

Cube & Lifter Instructions



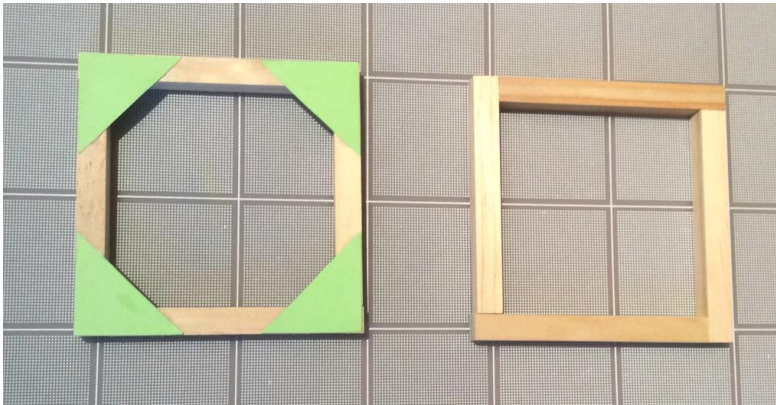
Cube & Lifter Kit Contents

- Wooden pieces ($\frac{3}{8}$ -inch cross-section):
 - 8 wooden $3\frac{5}{8}$ -inch pieces; 6 wooden $3\frac{1}{4}$ -inch pieces; 4 wooden 8-inch pieces; 2 wooden $1\frac{1}{2}$ -inch pieces; 3 wooden 1-inch pieces
- Green corner gussets: 2 paper cards of cut-outs
- Syringes, 20cc: 2 (**1 has a hole in the plunger**)
- Plastic Tubing
- Wooden Dowels - $\frac{3}{16}$ -inch diameter
 - 2 dowels 5-inch length
 - 1 dowel 3-inch length
- Axle Holders: 16
- Syringe Holder: 1
- Mini-washers: 8
- Stirring Sticks: 2
- Small sandpaper: 1



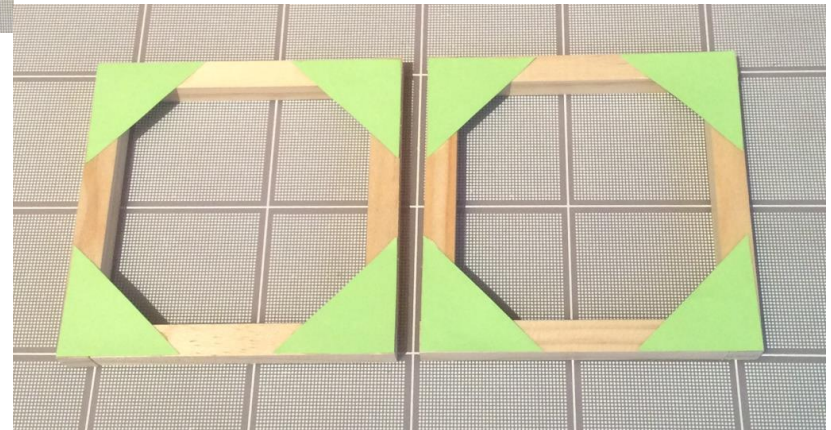
Build the Cube

- Use 8 of the $3\frac{5}{8}$ -inch pieces and 4 of the $3\frac{1}{4}$ -inch pieces.
- First make two squares...each uses 4 of the $3\frac{5}{8}$ -inch pieces.
- See images for assistance with the 4-inche square.
- Glue the green gusset triangles on the top side of each square.



Hint: 1st review the next two pages for gluing tips & more visuals.

Hint: Work in groups of 2, so your teammates can make the lifter arm assembly (see page 17).



Using Wood Glue & Paper Gussets

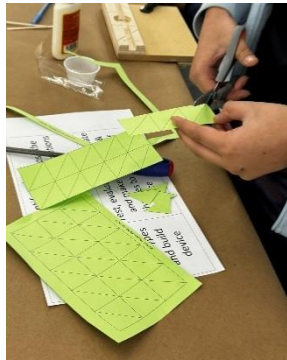
1



2



3



4

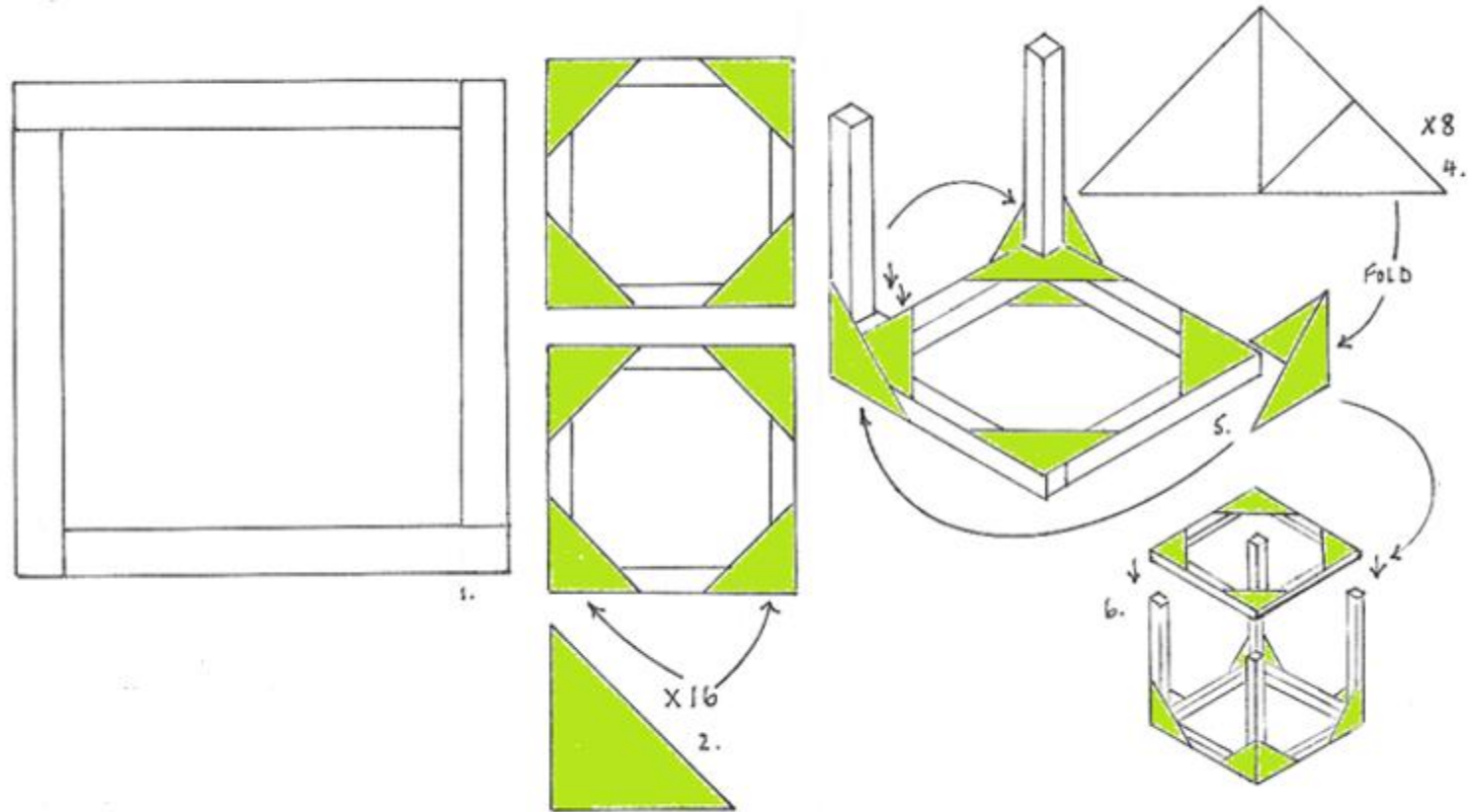


5



1. Add a small amount of glue to the plastic cup.
2. Use stir-stick to apply a thin dab of glue to area where two pieces of wood will connect.
3. Cut-out the green paper gussets needed; these will add strength to the glued wood.
4. Use a thin layer of glue when applying the **GREEN PAPER** triangular gussets; too much will soak the paper.
5. Position the gussets on the glued sections and let the assembly dry.

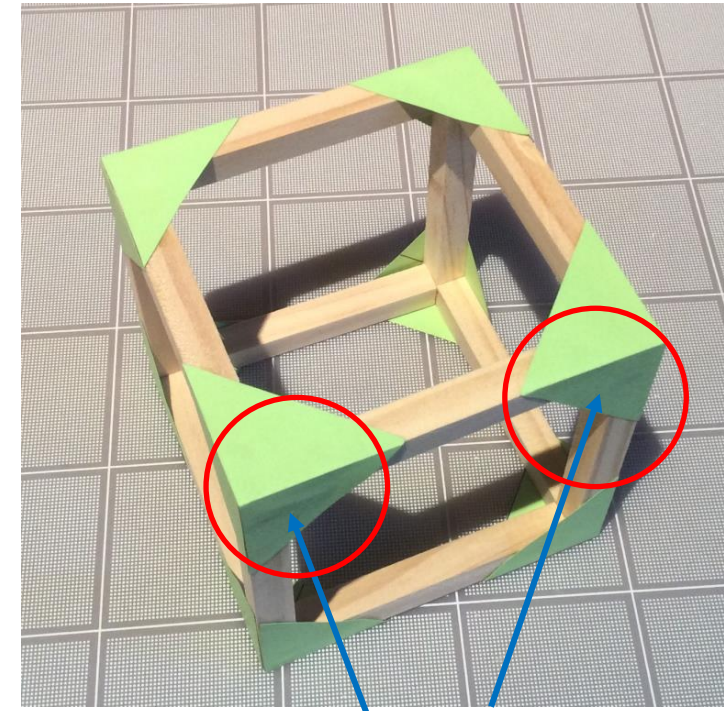
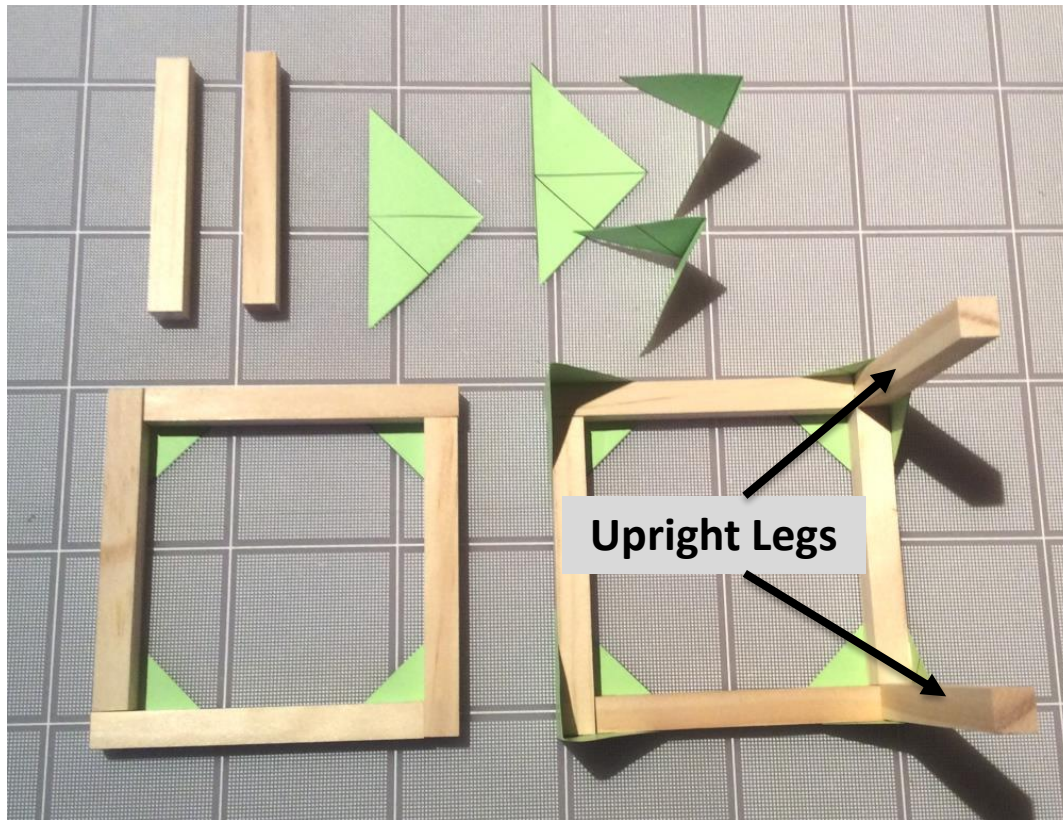
Cube Assembly Visual



Build Sides of the Cube

Use 4 of the 3¼ -inch pieces as upright legs.

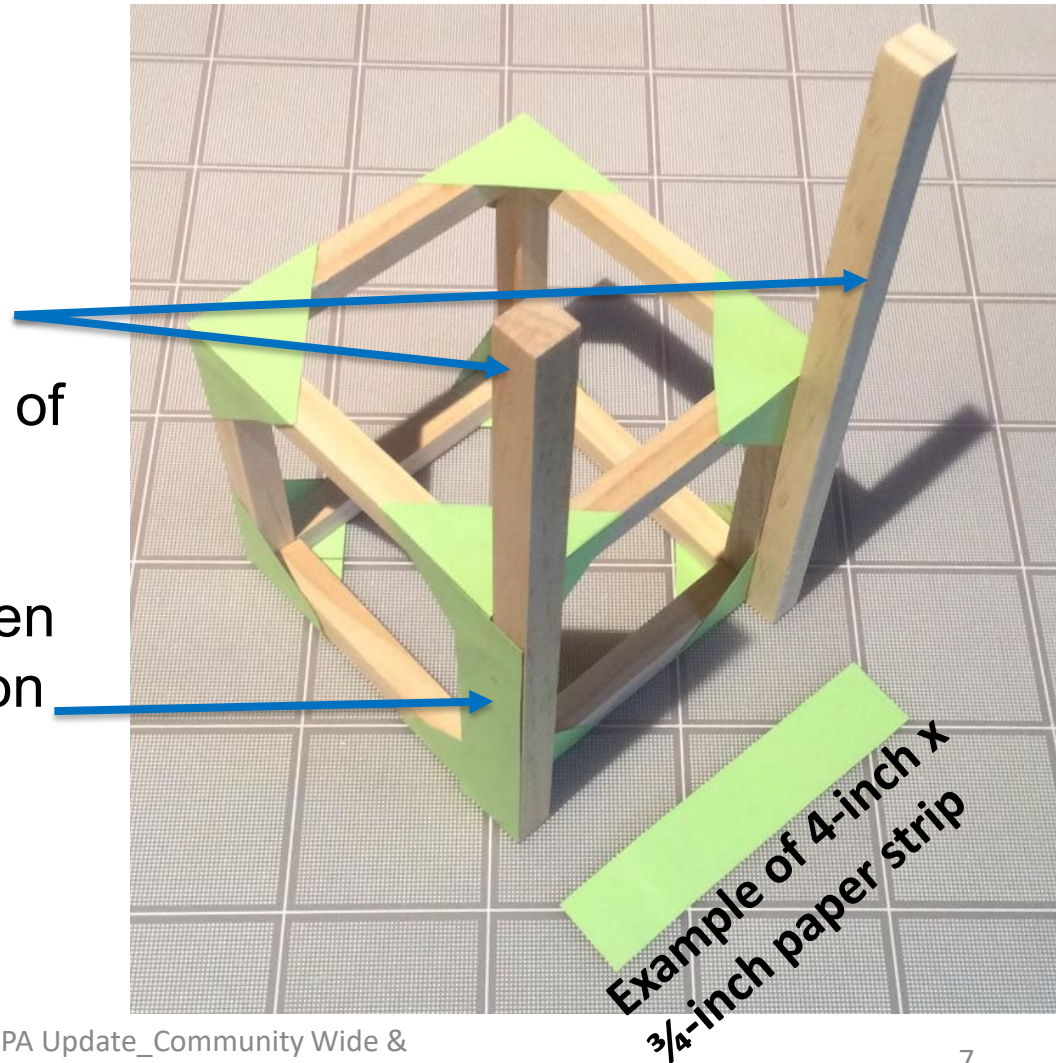
Use “**double-sized**” green paper triangles to secure all corners.



**Double-sized green gusset
placement examples**

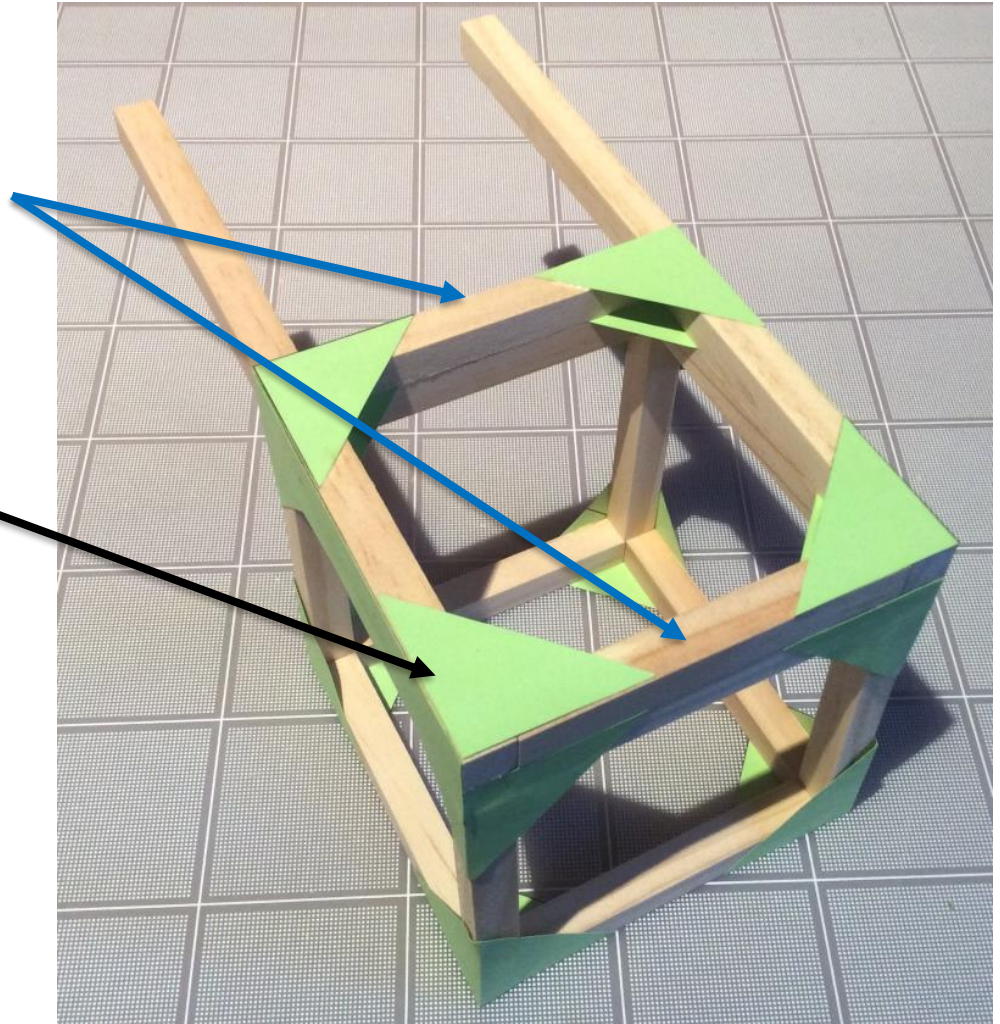
Build Cube's Lifter Supports

- Use the Cube as the main structure for the Lifter arm.
- Glue two 8-inch wooden pieces (vertically) to one side of the cube.
- Reinforce by gluing two green paper strips 4-inch x $\frac{3}{4}$ -inch on the side (cut these from the green card).



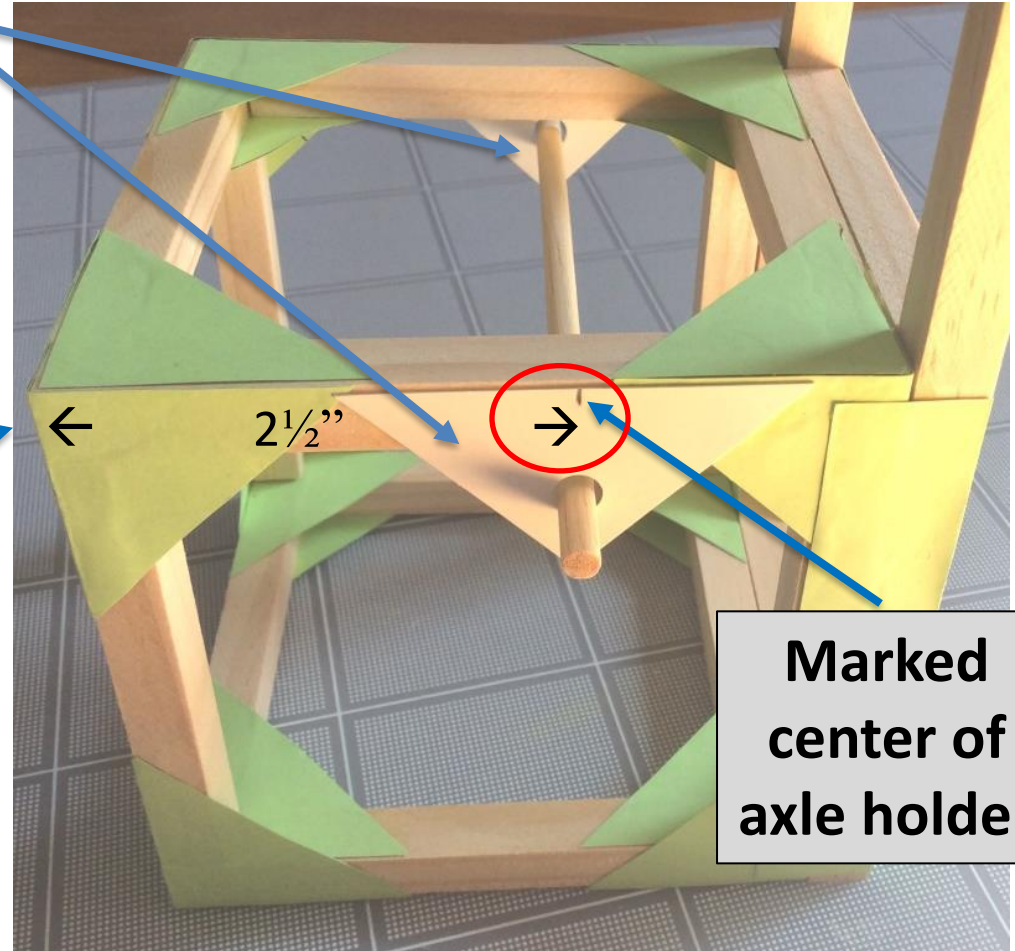
Build Cube's Lifter Supports

- Glue two wooden $3\frac{1}{4}$ -inch pieces between the 8-inch wooden uprights
- Reinforce with four green paper gusset triangles on all corners as shown



Build Cube's Lifter Supports

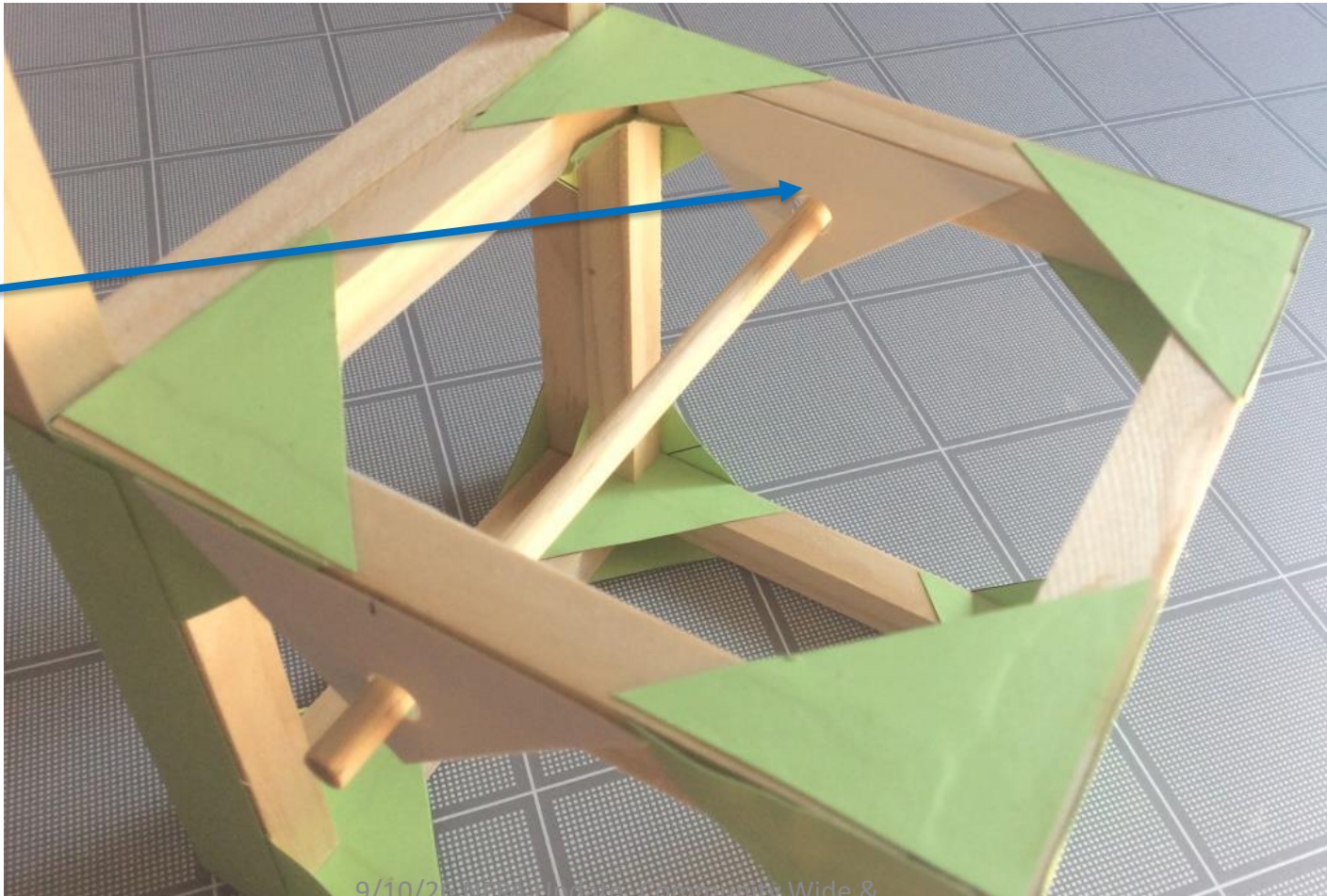
- Find paper axle holders (with hole) and prepare to glue them to the top of the cube's outside edges, as shown
- Measure and mark the center of the axle holder; then, measure 2½-inches from the edge that is furthest from the uprights. This positions the axle holder
- Glue the axle holders into place, making sure they are horizontal and parallel to the top wooden piece. Do not insert axle, yet.



Build Cube's Lifter Supports

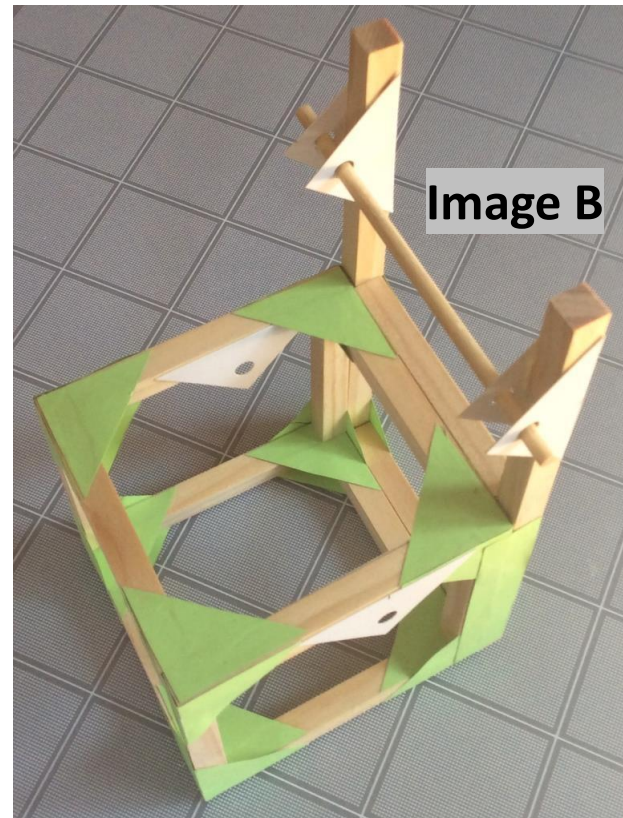
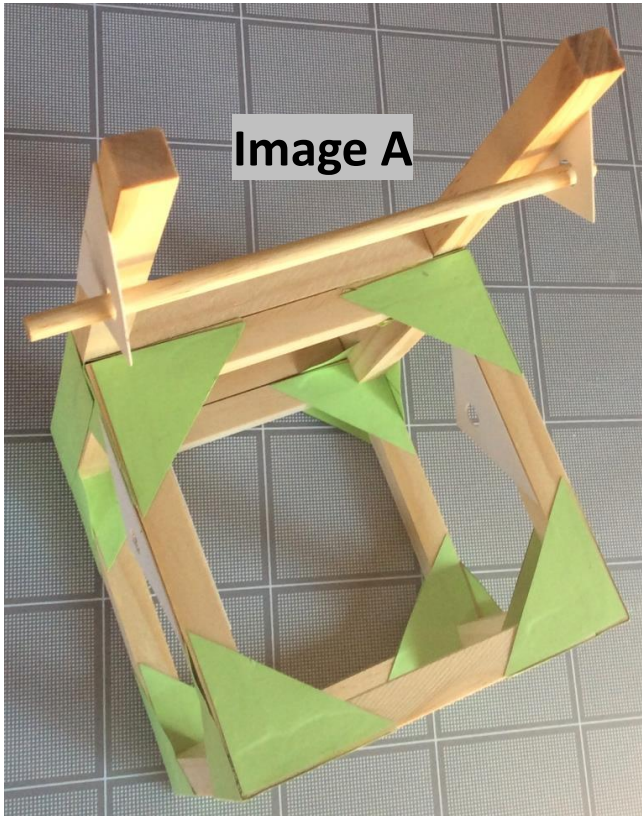
- Glue 2 more axle holders to the two **inside edges** for reinforcement (see photo)
- Make sure the holes line up and **let glue dry**

Example
of Axel
holder on
inside
edge



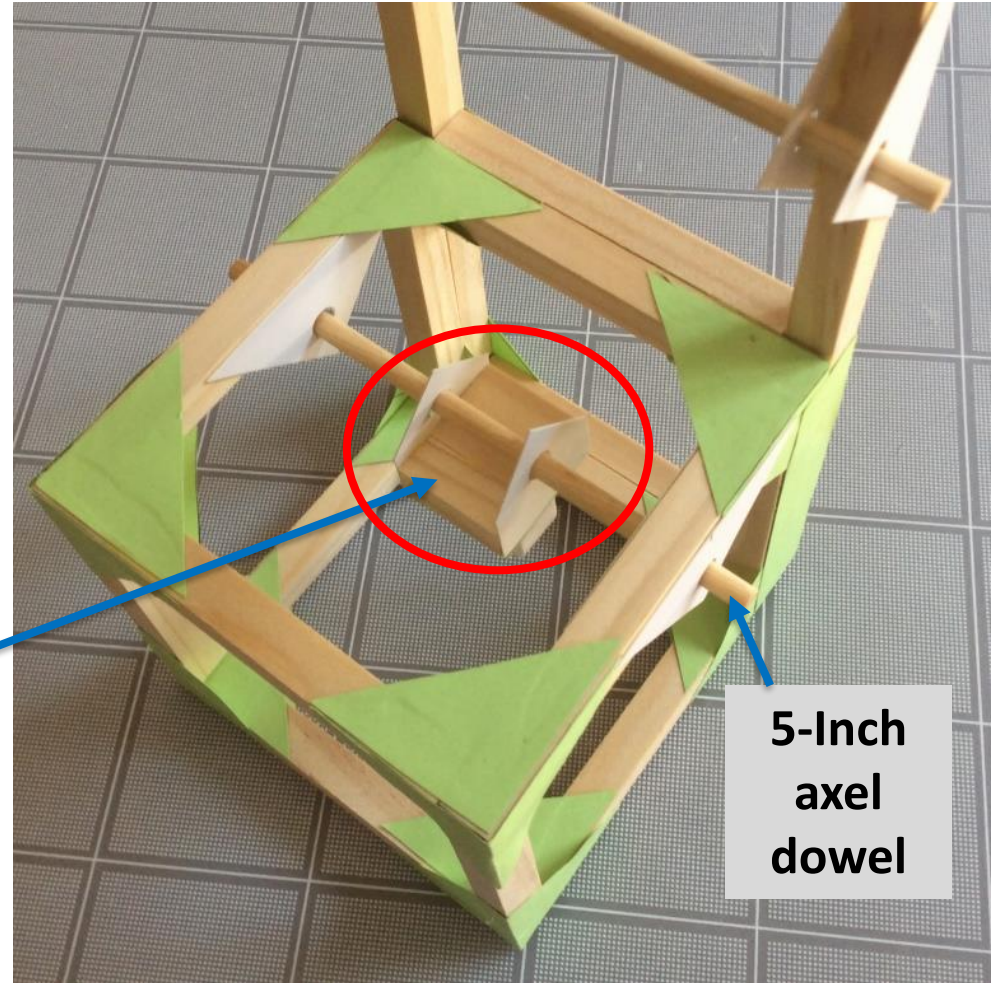
Build Cube's Lifter Supports

- Glue an axle holder onto the outside edges of both 8-inch uprights (**image A**)
- Center of the hole is 1½-inches below the top of uprights and points toward the cube
- Glue two more axle holders to the inside edges of the uprights (**Image B**). Line-up the holes so a 5-inch axel can easily go through them.



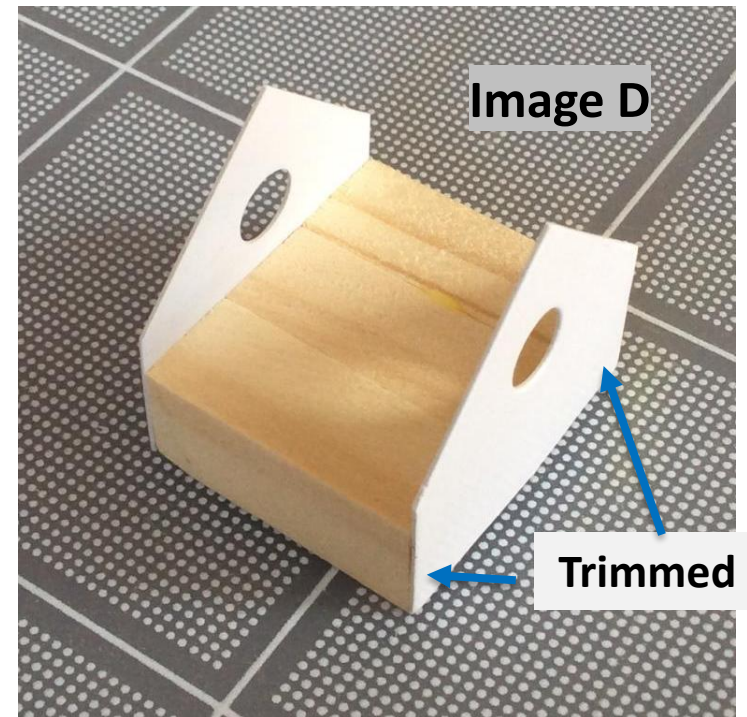
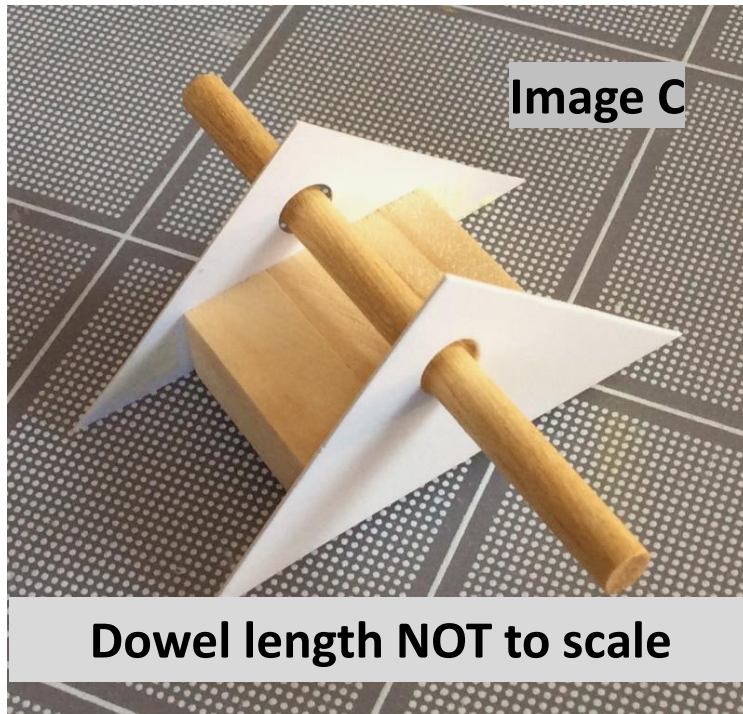
Build Cube's Lifter Supports

- Once glue is dry on the axel holders attached to the 8-inch uprights, test the alignment using a 5-inch axle. Ensure the axel rotates smoothly in the holes
- Next create the syringe platform shown, which is supported by a 5-inch axel. Pay attention to its position. See next page for build directions.



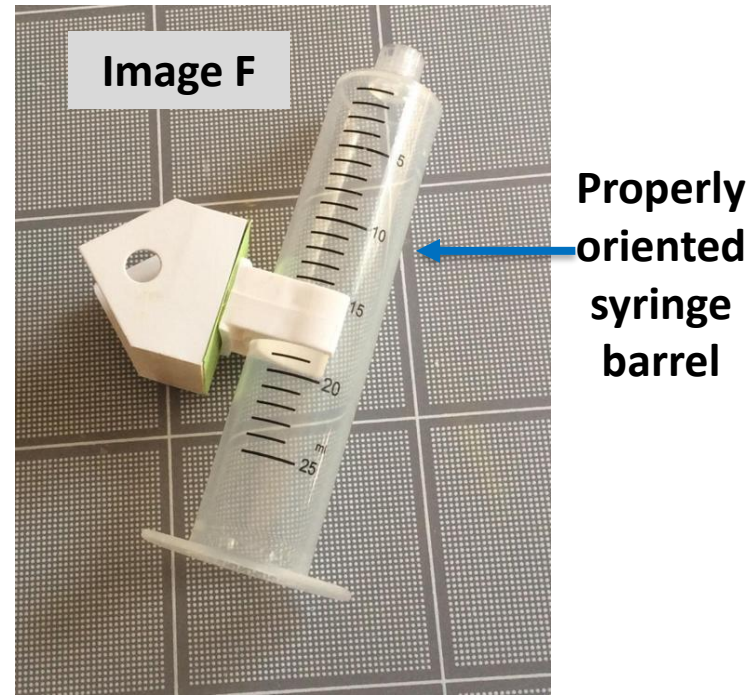
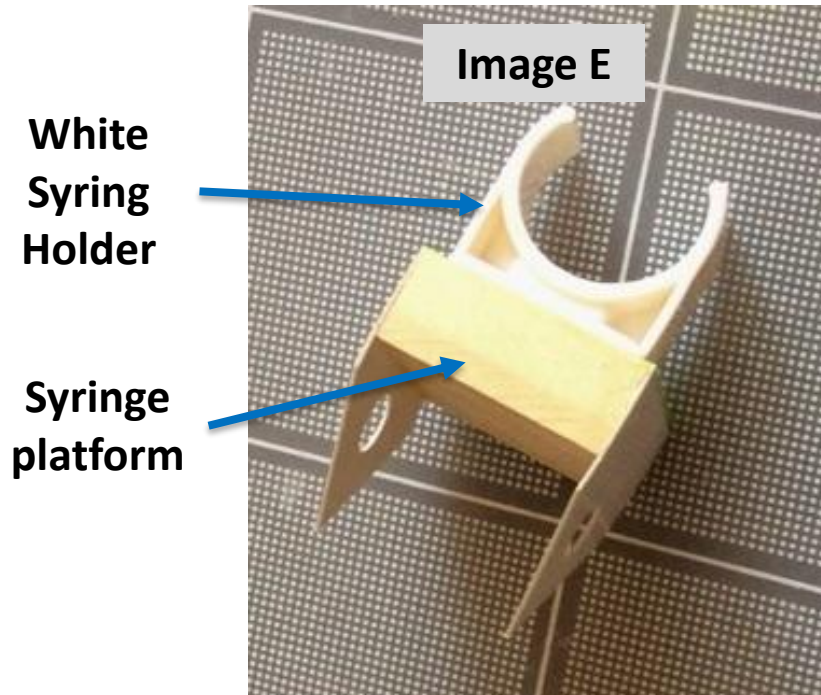
Build Syringe Platform

- Glue the three 1-inch long wooden pieces side-by-side to make the platform (**Image C**).
- Glue two axle holders to opposite sides; trim excess (**Image D**).
- Platform will support a white syringe holder for the lifter arm.



Create Syringe Platform

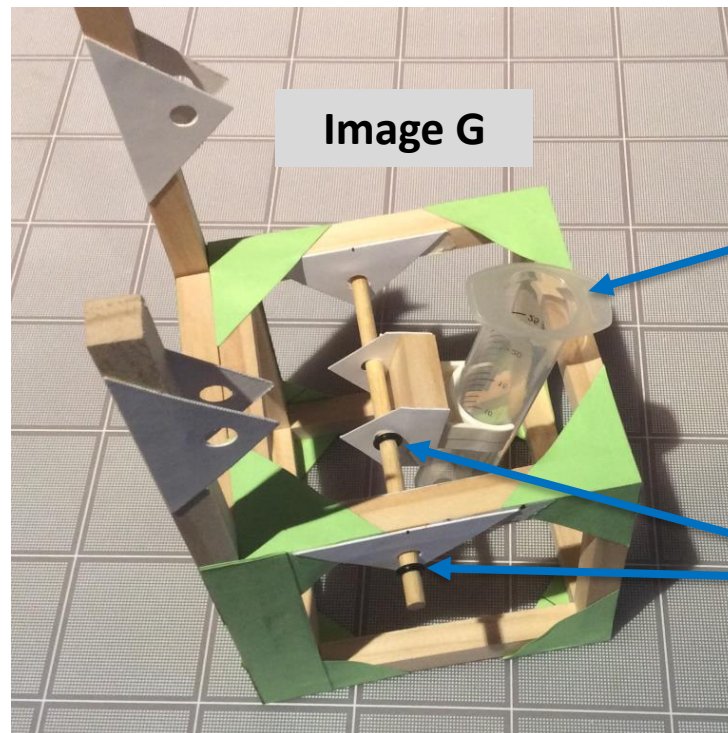
- Find the white piston syringe holder and strip the backing from it to uncover the “sticky pad.” Next, secure the syringe holder to small platform by aligning the “sticky-side” on the small platform and pressing it in place (**Image E**).
- Properly orient and place the barrel of the syringe (**plunger not inserted**) into the white holder so that the clip aligns with 15cc mark (**Image F**).



Mount Syringe Platform

- **(Image G)** slide a 5-inch an axel dowel halfway into structure and mount the syringe platform onto the dowel. Make sure the syringe barrel's flange lip points up.

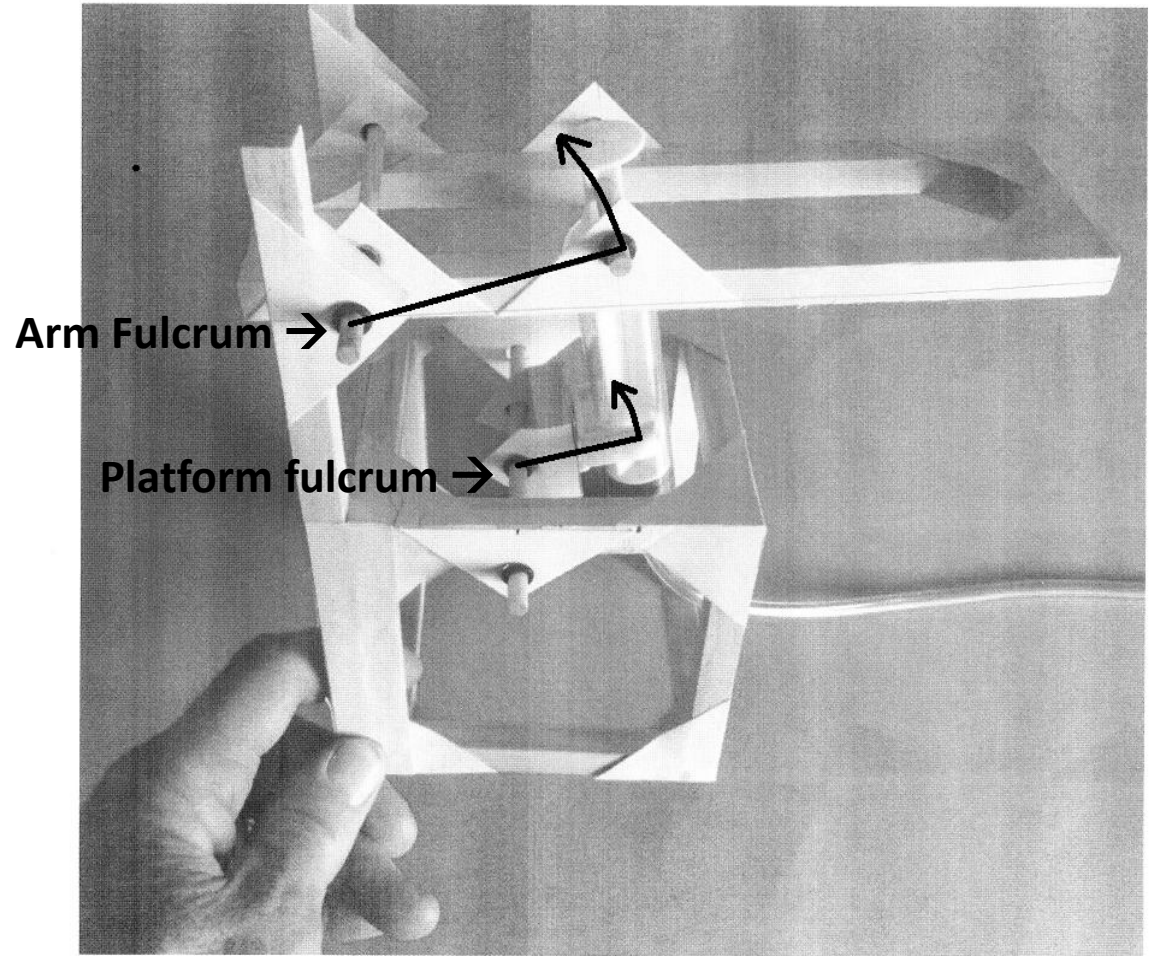
Once in place, secure the dowel and platform with four mini-washers - two securing the syringe platform and two securing the axle ends on the outside of the structure **(Image H)**.



Tip: Syringe Mounting

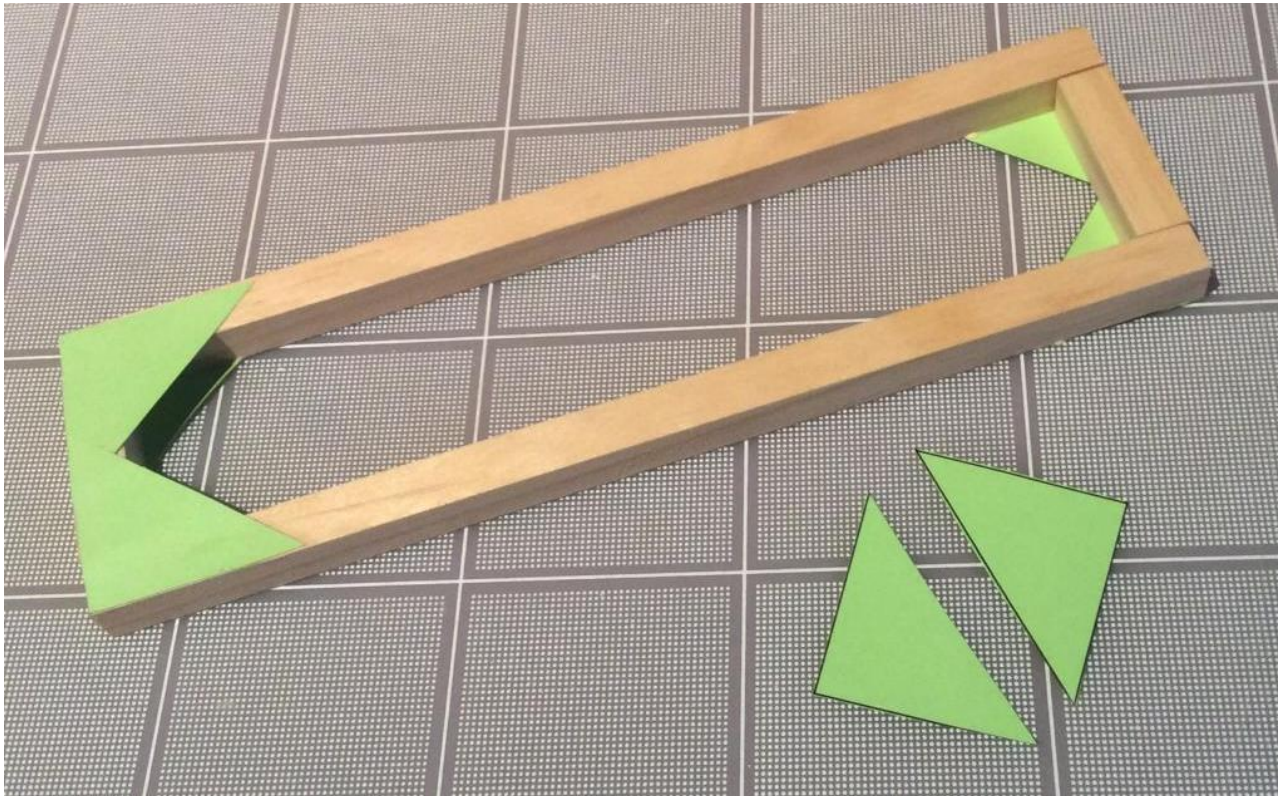
THE NUMBER #1
REASON THE CLIP
TEARS FROM ITS
BASE...

AS THE ARM TURNS SO
MUST THE PLATFORM
IT IS MOUNTED ON



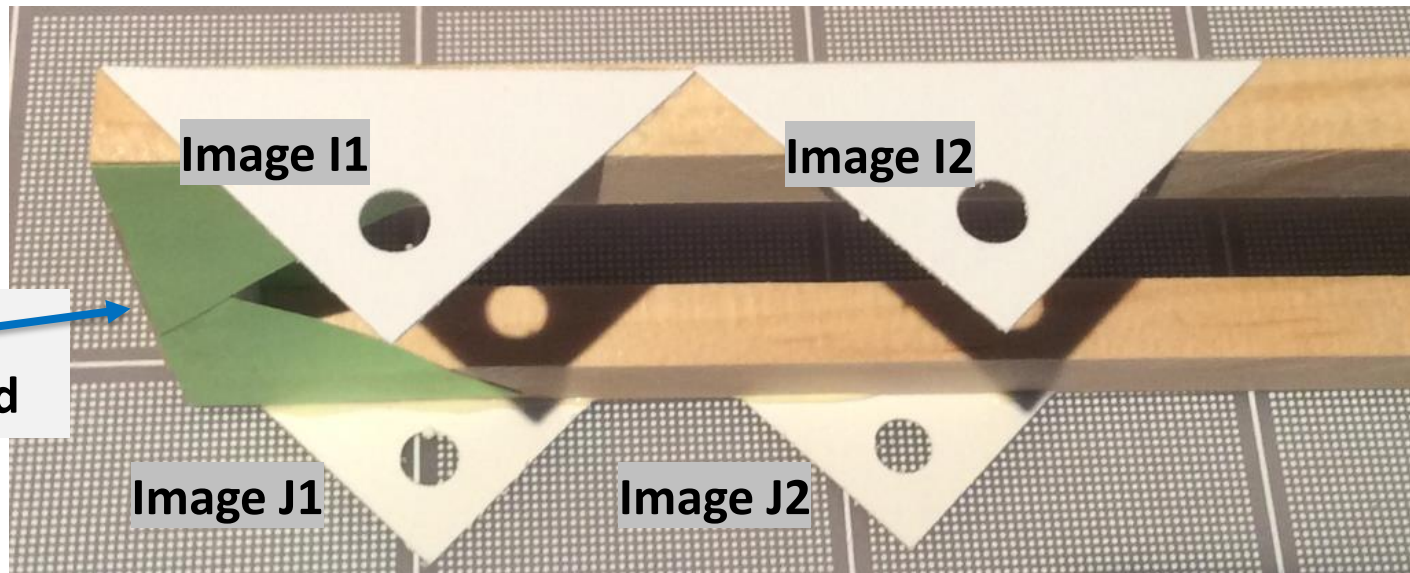
Build the Lifter Arm

- Make the arm by connecting two 8-inch wooden pieces and two 1 ½-inch wooden pieces
- Use 8 paper corner gussets – four on each side (top and bottom)



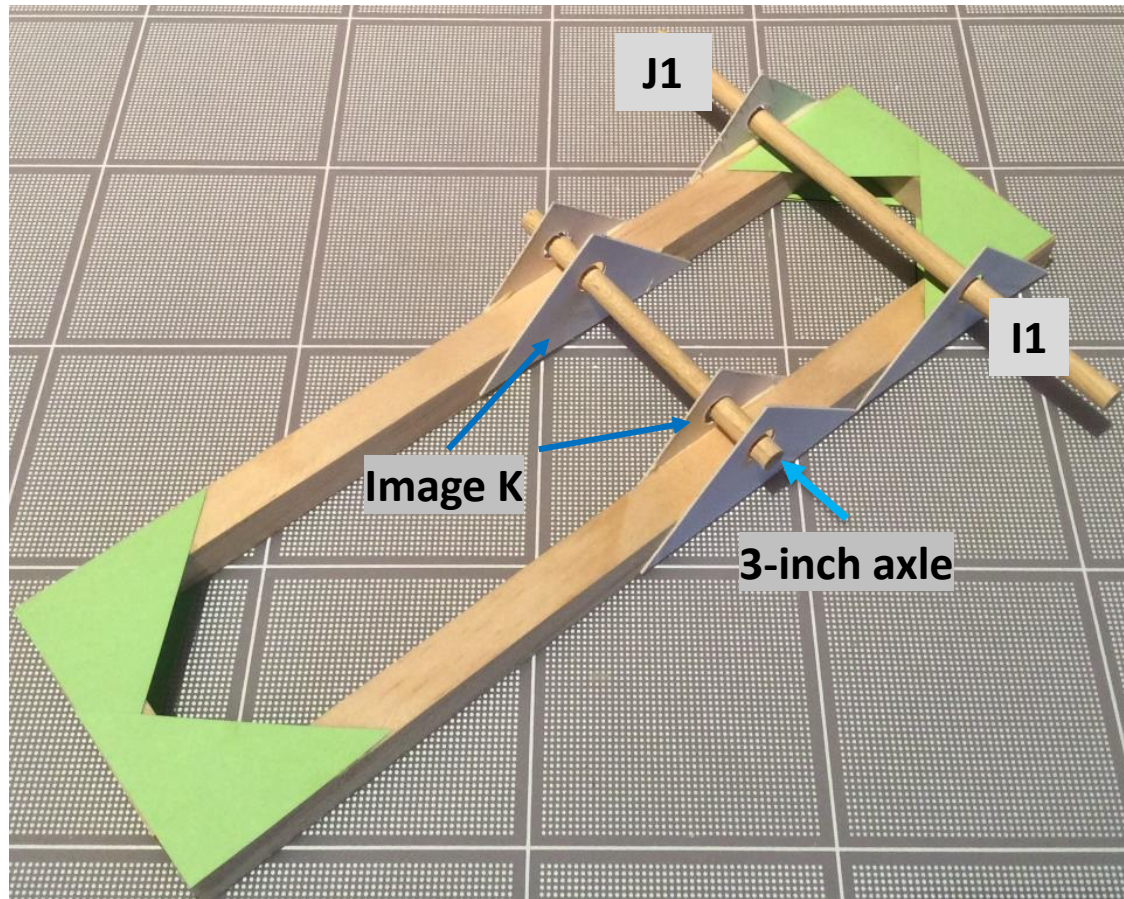
Build the Lifter Arm

- On the arm frame, glue an axle holder (**I1**) on the outside near the closest end. The smallest angle touches the frame's corner. Glue a second axle holder (**I2**) next to it.
- Use a **5-inch** axle dowel to align and glue another set (**J1 & J2**) of axle holders across from I1 & I2 on the frame's opposite outside edge. Temporarily insert an axle into **I1 / J1 AND I2 / J2** to ensure the axle is parallel to frame's closest end (**see next slide**)



Build the Lifter Arm

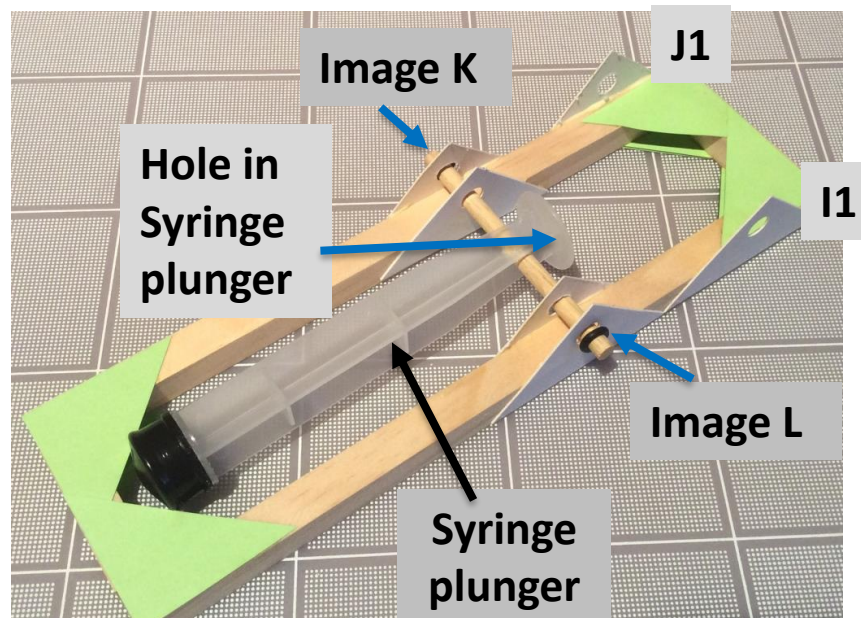
- Align and glue two more axle holders on the **inside** of the frame (**Image K**)
- Then, align the four axle holder holes with a 3-inch axle (**Image K**). Remove the axle after alignment.



A 5-inch axle will eventually go into axel holes I1 & J1

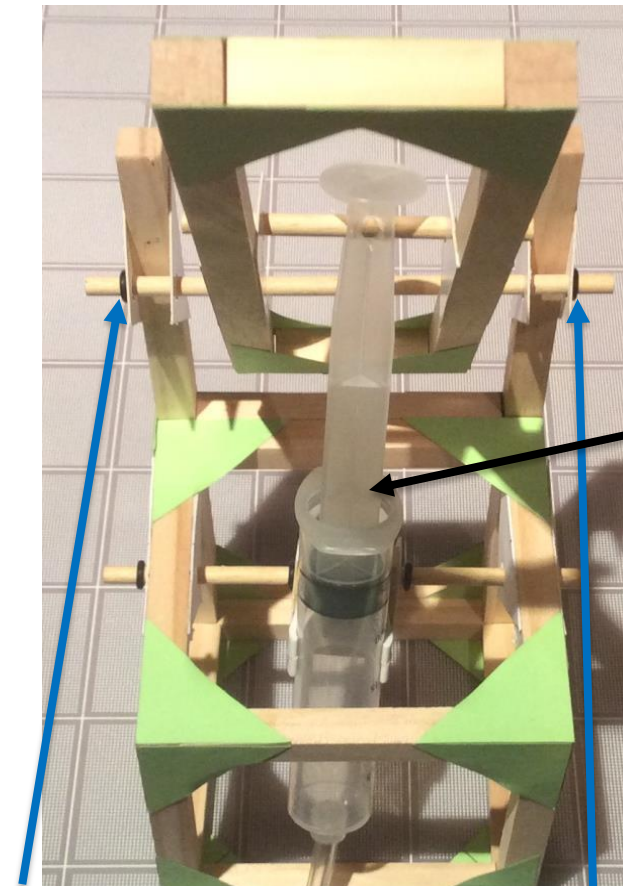
Build Lifter Arm

- Identify the syringe with a hole drilled in its plunger (see photo).
- Prepare to insert the 3-inch axle through the hole in the plunger (see photo).
- Starting on one side of the lifter arm, insert the 3-inch axle through the first set of double axle holders (**Image K**); then, through the plunger; and finally, through the second set of double axle holders.
- Secure both protruding ends of the 3-inch axle with mini-washers (**Image L**).



Connect Lifter Arm & Cube

- Position the end of the lifter arm that has axel holders between the two 8-inch uprights.
- Insert the syringe plunger (connected to the lifter arm) into the syringe barrel attached to the cube's syringe platform (see image).
- Reposition the lifter arm so the two open axel holder holes (**J1 & I1**) align with the four open axel holder holes on the 8-inch uprights.
- Next, insert the 5-inch axle through the holes. **This connects the lifter and cube.**
- Use two mini washers to secure the 5-inch axle (see image).



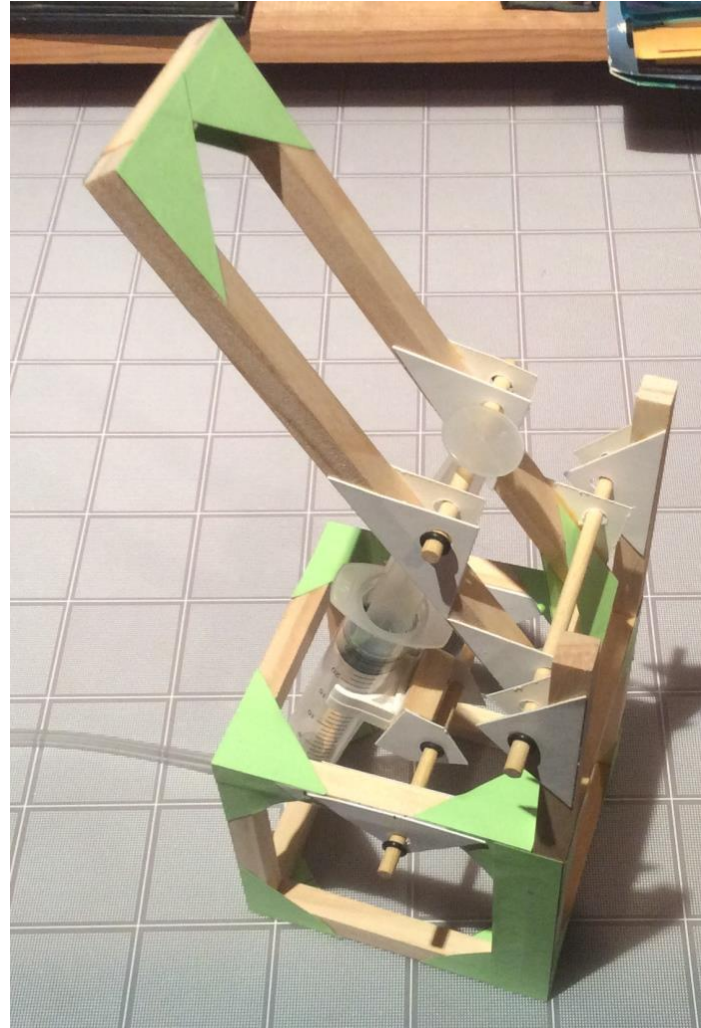
Insert
syringe
plunger
into
syringe
barrel

5-inch axle inserted though 6
axel holder holes and secured
with mini washers.

Connect Tubing & Operate Device

- Find and attach the plastic tubing to the open end of the syringe that's connected to the syringe platform.
- Make sure the syringe plunger connected to the platform is extended and in the “open” position” (see image). If not, pull the plunger to near the top of syringe barrel to open it (see image).
- Find and attach the 2nd syringe to the open –end of the tubing. Using the 2nd syringe, push the plunger down to operate the device.

Congratulations, you are done!



**Extended
syringe
plunger
in the
“open
position.”**