

# Yeast Mobile

Build Guide



Page 1

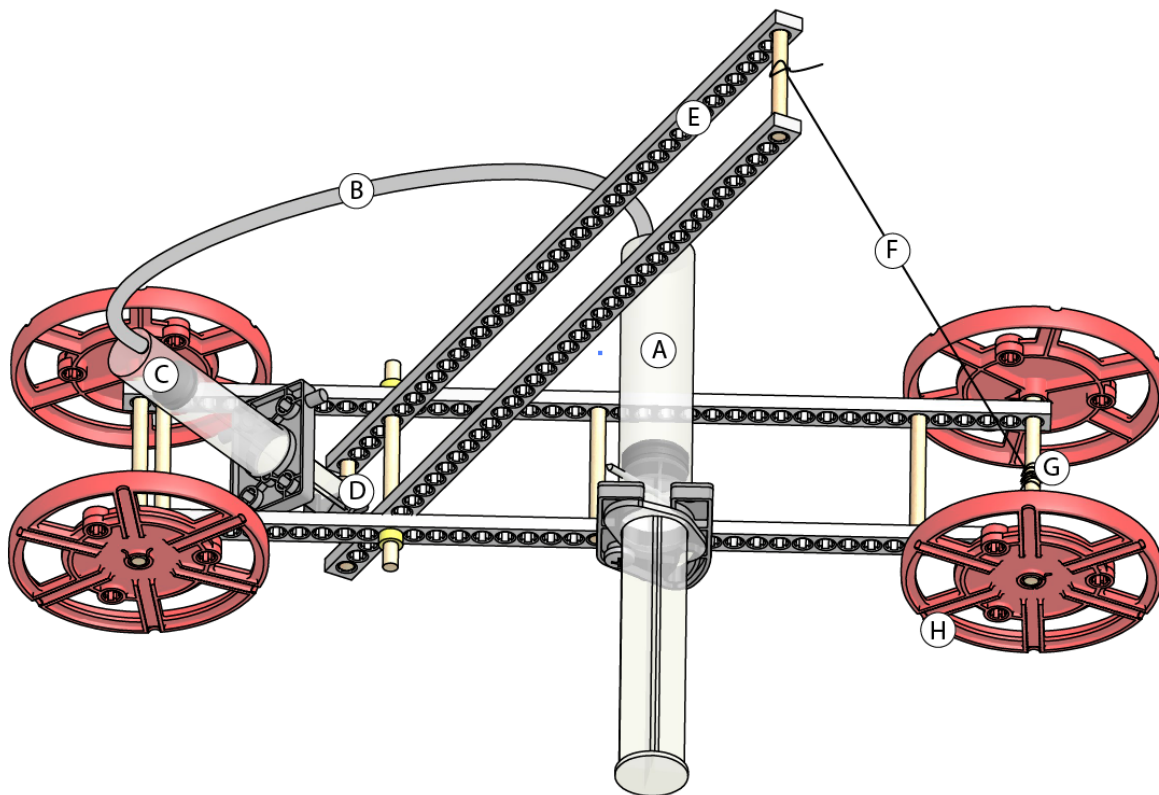
This guide will take you through the process of creating an example yeast mobile.

Customize your student's engineering experience; the MS-Word version can be edited to fit your classroom, where you can choose to provide students with some or all of the instructions. Download it here: [http://www.teachergeek.org/yeast\\_mobile\\_build.docx](http://www.teachergeek.org/yeast_mobile_build.docx)

Race your yeast mobiles when they are done. Challenges: Distance, Speed (first to travel 2ft).

## How does the example yeast mobile work?

Note: this is an example. Students yeast mobiles should incorporate unique design solutions.



- A. Pressure is created by the production of gas in chamber A
- B. Pressure transfers to chamber C through line B (Pascal's law)
- C. Pressure in chamber C forces piston D down
- D. Lever Arm E trades force generated by piston D for Distance (pulling string F)
- E. String F wraps around Axle G, so when string F is pulled it unravels the and turns axle G.
- F. Axle G is connected to the wheels (H). The wheels turn when Axle G turns.

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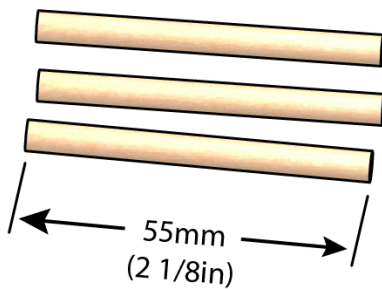
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## Concepts:

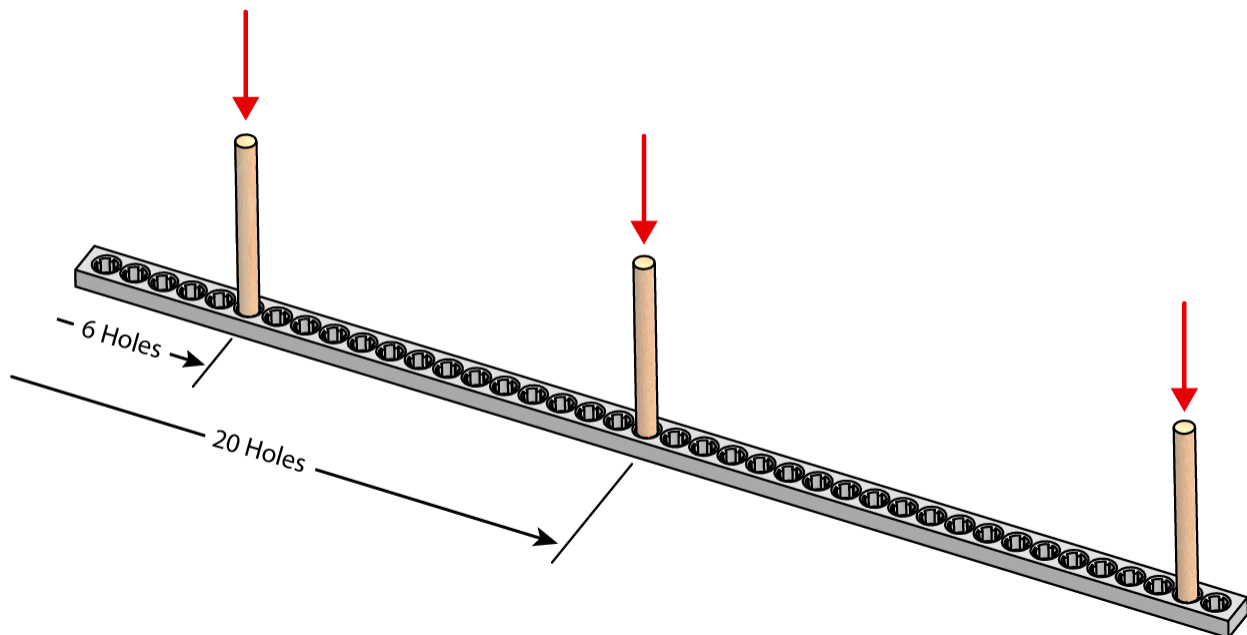
Simple Machines

## Build Instructions:

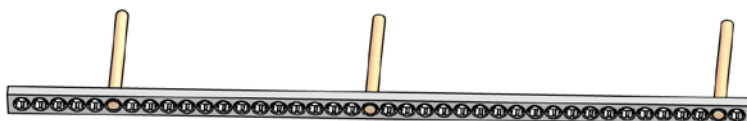
**Step 1:** Cut Three 55mm (2 1/8in) dowels.



**Step 2:** Push or tap the dowels into a full connector strip as shown.



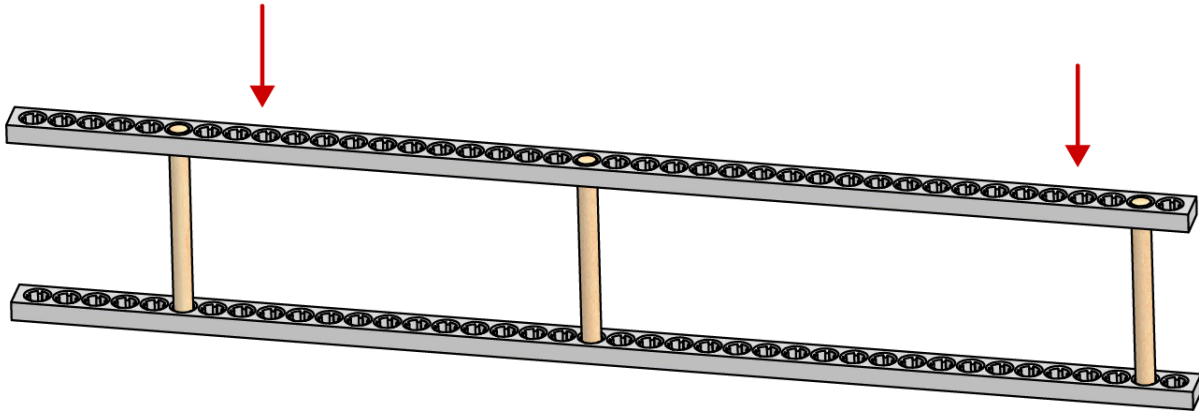
It should look like this when you are done:



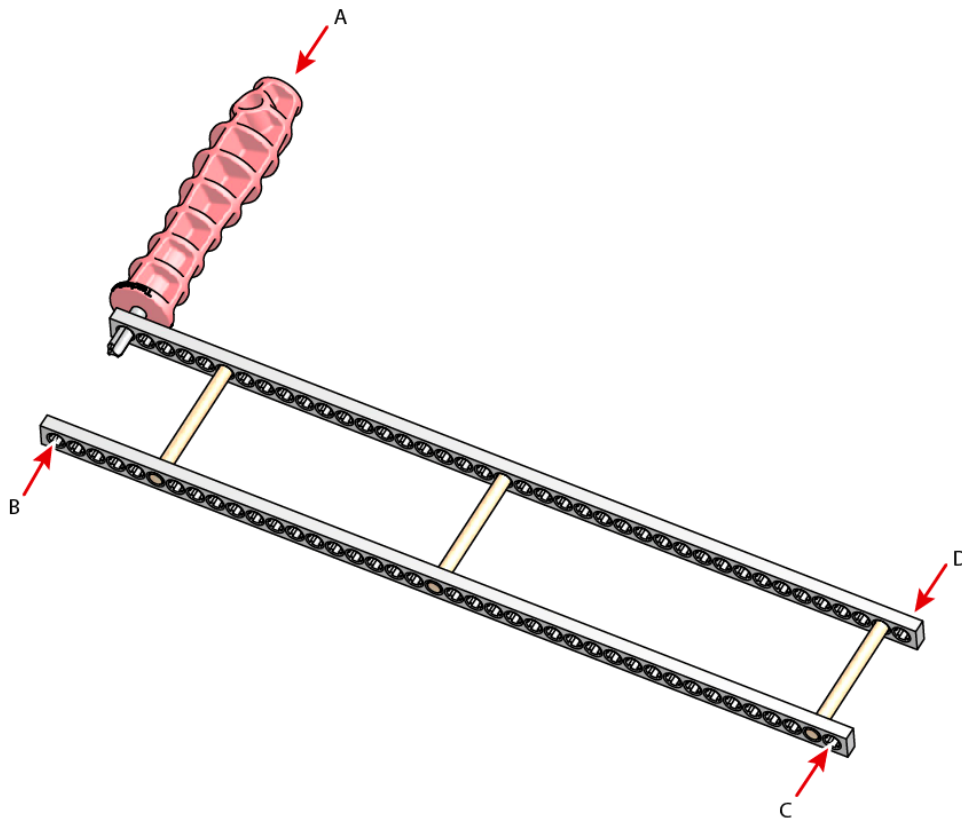
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**Step 3:** Place a second connector strip on to the assembly from Step 2 as shown.



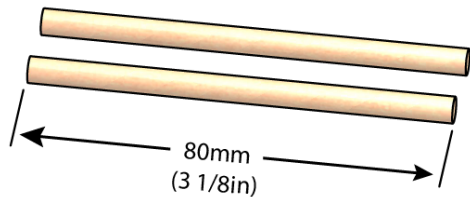
**Step 4:** Ream holes marked A, B, C and D below.



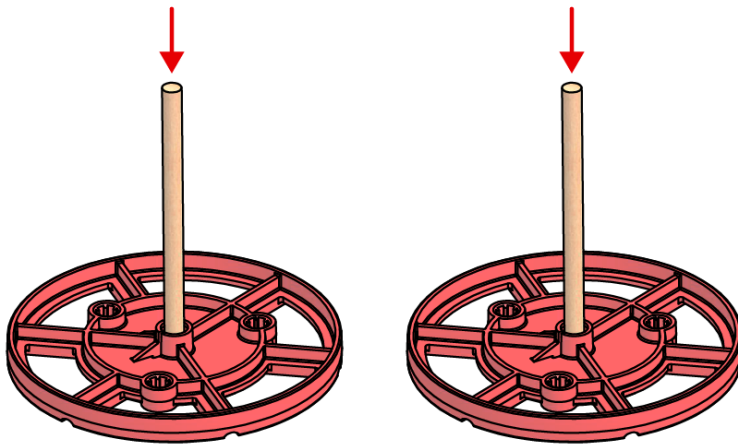
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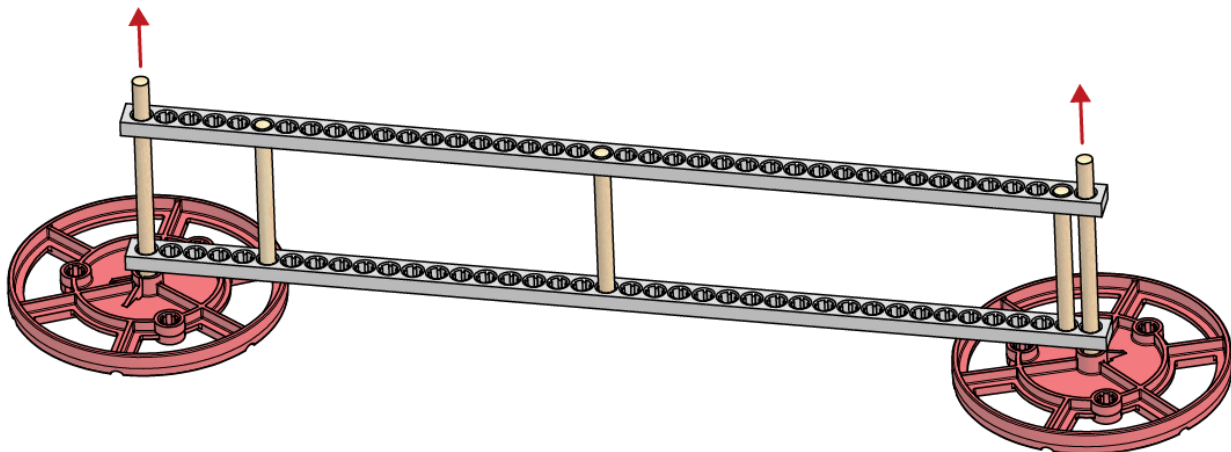
**Step 4:** Cut two 80mm (3 1/8in) dowels



**Step 5:** Push/tap the dowels from Step 4 into wheels.



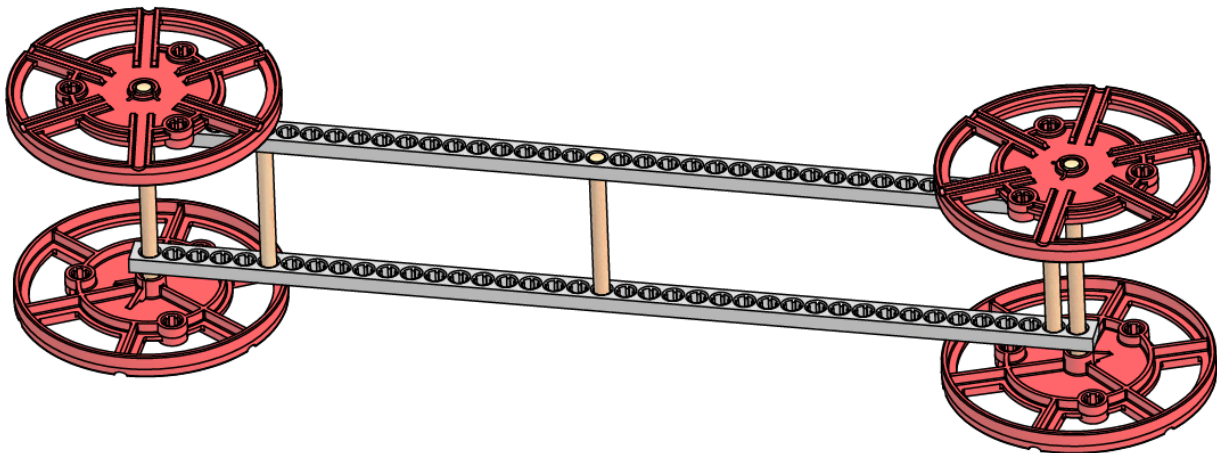
**Step 6:** Insert the wheel assemblies from Step 5 into the frame from Step 4.



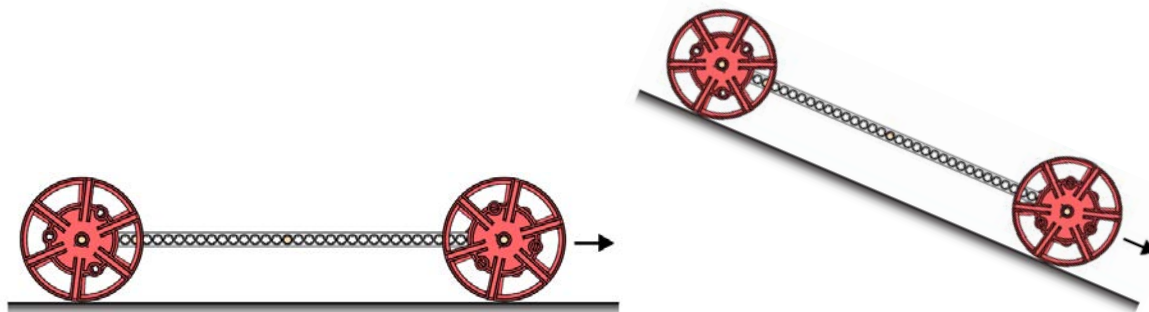
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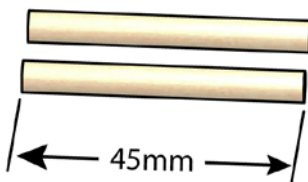
**Step 7:** Push/tap two more wheels onto the wheel assemblies from Step 4.



**Step 8:** Give it a roll. Make sure your yeast mobile frame is working properly, and that it will roll with the least resistance. Examine: Friction, Alignment



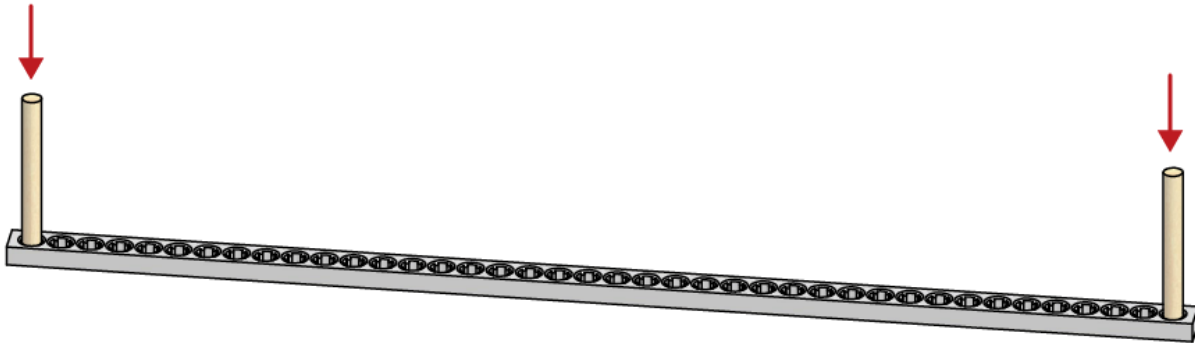
**Step 9:** Cut two 45mm (2 3/4in) dowels.



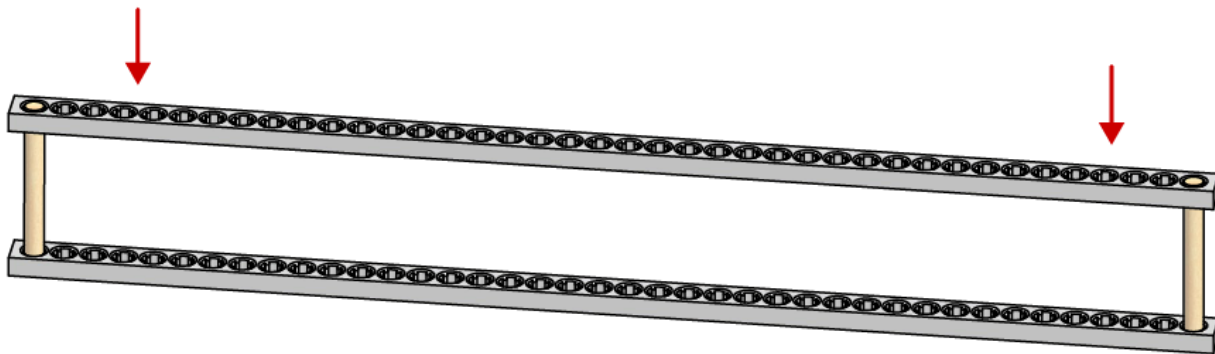
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**Step 10:** Push/tap the dowels from Step 9 into a new full connector strip.



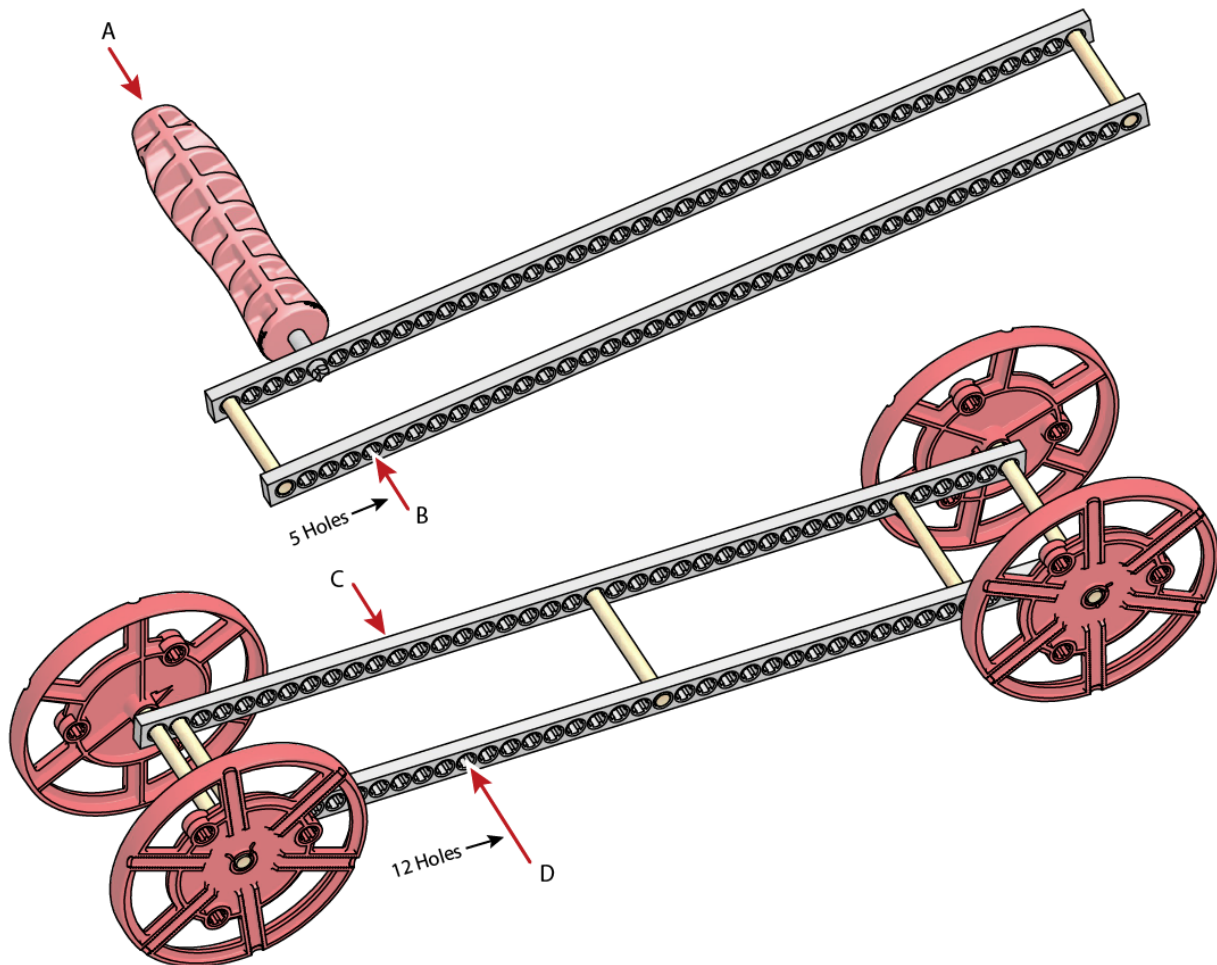
**Step 11:** Push/tap a new full connector strip onto the dowels from Step 10.



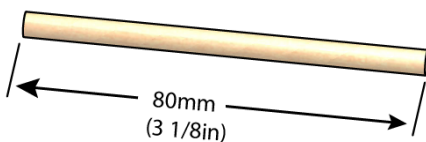
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**Step 12:** Ream holes A, B, C, and D in the frame and arm assembly created in Step 11. The reamed holes will become a pivot point (fulcrum) for the lever arm.



**Step 13:** Cut one 80mm (3 1/8in) dowel.

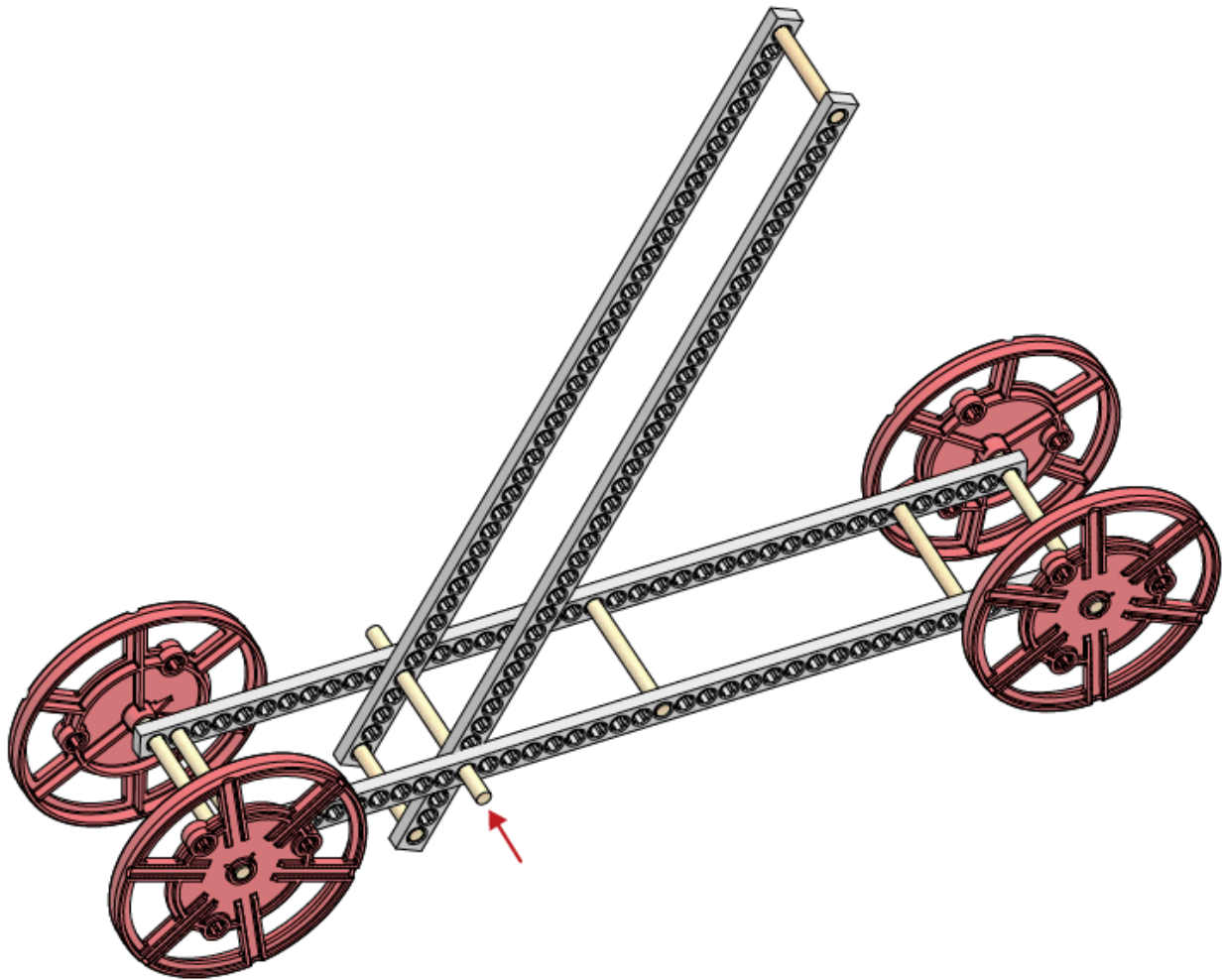




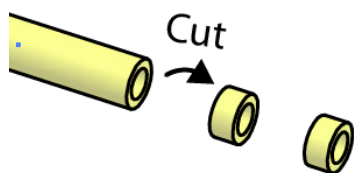
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**Step 14:** Slide the dowel from Step 13 through the holes reamed in Step 12.



**Step 15:** Cut two 3mm (1/8in) sections of slide stop.

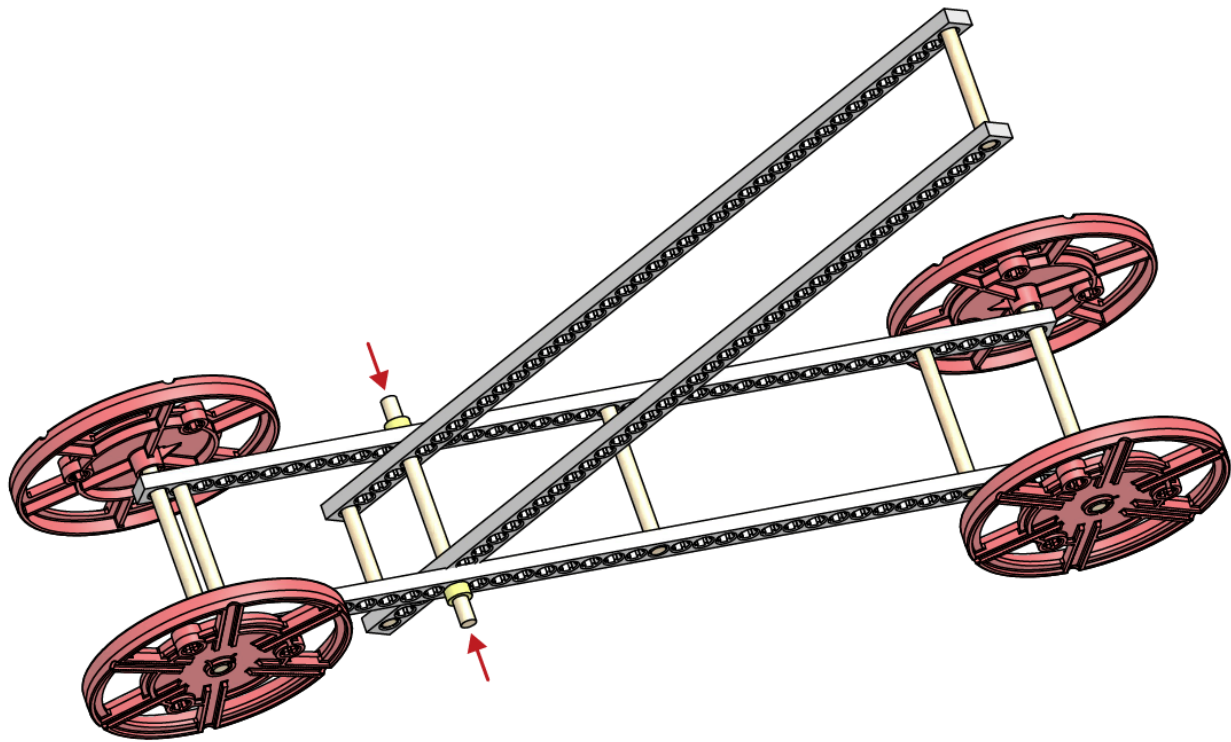




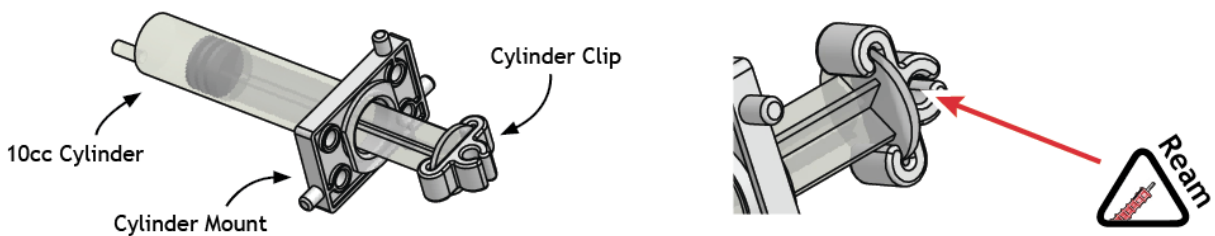
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**Step 16:** Secure the loose dowel with slide stop sections from Step 15.



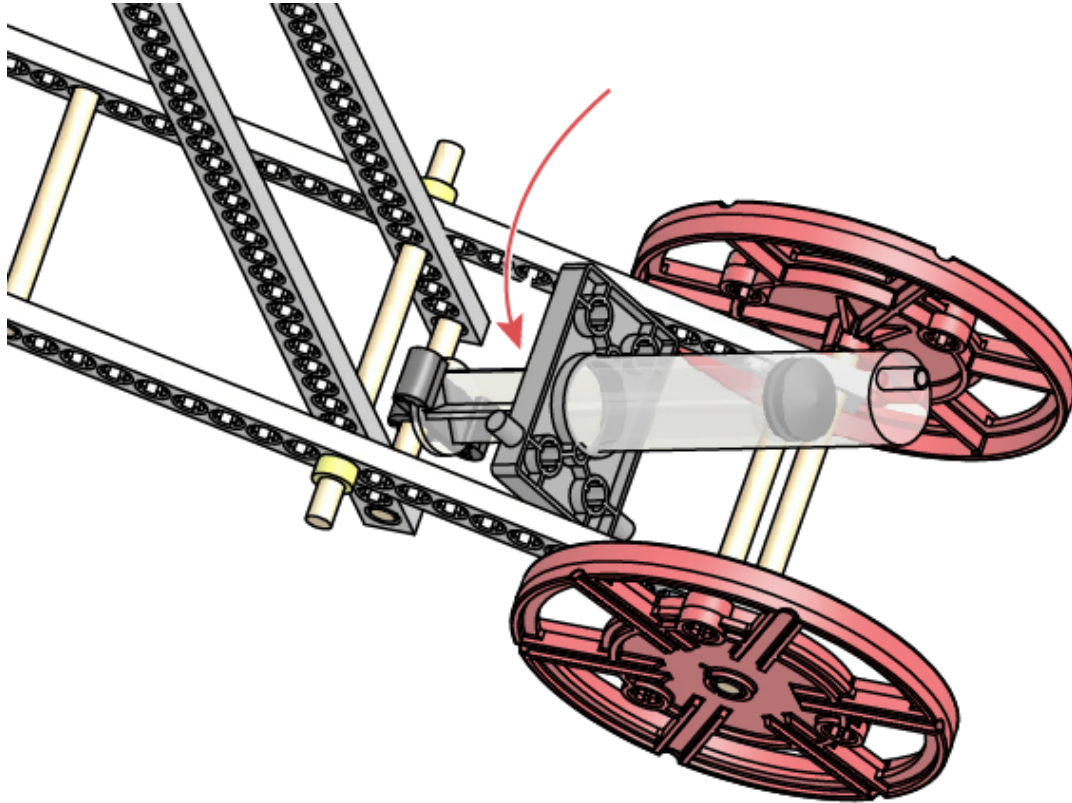
**Step 17:** Assemble the 10cc the cylinder as shown.



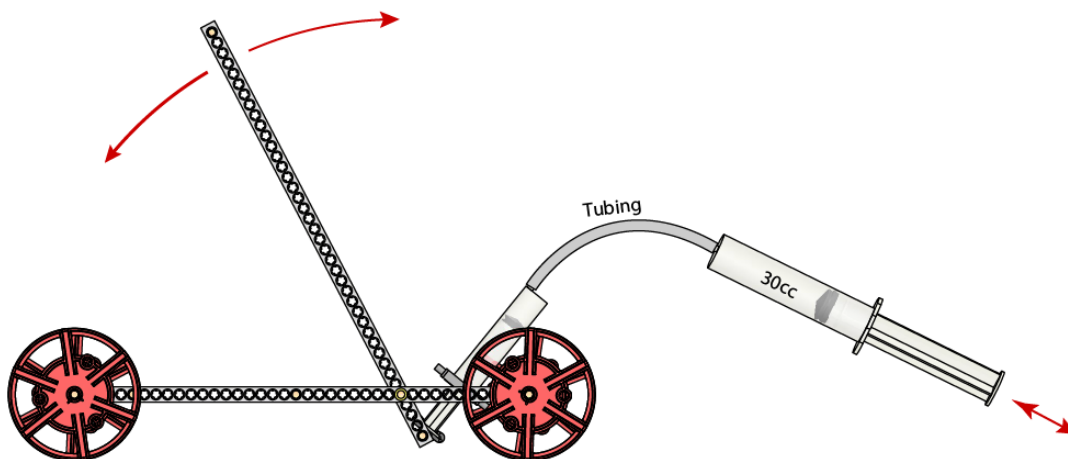
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**Step 18:** Attach the cylinder assembly from Step 17 to the frame and arm.



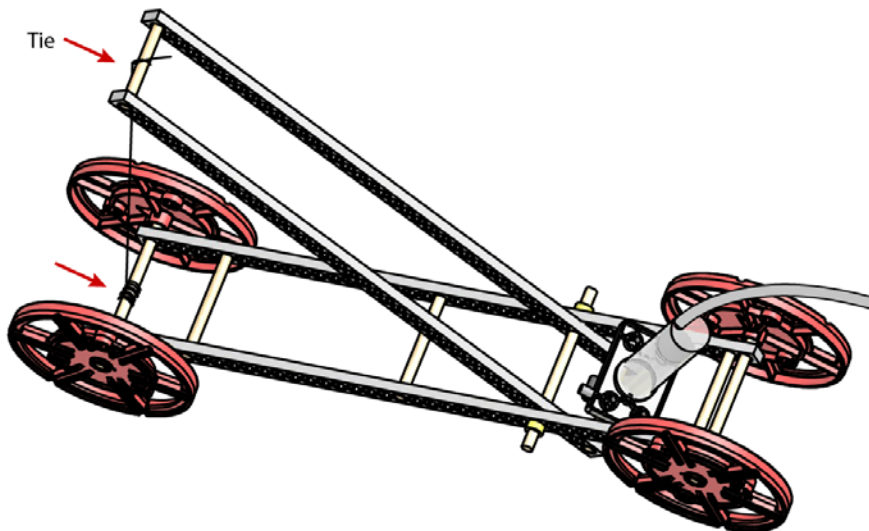
**Step 19:** Use a 150mm (12in) section of tubing to connect the 10cc cylinder to the 30cc cylinder.  
Experiment: Move the cylinders and lever arm. Discover the mechanical advantages.



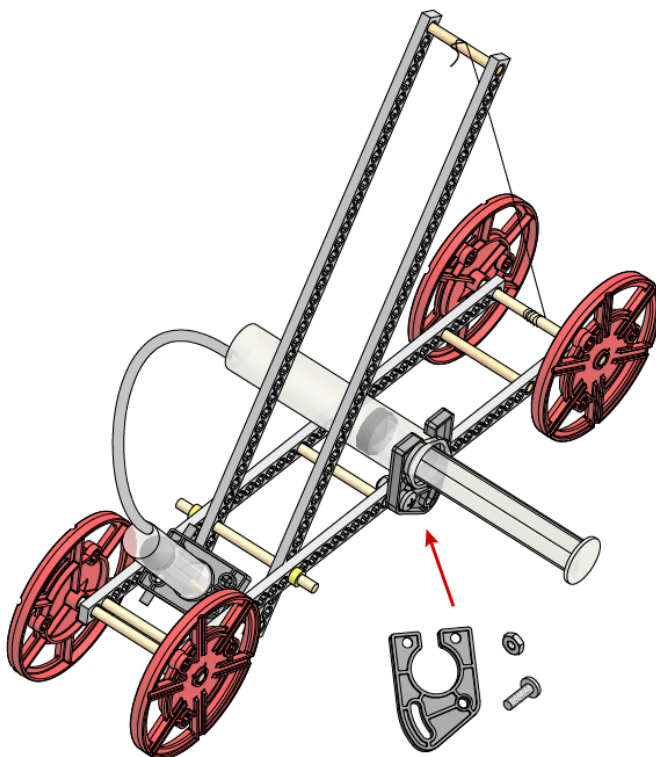
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**Step 20:** Attach a string (not supplied) to the lever and wheel axle. The string should be long enough so that it continues to unwind as the lever arm moves away from the axle.



**Step 21:** Attach the 30cc cylinder to the frame using a mount, screw and nut.

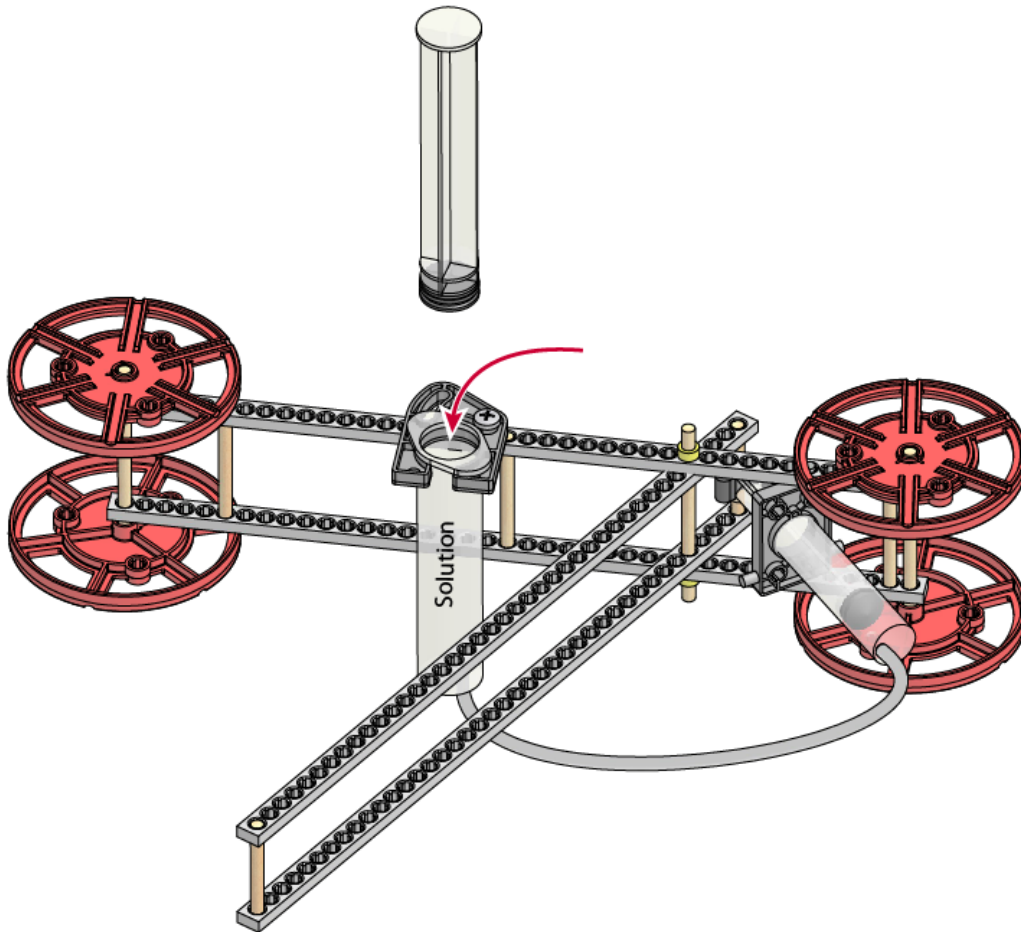


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## How will it work?

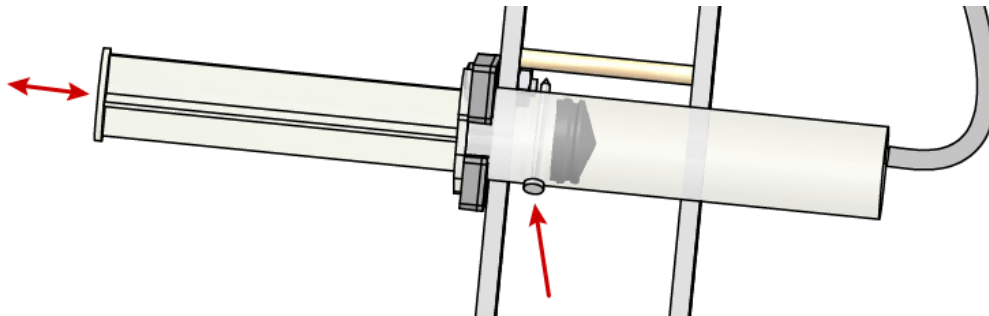
Wind the string on the axle, pulling the lever arm down. Remove the piston from the 30cc cylinder. Add a yeast, or other gas producing solution. Quickly replace the piston. The expanding gas should transfer to the 10cc cylinder and cause it's piston to push outward.



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**Problem:** The 30cc piston will want to pop out from pressure inside the cylinder. Solution: Find a way to secure the piston so it cannot pop out. The picture below shows a nail placed through a hole to secure the piston.



**Engineer:** Now it's time to test, modify and improve your yeast mobile. You have constructed the example design, but it is not the best design or configuration. Ideas: Experiment with mechanical advantage by changing where the piston and string attach on the lever. Create a new frame configuration. Develop the ideal yeast solution (food, water, temperature) through scientific method.

