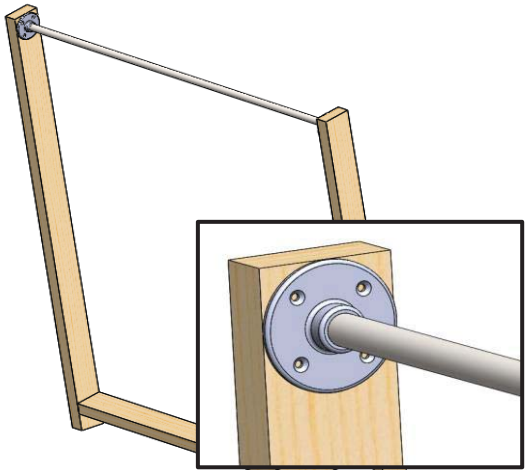
Comments

For each *Upper Hurdle* the center line is 3/8" farther from the bottom edge of the *Upper Mountain,* than the dimensioned edge.

Step 21 | Sub 3-2

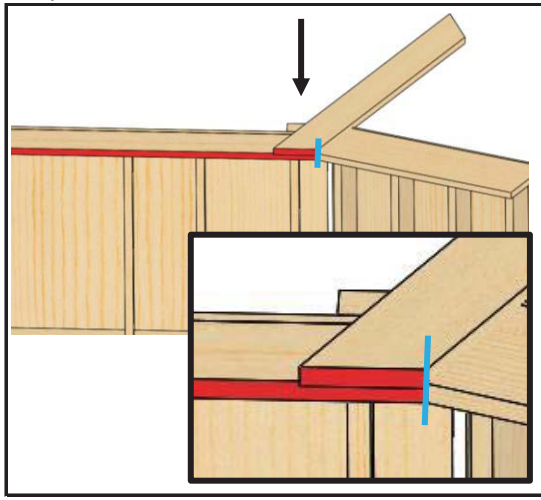
Thread the *Base Flanges* onto the *1/2" Pipe.* Using a pair of plumbing pliers tighten them down as far as they will go.

Step 22 | Sub 3-3



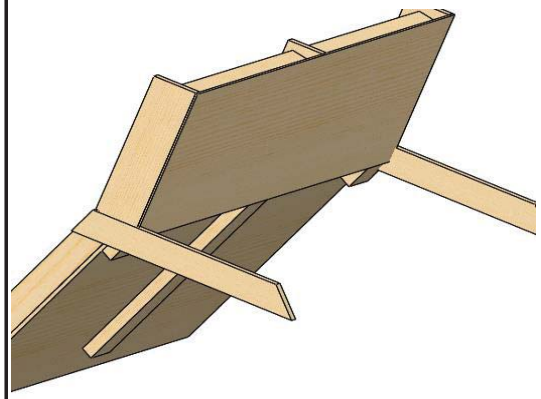
Align the *Base Flanges* with the center and top edge of the *Arch Support Leg.* Secure in place with (4) 1.625" screws in each *Base Flange.*

Step 23 | Sub 4-1



Place the *Upper Mountain* and *Lower Mountain* on their sides and use the *Mid Mountain Stay* to join them together. Be sure the Red faces and blue edges line up and the two mountain parts are flush with each other. Secure with (5) 1.375" screws each (follow arrow).

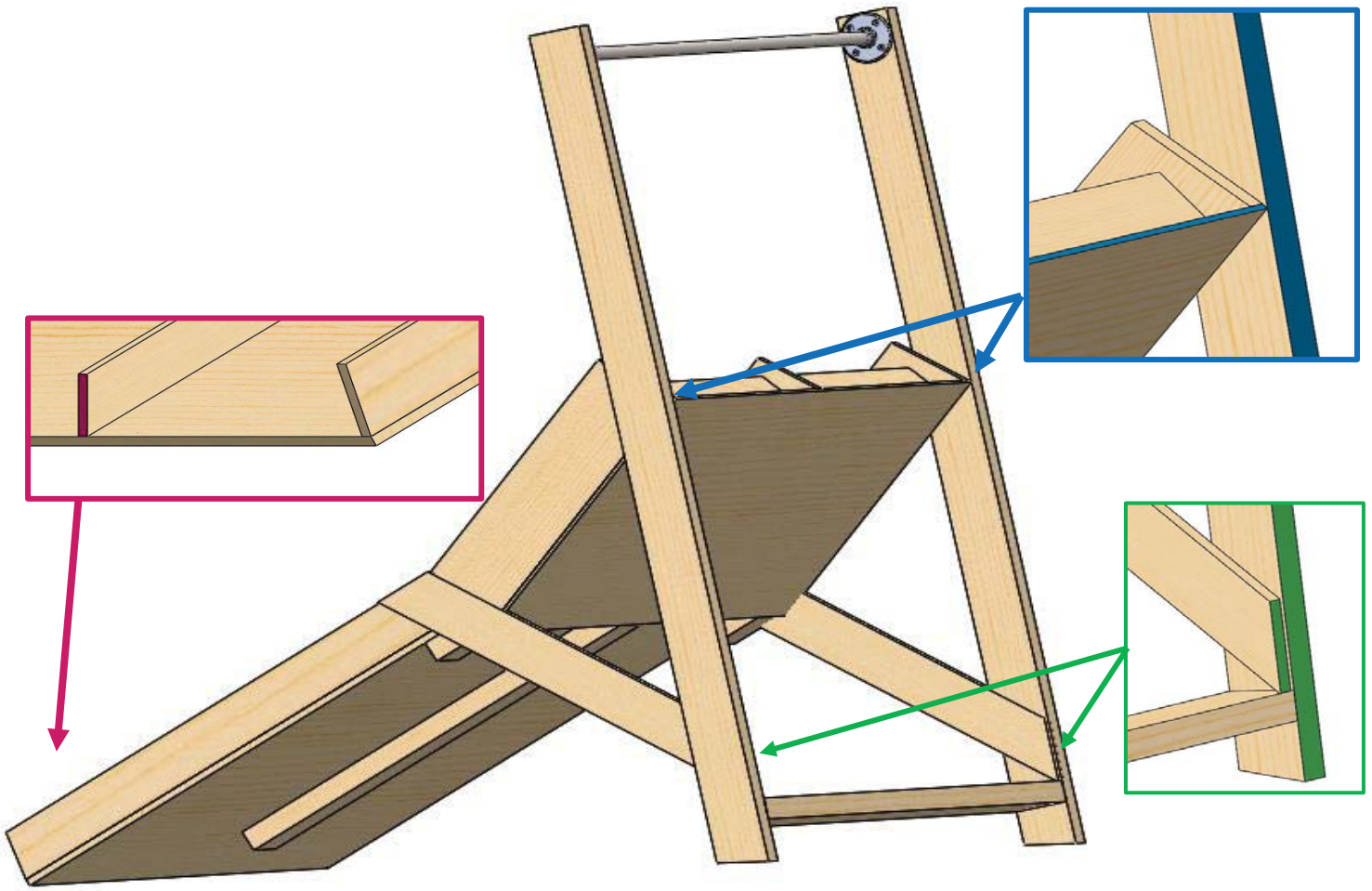
Step 24 | Sub 4-2



Carefully flip the *Mountain Ramp* over and repeat this for the opposite *Mid Mountain Stay.*

Comments

Step 25 Sub 4-3

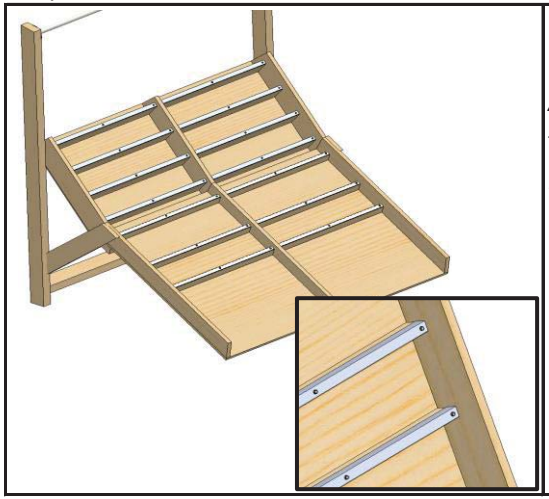


With 3 or more people line the *Mountain Ramp* up with the *Mountain Arch,* clamps may be helpful for this step. The bottom face of the *Lower Mountain Center* should be vertical (Magenta). The back face of the *Mid Mountain Stay* should be flush with the back of the *Arch Support Leg* (green). The bottom of the *Arch* should sit flat against the floor. The top edge of the *Upper Mountain Panel* should line up with the back of the *Arch Support Leg* (blue). Check the angle of the *Lower Mountain* is 30 degrees, *Upper Mountain* is 50 degrees and the *Arch* is 80 degrees from the floor. Secure all parts together with many 1.625" screws. The basic *Mountain* is now complete!

Comments

If you want your *Mountain* to act more like the *Competition Mountain* here are a few additional parts that you can add to improve it's accuracy.

Step 26



Sub 5-1

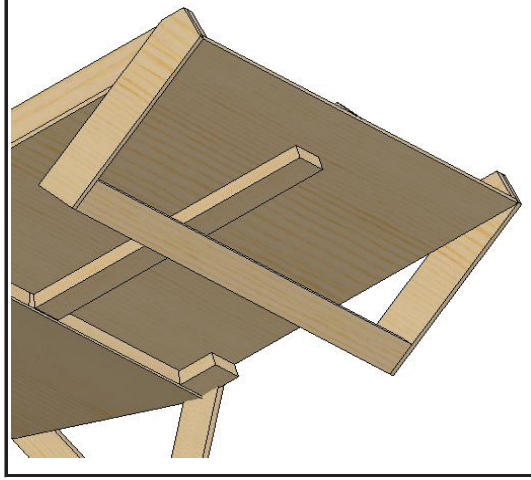
Using 3 button head screws per *Hurdle* secure the *Hurdle Armor* so that it protects the top, and up-hill side of the *Hurdles* .

Step 27

Sub 5-2

To keep *Balls* and *Blocks* out from under the *Mountain* add *Ball Fences* to the L*ower Mountain Side.* Line up the sloped faces on the front of the *Fence* with the *Mountain Side.* Secure with (4) 1.25" screws each from the *Lower Mountain Side* outwards.

Step 28



Sub 5-3

Use an *Arch Lower Cross Member* to strengthen the back portion of the *Ball Fences.* Secure with (3) 1.625" screws on each side.

Step 29

Sub 5-4

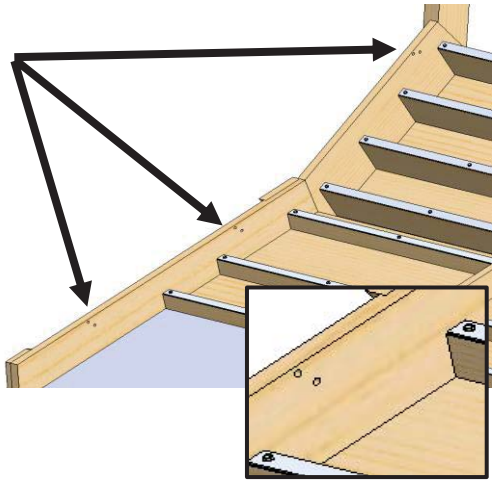
To better simulate the driving surface of the *Competition Mountain Panel,* add a sheet of *1/16th Inch Lexan* (or other Polycarbonate) to the lowest portion of the *Mountain.* Use (4) button head screws in the corners of the *Lexan.*

Comments

The Lexan will be closer in performance to the competition panel, but be ready make adjustments when you play on a competition field.

If you want your *Mountain* to act more like the *Competition Mountain* here are a few additional parts that you can add to improve it's accuracy.

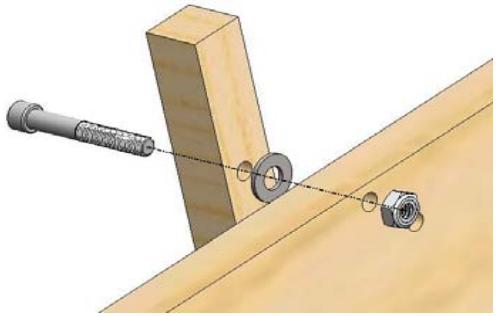
Step 30



Sub 5-5

If you would like to add a set of *Triggers* to your *Mountain,* drill the marked holes in the *Upper* and *Lower Mountain Sides.* Be sure that the hole on the edge is on the downhill side. Use the part drawings for hole locations and size.

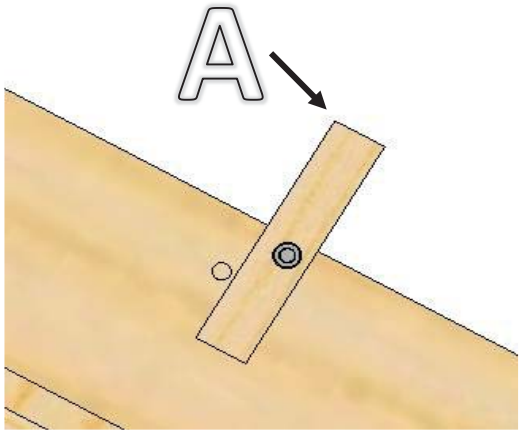
Step 31



Sub 5-6

Attach each *Trigger* with a *1/4-20 x 1.75" bolt* , *washer* and *lock nut* . Be sure to use the hole closest to the edge. Do not over tighten the *bolt* , the *Trigger* should spin freely.

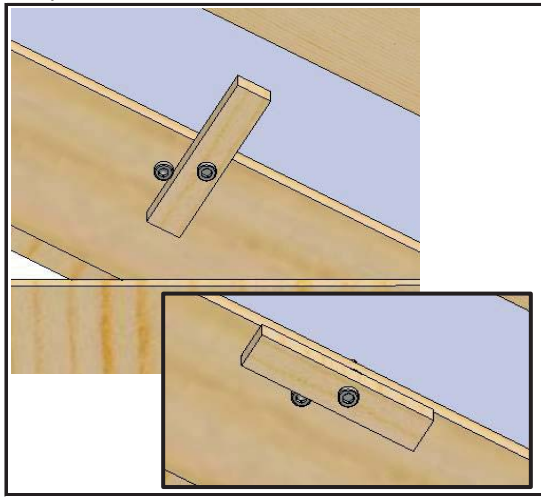
Step 32



Sub 5-7

Be sure the *Trigger* is facing in the correct orientation, See corner (A) on the print for the *Trigger.*

Step 33



Sub 5-8

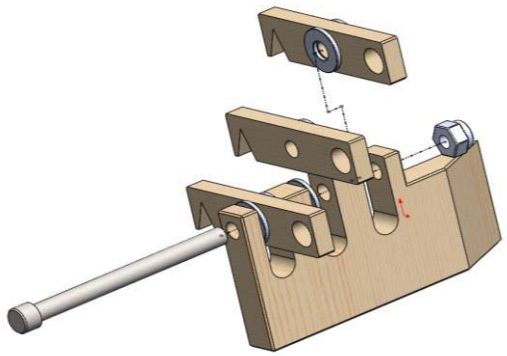
In the second hole near each *Trigger* add a *1/4-20 x 1.00" bolt* and *lock nut.* This *Bolt* will hold the *Trigger* upright and prevent it from over rotating.

Comments

Be sure to note there are variations in the Zip Line assemblies and the competition field. Be ready to make adjustments when you start playing on a competition field.

If you want your *Mountain* to act more like the *Competition Mountain* here are a few additional parts that you can add to improve it's accuracy.

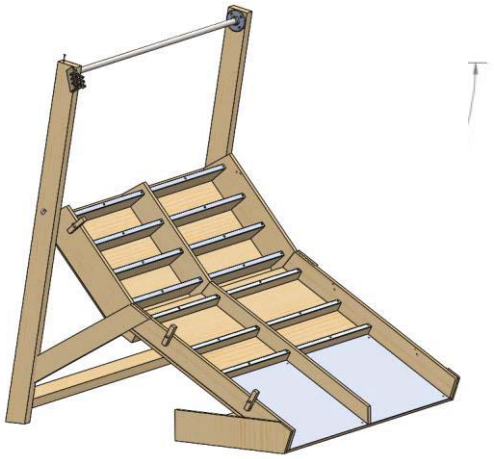
Step 34



Sub 5-9

Add the three *Releases* to the *Main Release Mount.* Use *Washers* to allow for easy motion of the *Releases* and a *1/4-20 x 3.00" bolt* as the main axle. For simplicity these parts can be replaced by their competition field counterparts. For detail see the notes on the BoM

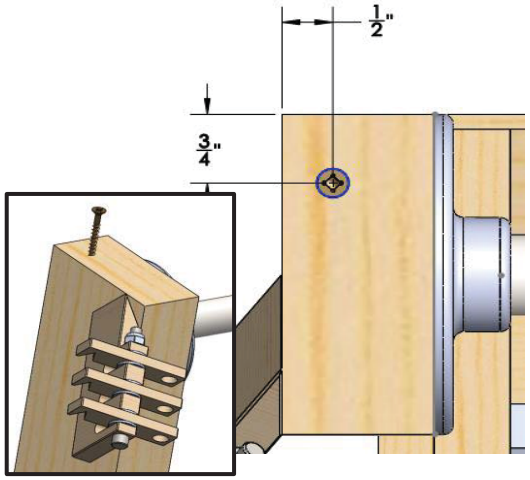
Step 35



Sub 5-10

Using a protractor hold the *Release Assembly* at a 45 degree angle to the top of the *Mountain Arch.* Secure this in place with (2) *1.625" screws.*

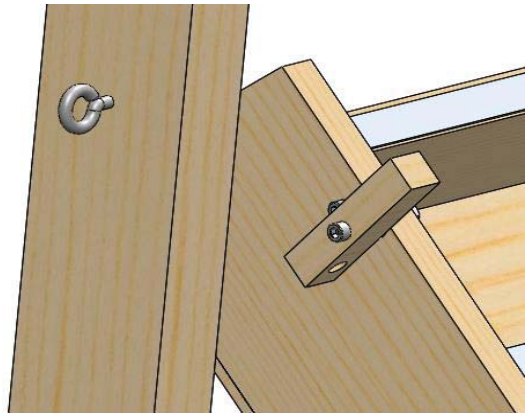
Step 36



Sub 5-11

Using the given dimensions, add a *1.625" screw* to the top of the *Mountain Arch.* This screw is used as the top anchor point for the Zip Line Paracord.

Step 37



Sub 5-12

At the connection between *Arch* and the *Upper Mountain,* insert a *1/4" x 1.50" Lag Screw Eye Bolt.* This is used as a guide for the T*rigger lines.*

Comments

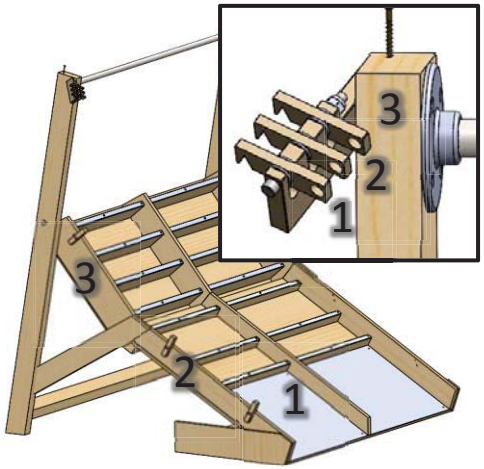
Be sure to note there are variations in the Zip Line assemblies and the competition field. Be ready to make adjustments when you start playing on a competition field.

If you want your *Mountain* to act more like the *Competition Mountain* here are a few additional parts that you can add to improve it's accuracy.

Step 38 | Sub 5-13

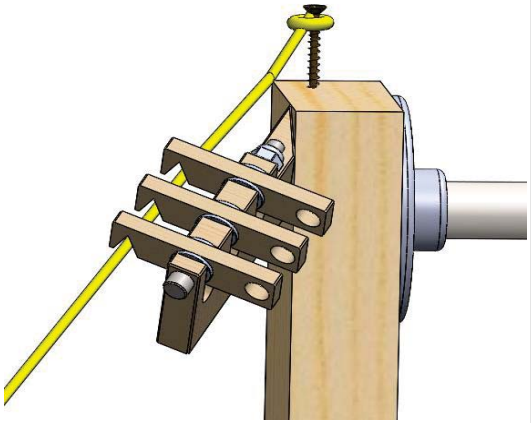
	Cut the Paracord into the lengths below:
Main Zip Line	Approx: 96"
Trigger 1 Line	Approx: 81"
Trigger 2 Line	Approx: 63"
Trigger 3 Line	Approx: 40"

Step 39 | Sub 5-14



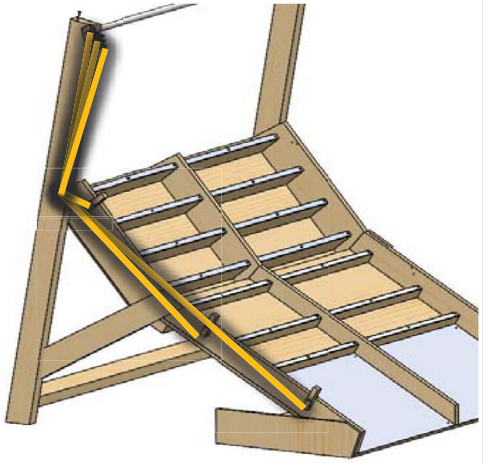
Run the three *Trigger Lines* from their respective *Triggers* to their R*eleases.*

Step 40 | Sub 5-15



Secure the top of the Main Zip Line to the top anchor screw, and the lower end to the Field Perimeter or a heavy counter weight.

Step 41 | Sub 5-16



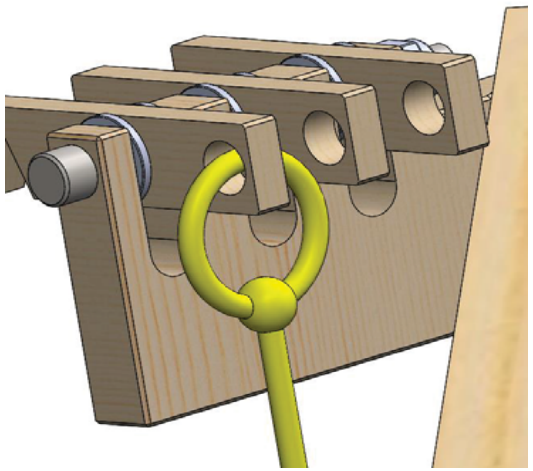
Be sure to route each *Trigger Line* through the *Eye Bolt.*

Comments

Be sure to note there are variations in the Zip Line assemblies and the competition field. Be ready to make adjustments when you start playing on a competition field.

If you want your *Mountain* to act more like the *Competition Mountain* here are a few additional parts that you can add to improve it's accuracy.

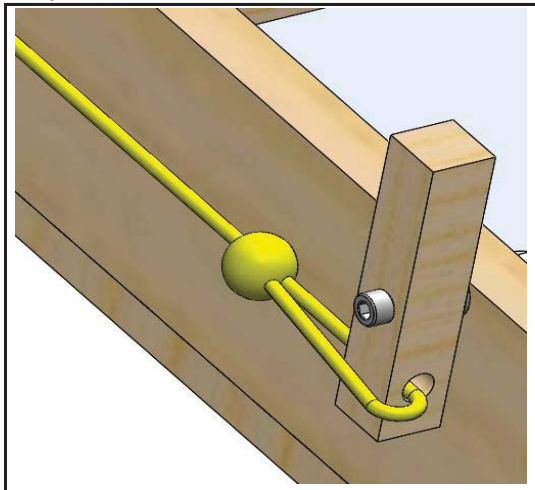
Step 42



Sub 5-17

Tie each *Trigger Line* to it's *Release* with a simple loop and knot.

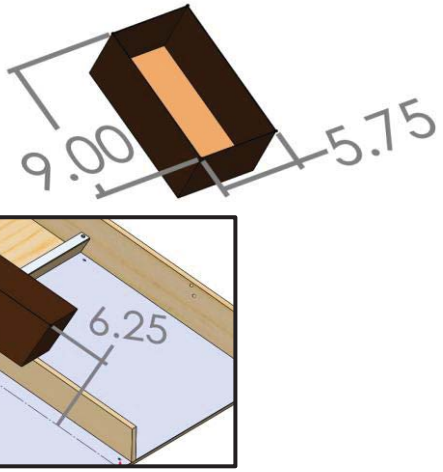
Step 43



Sub 5-18

Tie each *Trigger Line* to it's *Trigger* with a loop and slip knot. Use this knot to adjust the tension in the *Trigger Lines.* You want to remove as much slack as possible but not so much that the *Release* rises by itself.

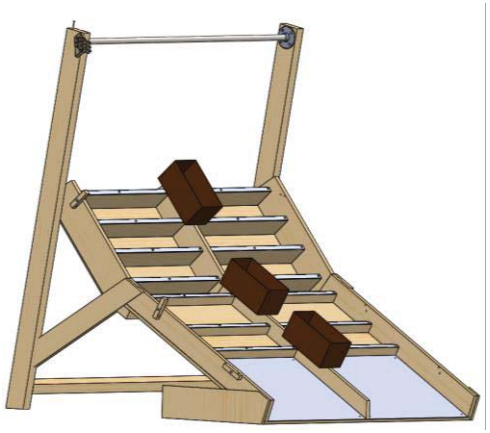
Step 44



Sub 5-19

Goal Baskets can be made from cardboard, Sterilight Mini crates, or by cutting the top off of a rectangular tissue box. Each *Basket* should be roughly 9.0" long, 5.75" wide and the opening should be 6.25" above the driving surface (*Lower Mountain Panel*)

Step 45



Sub 5-20

Goal Baskets can be secured to the *Mountain* with screws, tape, or zip ties.

Comments

Be sure to note there are variations in the Zip Line assemblies and the competition field. Be ready to make adjustments when you start playing on a competition field.