

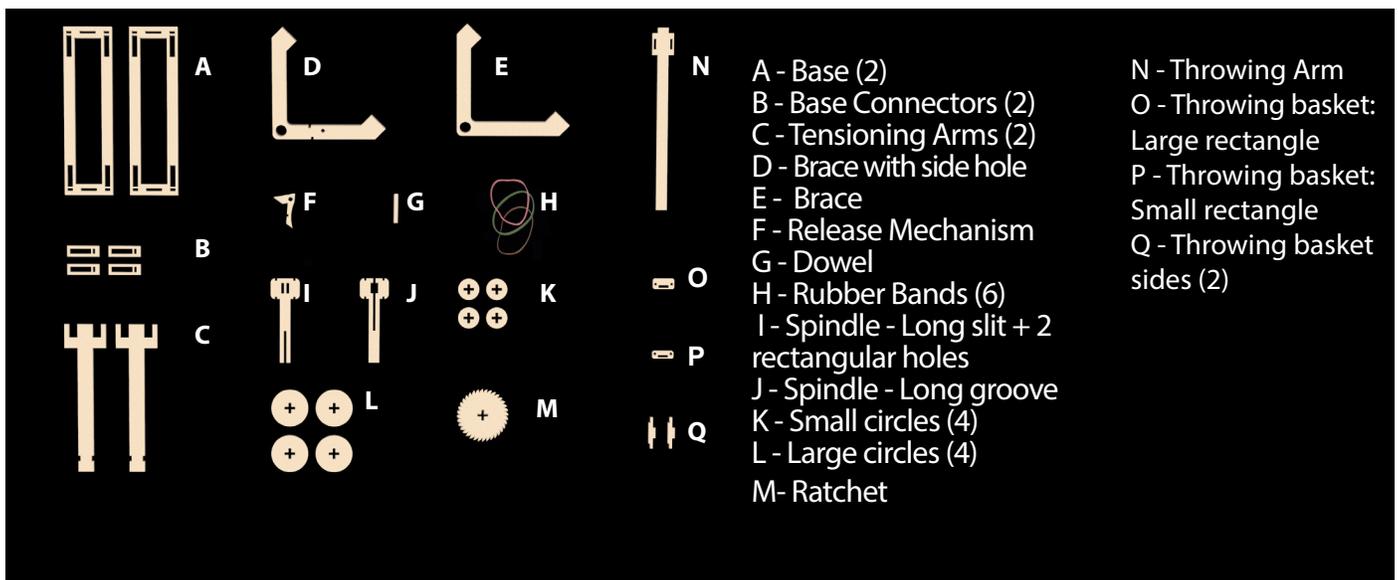
# DA VINCI CATAPULT - INSTRUCTIONS

## Background:

Catapults date back to antiquity. They have been used in different forms by the Greeks, Chinese and Romans.

DaVinci recognized the use of the catapult and improved on it. His variant introduced the notion of a rotating drum which would spin on an axle connected to the arm. In our model, the throwing arm can be moved so you can experiment to find the best throwing angle. The projectile is held in place in the small scoop. The ratchet system locks the throwing arm in place. Rubber bands wrap the drum and attach to the tensioning arms causing the wood to gently bend.

When ready to launch, release the ratchet lock mechanism and watch the projectile go. Make sure to experiment with the position of the throwing arm to see how it's position impacts the projectile's path.

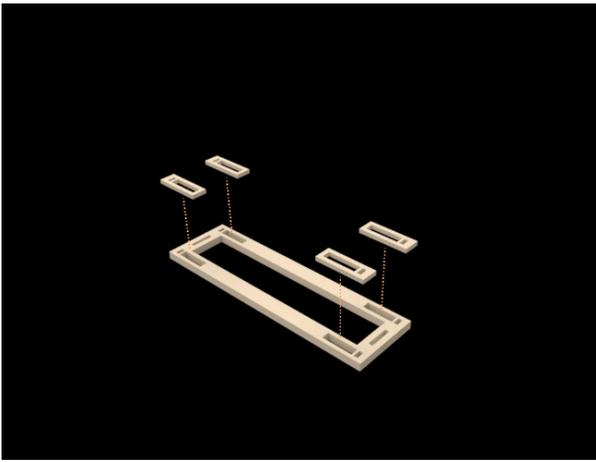


## Prep:

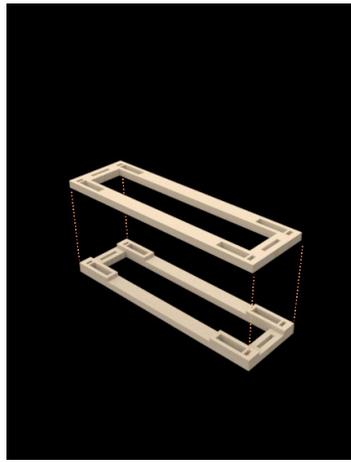
- Lay out your pieces so you can easily identify them.
- Use markers to decorate the various parts to personalize your catapult. *We recommend coloring the pieces before assembling the catapult.*
- You can use wood glue to secure the parts. Use small amounts when applying the glue. Masking tape will help secure the pieces while the glue dries.

## Additional information:

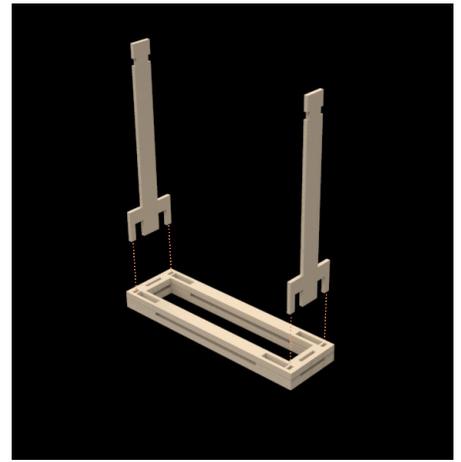
1. Your catapult has been laser cut on plywood which is not always uniform in width. Consequently some pieces may fit more tightly than others.
2. You can use wood glue to secure the parts. Dispense small amounts. Masking tape will help secure the pieces while the glue dries.
3. Use sandpaper to sand down parts if the fit is tight.



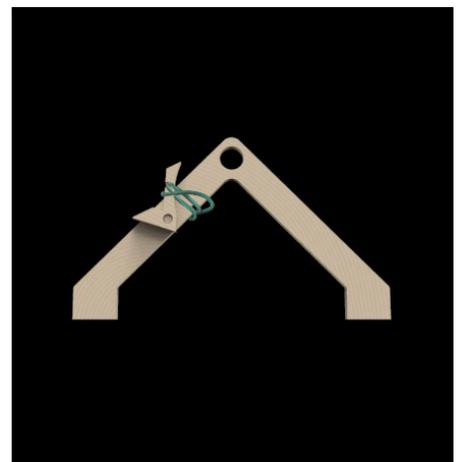
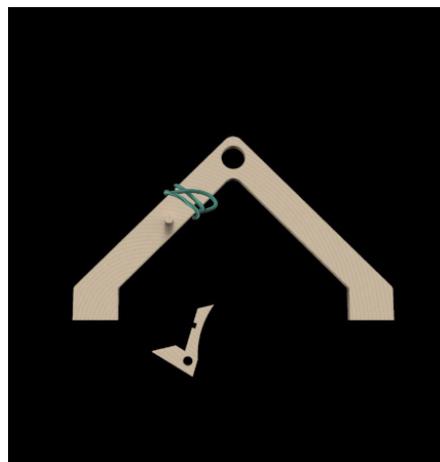
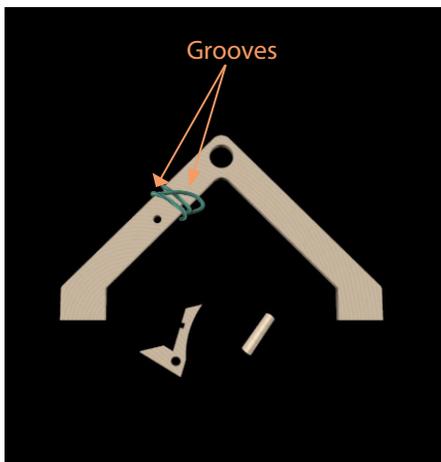
**Step 1:** Align the holes of the connectors (B) over the corresponding holes on (A). Making sure that you can see through the holes, use a small amount of wood glue to secure the connectors over the base.



**Step 2:** Once the connectors have dried, take the second base component (A) and aligning the openings glue the base over the connectors.



**Step 3:** Insert the Tension arms (C) into the holes on edge of the base. They should not be glued in and should slip into place. Use sandpaper if the fit is tight

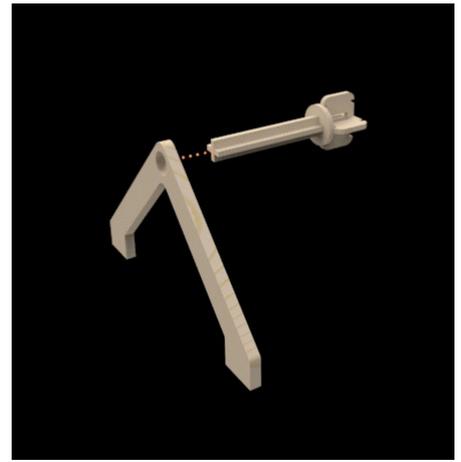
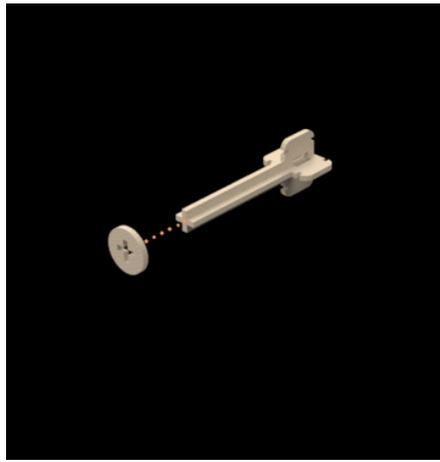
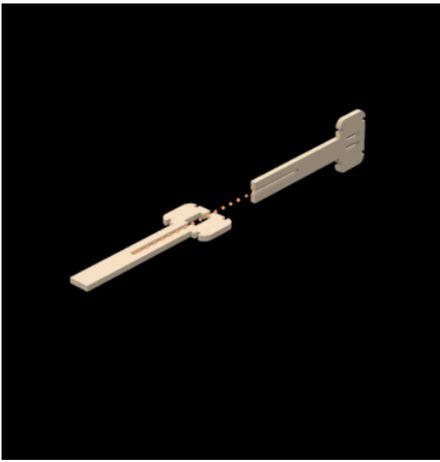


**Step 4:** Loop a rubber band over the angled brace (D). The rubber band will wrap around the small grooves on the brace. Do not wrap it around tightly at this stage.

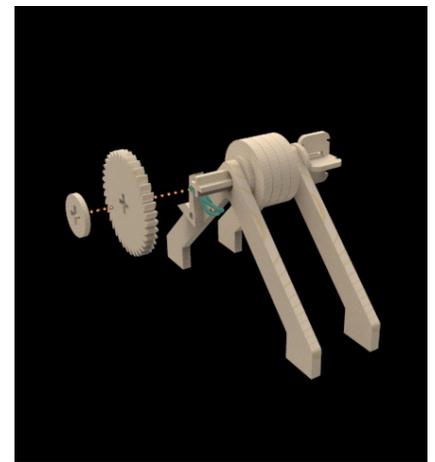
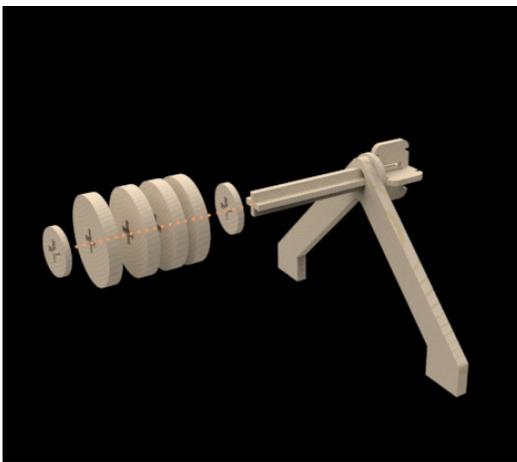
Next you will connect the release mechanism (F) to the angled brace (D). Slide the dowel (G) into the side hole on angled brace (D). If the dowel is loose you can apply some glue to hold it in place.

Slide the ratchet release mechanism (F) over the dowel so that the small pointy top of the ratchet faces the top of the brace. *DO NOT GLUE THE RELEASE MECHANISM TO THE DOWEL.*

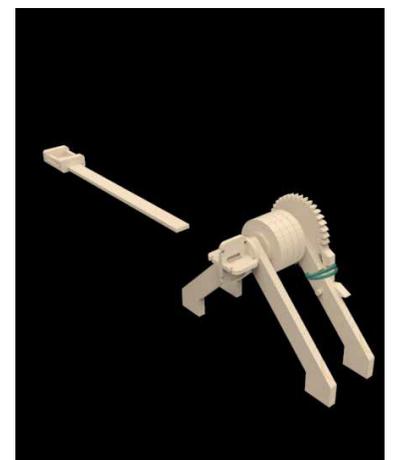
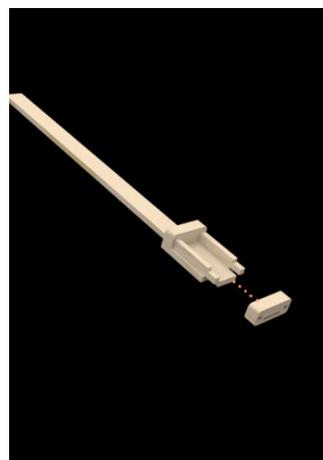
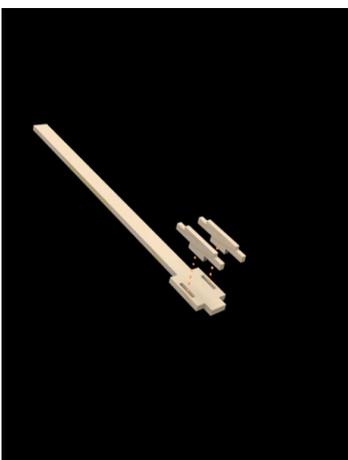
The illustrations above show the orientation of the ratchet release mechanism. Secure the ratchet release mechanism to the brace by looping the rubber band across the brace and around the thin portion of the release mechanism. The rubberband should be tight but



**Step 5:** Assemble the spindle by sliding spindle part J into spindle part I along the slit. Then thread one of the small wooden circles (K) against the X formed by the interlocking spindle components. Slide the spindle through the hole of brace E. The wooden circle will touch the outer wall of the brace.

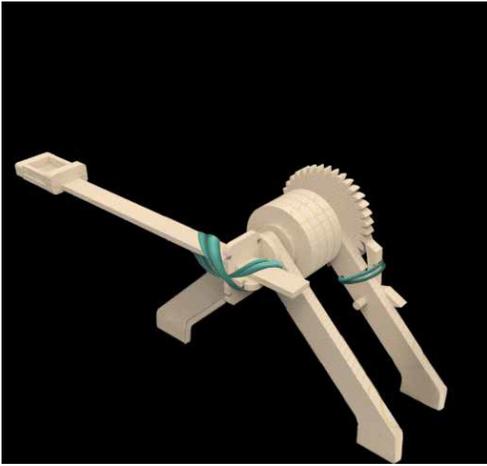


**Step 6:** Take a second small circle (K) and slide it through the spindle. Now slide the 4 large circles (L) through the spindle and then add a small circle (K) at the end. You will end up with the 4 large circles sandwiched between the two small circles. Now thread the spindle through the hole at the top of angled brace (D). Add the ratchet (M) by sliding it through the spindle. Slide the last small circle (K) to hold the ratchet in place. Make sure that the edge of the ratchet release mechanism can sit on the teeth of the ratchet.



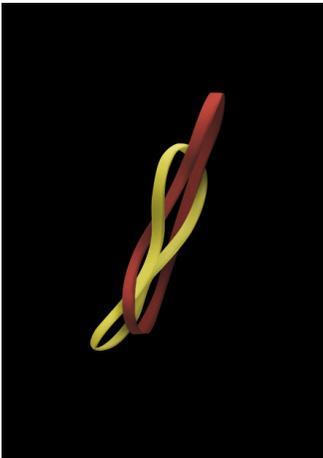
**Step 7:** Assemble the throwing arm and basket. Insert the two side walls (Q) into the slits on the arm (N). Slide the small rectangle (P) down the long side of the arm and connect to the wooden tabs. Repeat with the larger rectangle (O) on the other end. Use glue as needed to secure the basket.

**Step 8:** Slide the throwing arm through the slit that is created by the spindle end.

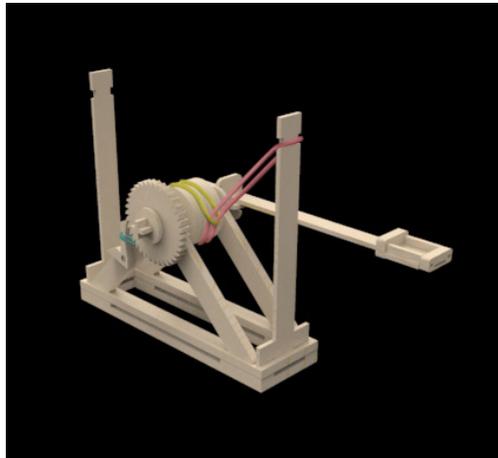


**Step 9:** Take one of your rubber bands (H) and twist it around the edges of the spindle and the throwing arm. This will prevent the throwing arm from slipping. **Do not use glue!**

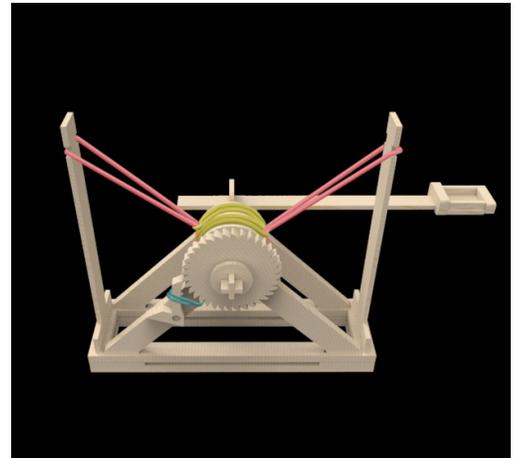
**Step 10:** Attach the throwing arm/brace components to the base. The braces each fit into the remaining holes on the base. If they are loose you can glue them



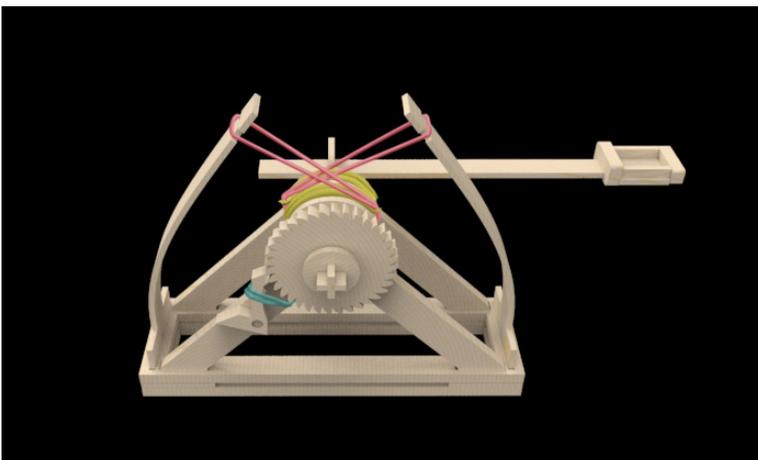
**Step 11:** Take 2 rubber bands and loop them one into the other.



**Step 12:** Using your long rubber band loop it around the drum and attach one rubber band end to the top of a tension arm.



**Step 13:** Repeat steps 10 and 11 to attach the second tension arm.



**Step 14:** Your DaVinci catapult is now ready to us. When you turn the ratchet, the drum will rotate causing the tension on the rubber bands to increase and the wooden arms to bend. When you are ready to launch, release the ratchet and watch the throwing arm move.

Thank you for purchasing our Da Vinci catapult kit.

Additional kits are available at [www.scienceseeds.com/shop](http://www.scienceseeds.com/shop)

Share with us your completed catapult by sending a photo to [shop@scienceseeds.com](mailto:shop@scienceseeds.com)