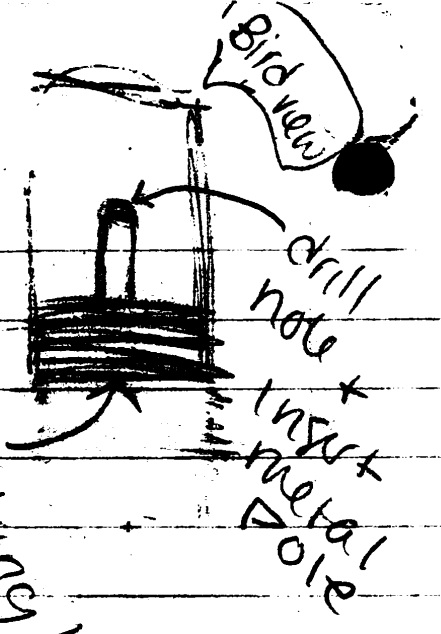


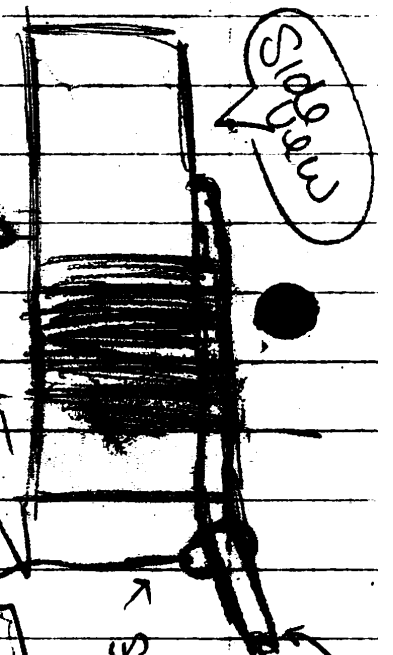
## Preliminary

We began researching in November of 2008. Our research continued through February of 2009. During February we completed our research most of which was done online and at the Edwardsville Public Library. When we received the supplies, we constructed the tabletop trebuchet. In doing this it helped us put our ideas together and visualize what we wanted to do with ours. We based our trebuchet off the basic design of the tabletop version.





String/Yall  
+ figure



keyhole  
screw

metal/wire hanger  
pole

String attached to  
Screw

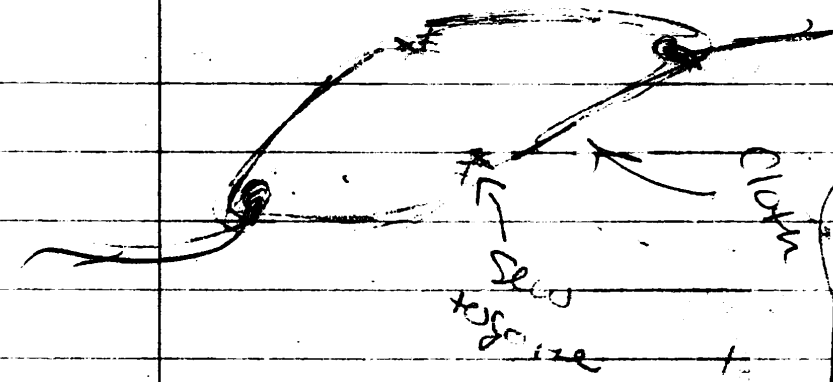
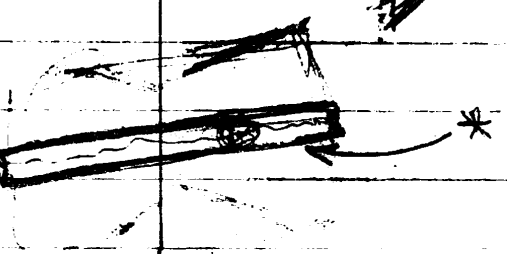


wood hinges

\* goocriest window  
Buss front to back



wood

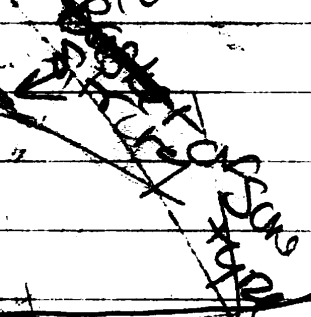


clown

to  
to  
to

- Old T-shirt  
- leather

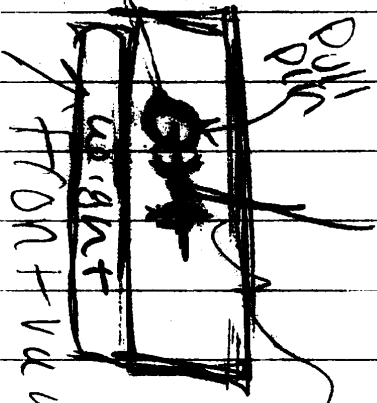
gut + rope



top

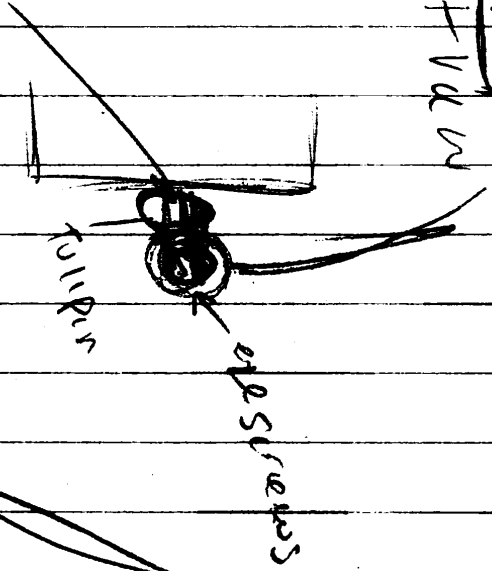
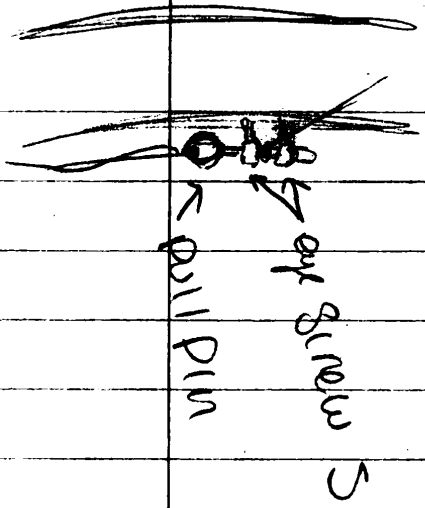
IDEAS

# Trigger



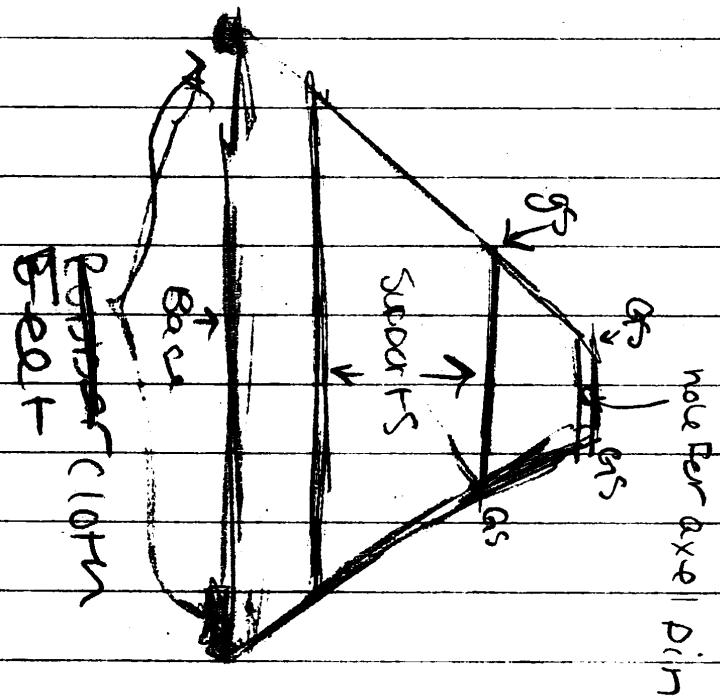
↓  
striking tool

## Top view



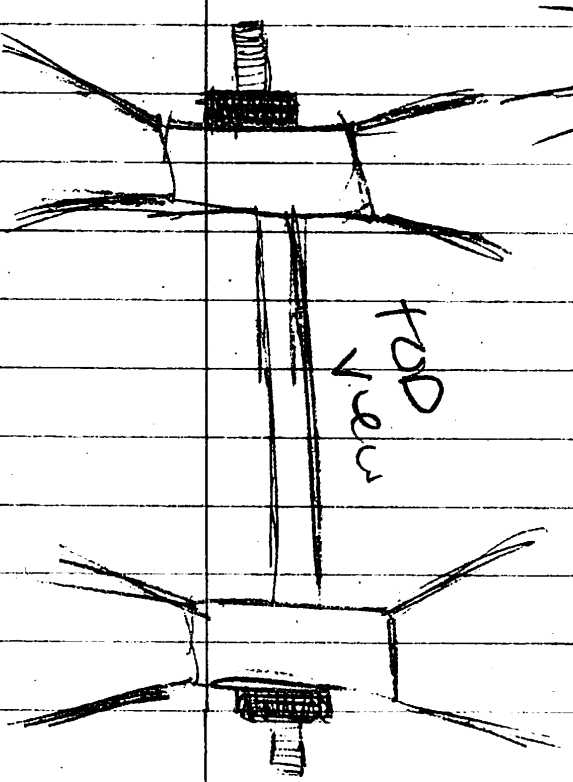
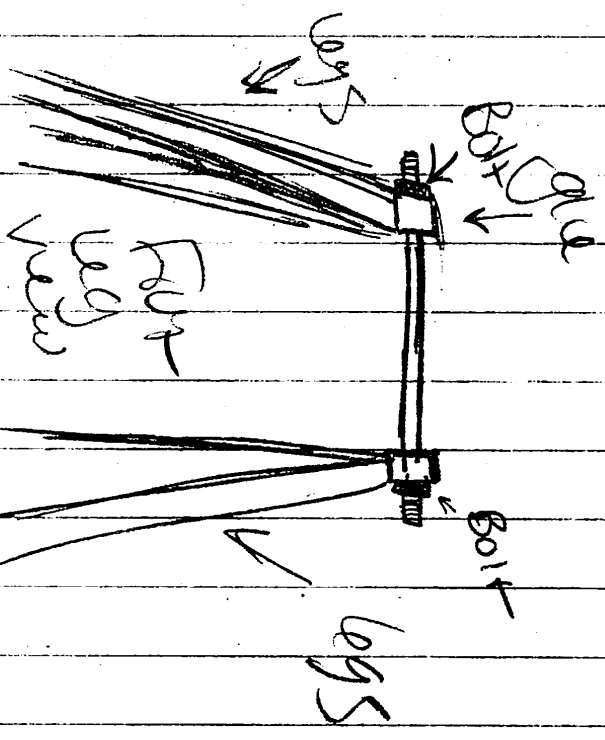
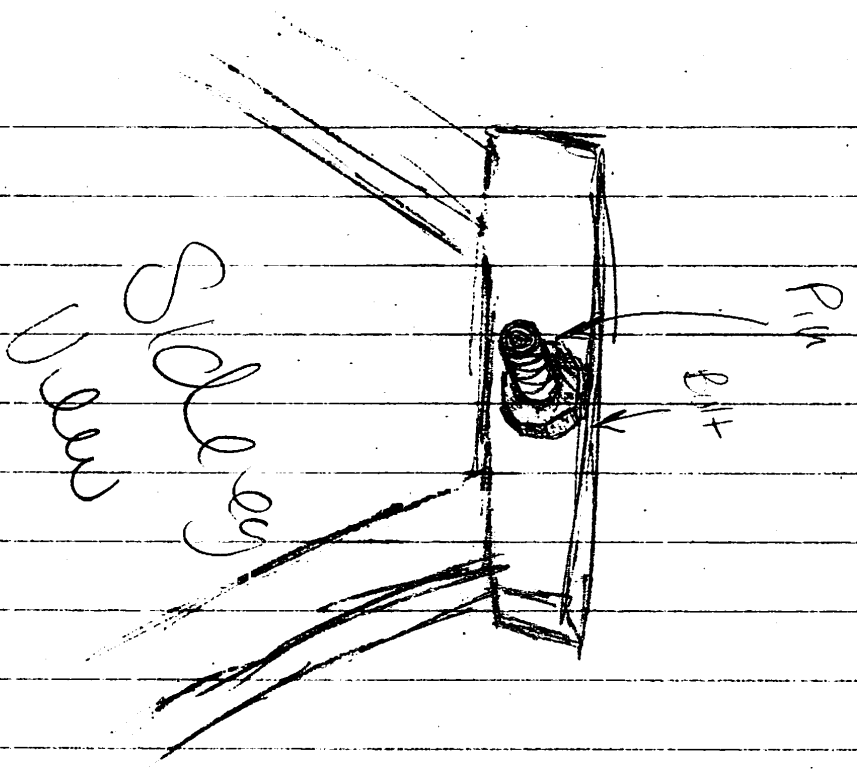
# Side legs

$gs = g/4 + \text{screw}$



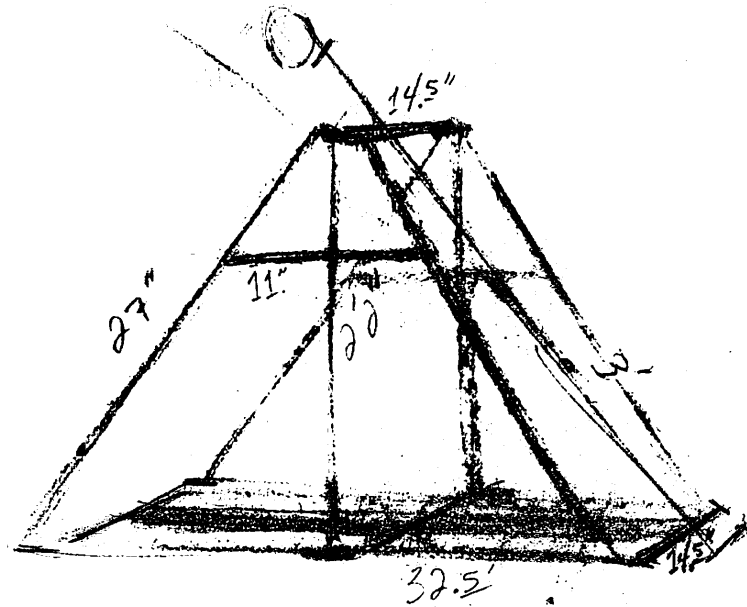
# IDEAS

# AXEL



## IDEAS

# FINAL IDEA



## MEASUREMENTS

$\times 4$   $\left. \begin{array}{l} 20'' \\ 11'' \\ 32.5'' \end{array} \right\} 2 \times 2$   $\times 8$   $27'' \sim 2 \times 2$   
 $\times 6$   $14.5'' 2 \times 2$

$2 \times 2 \rightarrow (+6) 8^{+1}$  length

$\times 2$   $36'' 2 \times 4 \rightarrow (-1) 8^{+1}$  length

## List SUPPLIES

stain  
 primer (1qt)  
 screws (47 at least)  
 $2 \times 2$  (7)  
 $2 \times 4$  (1)  
 eye hooks (4)  
 pull pin (2)  
 $\frac{1}{2}$  dowel (2)

3' 1/2

## Day One

First, we made our supplies list. Which included...

Stain, Screws, 7 2x2's, 1 2x4, 4 eyehooks, 2 pull pins, and 2 1/2 inch dowel rods.

Next, We planned out the lengths and checked them with the rulebook.

Then took a trip to Home Depot and bought our supplies with the lovely gift card that was provided! Then we returned to [REDACTED] house and measured the miniature version that was supplied and converted it to the maximum size possible. So we measured the arm length of the small trebuchet and figured out the difference between the mini arm and our 3-foot long arm. This enabled us to base the rest of our measurements off the small trebuchet. After, we began cutting the correct measurements of the wood. We're using a 2x4, which is 36 inches in length for the arm. Also using 2x2's for all of the rest of the trebuchet except the trough and axel. We also used 1/2-inch dowel rod for the axel as well.





## DAY 2

Today we measured and marked our wood lengths to prepare for the cutting.

Next we cut all the wood for both trebuchets and numbered them to keep from mixing them up. Our measurements included: (6) 14 1/2 inches 2x2's for the bases, (4) 26 inch for the middle section on the leg, (8) 27 inch for the diagonal section for the legs. We also cut (4) 32 1/2 inches for the base of the leg and lastly cut (4) 11 inch for the cross section on the leg. This is all we did on this day.



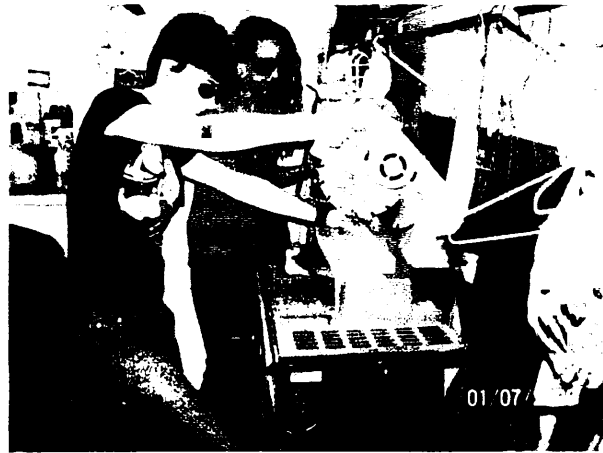


### DAY 3

On this day we concentrated on cutting the angles on the legs of the trebuchet. The first thing we did was placed the wood on top of each other to see what it was supposed to look like. We were planning to screw it together but decided against that because it did not look sturdy and probably would not have been very accurate at all. So we chose to cut the angles of the wood and fit the pieces together like a Lap joint. So we concentrated on cutting all the angles and the inter locking parts for one leg. Then we found out that the miter saw would make the cut curved instead of straight across since we weren't going all the way through. First we tried to fix this problem with a chisel but that took too much time and effort. So, we figured out if we turned the wood around and cut again from the opposite side it would be generally flat. Then we proceeded to trim the small flat with the chisel. We did that for every interlocking piece, so we did it a total of 12 times for one leg of the trebuchet that day. We cut the middle interlocking piece on the base too small so we had to shim it to make it fit. Since we were trying to cut so slow



the wood began to burn and kept setting off the fire alarm. So, [REDACTED] being six feet tall ripped out the batteries and that fixed that problem. Saw dust got everywhere so, clean up was nasty, also [REDACTED] sucked up the pensile into the shop vac.



#### Day four

Today we decided to cut the other interlocking pieces for the other leg. We really wanted to use the first leg measurements as a guide and stencil; so, we wouldn't have to measure everything again. However, we drew the first one and realized that everything was backwards luckily we hadn't cut anything yet! So we erased our marks and had to re measure everything to be the right direction and angle for the left side. After we figured that out we cut everything twice again the make the interlocking pieces be flush against each other.



## Day five

We took all of our cut pieces outside. There we beat and whacked the heck out of them, with hammers, bolts, and screws to make awesome wear marks and indents to add an aged and distressed effect to the wood. We did that to all of the pieces of the legs. We did this to make it look like an old medieval trebuchet. Then we went back inside to put it together. At first, we glued and clamped the pieces and had planned to wait and let the glue dry before we screwed it together. Then [REDACTED] dad informed us that we could screw it together while the glue was still wet. Then we screwed those pieces together for one leg. For the second leg we glued and screwed using 1 1/4 inch Phillip head screws and Elmer's wood glue to put it all together. After doing that for both legs we let it dry for 30 minutes. While that was drying we went back to Home Depot and got MinWax water based wood stain and foam brushes. And then we went back to [REDACTED] house and stained both pieces. Spreading the stain with the foam brushes, letting that dry for 5 minutes and then going back and wiping the area with a stain damp cloth.



## Day six

Today we took the three base connectors beat them out side. Then we screwed them to the legs. However, today didn't go so well because the screw would not catch the wood. So, we searched around in the garage and found longer screws. Next, even though the screws were long enough every time we screwed one of the base pieces in it would become uneven and would spin. We tried different techniques to try and hold the wood steadier, and even asked [REDACTED] dad for help, but it just wouldn't work. So, we did what we could, finished screwing them together, and leveled it off with an extra piece of wood under one leg. Then we chiseled of the bottom corner part of one of the base pieces to also make it more level. Today was not the best. The next, thing that happened was the legs were bowing out. They were not right angles to the base or straight up and down. So, we asked [REDACTED] dad what we should do. He assisted us in using to scrap right triangles of wood to help make them straighter and then we clamped the top pieces were we wanted it to stay and glued and screwed the triangles.



## Day Seven

Today we are working at [REDACTED] house instead of [REDACTED]. We began bright and early in the morning at 10:00A.M.!!!! [REDACTED] brought over the supplies and the unfinished trebuchet. First, all the supplies were brought in by us. Next, we measured and trimmed our 2x4 to make sure our arm was within the rule limits. We did this because we had to put the spoke at the end of the arm to hold the string of the sling. Then [REDACTED] dad helped us make the pieces for the axel that the arm would spin on. He helped us because he didn't want us using his saw and drills at first because they are different than what we've been using. We used a 2x6 for the axel part. At first we were going to drill all the way through the top of the legs and the axel pieces to put the dowel rod in. Then [REDACTED] dad informed us that if we made the dowel rod shorter it would support more weight. So, he drilled  $\frac{3}{4}$  of the way into each side of the axel parts. He did this because he didn't want us using that specific type of drill bit. We trimmed the dowel rod to nine inches thus making it shorter than before and much more sturdy. After that we trimmed off a total of one inch off the axel side pieces to allow for some wiggle room for the arm so the wood would not rub against wood and make more friction and slow down the arms rotation. After we placed these together we realized we trimmed off too much and had too much wiggle room make our trebuchet very inaccurate. We were going to just glue some extra wood to make up the space, but then [REDACTED] dad had a bright idea. He told us that wood rubbing on wood creates a lot of friction but wood rubbing on plastic do not create as much. So, we search through the garage in search of plastic to cut up. We came up empty handed until dad became thirsty and grabbed a bottle of water. He unscrewed the cap and the light

bubble came on. So, dad drilled holes in the caps using the bottle as a handle the same size as the dowel rod. We finally put the axel together and screwed it in place on the legs. After this was done we needed to figure out how to put the weight provided on to the arm. To do this dad found this metal strip with holes in it. It was perfect we screwed it to the end of the arm and the length we wanted it and connected the weight with a bolt and nut. We had to make sure that the weight did not touch the arm like the rules specify. To do this it took a lot of adjustments with the length of the metal strip and the placement of the axel hole on the arm. Eventually we figured it out and were successful. We used the rest of our stain to cover what we could we need more stain for the rest but that would have to wait until tomorrow.







## Day eight

Today we didn't do much because our trebuchet was mostly finished. We got more stain and finished that. While we let the stain dry we concentrated on making the sling for the squash ball. We are making our sling out of faux leather and using leather strap for the release string. To make the leather strap stay on we rapped it around the arm several times and then we glued and stapled the end to make sure it stayed. To make sure the release loop at the end worked we decided to tie the string onto a small washer that fits around our  $\frac{1}{2}$  inch dowel rod at the pivot of the arm. We were going to make a release mechanism but our physics teacher Mr. [REDACTED] told us that would take up to much time during the 6 minutes we had to get the squash balls launched. So, we scratched that idea and were just going to hold it and release it our selves.



Day nine

Today we went to [REDACTED]'s grandma's farm and practiced with our trebuchet. We practiced in the large machine shed due to a very windy day. At first we couldn't get the ball to release and we found out that we had to pull the string back at a certain angle to get the right release. The squash ball went the pretty far but we didn't have a tape measure to measure the exact length of distance. To make sure that the wood doesn't scratch your



gym floor we put some square pieces of carpet on the bottom of the corners. We finished the final touches on the journals and The C.A.D. Drawing

### Summary and Conclusion

During the making of the trebuchet we have learned to take each problem as it comes. To try and remember that we are not going to know how to do everything. Also, that building a trebuchet is a lot harder than the books and websites make it look. All of our work including all the time put into research; the ideas we come up with but did not use due to rules or just not working. Also we realized the hard way that making extra time to do all of the research, planning, and building was going to be so difficult. A few things that this taught us physically was we learned how to use a Miter saw and drill straight holes. Also, we learned how to use C.A.D even though it was confusing. All in all this was a good thing for us to be a part of and will be an even greater experience.

