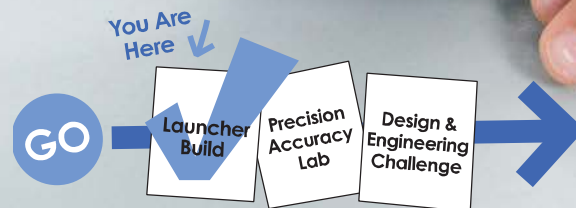
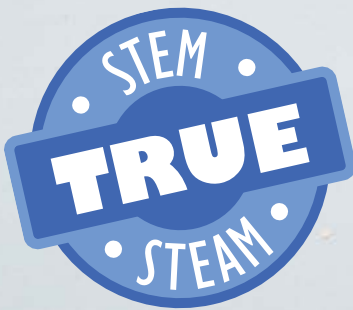




# Projectile Launcher Basic Build Guide



Start by building the example launcher, then turn it into **your own** unique design.



Download documents at [teachergeek.com/learn](https://teachergeek.com/learn)

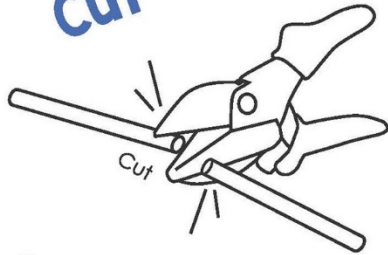
For use with TeacherGeek [Projectile Launcher Activity](#), or [Maker Cart](#) available at [teachergeek.com](https://teachergeek.com).



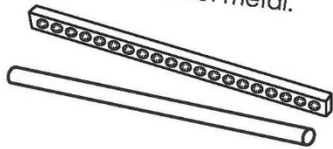
# Projectile Launcher Basic Build Guide



## Cut



**Multi-Cutters** cut wood & plastic (like **dowels** and **connector strips**). They do not cut metal.

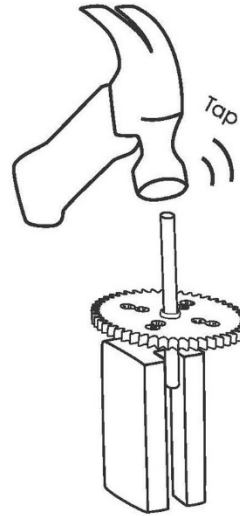


## Push, Wiggle,

Push, wiggle or tap **dowels** into holes.



## Tap



Use a **hammer** and **slider block** to tap **dowels** farther through holes.

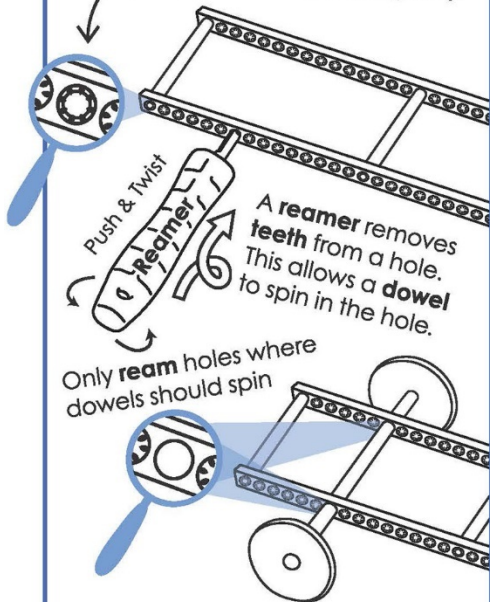
## Quick Tip!



Use a **crayon**, or **soap** on the end of a **dowel** to make building easier.

## Ream

Most parts have holes with **teeth**. The **teeth** hold **dowels** (keep dowels from falling out).



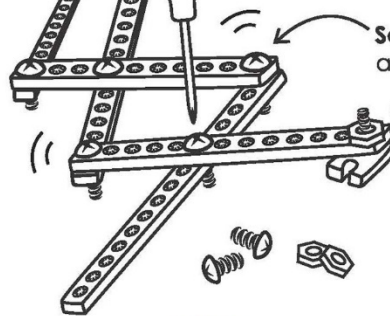
A **reamer** removes **teeth** from a hole. This allows a **dowel** to spin in the hole.

Only **ream** holes where dowels should spin

Never **ream** pulleys, gears, wheels, or any hole a **dowel** stays stuck into.

## Screws & Nuts

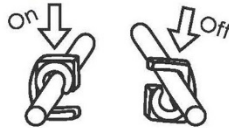
Do not **ream** holes you will put **screws** into.



**Screws (without nuts)** can connect parts, and allow them to rotate.

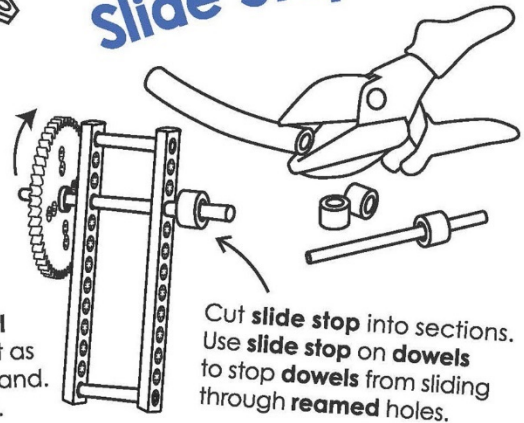
**Screws (with a nut)** can connect parts, and keep them from rotating.

## Stop Clip



Press a **stop clip** onto a **dowel** to keep it from sliding or use it as a hook for a string / rubber band. It takes little force to get it on.

## Slide Stop



Cut **slide stop** into sections. Use **slide stop** on **dowels** to stop **dowels** from sliding through **reamed** holes.



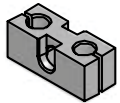
# Projectile Launcher Basic Build Guide



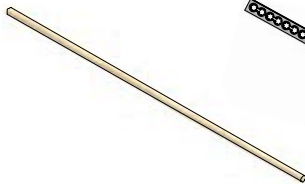
## TeacherGeek Components

For One  
Launcher

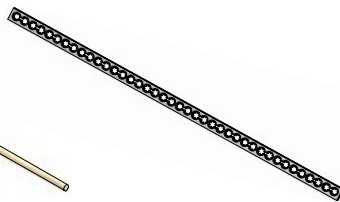
TeacherGeek components for the example projectile launcher, and extra pieces to turn it into your own unique design.



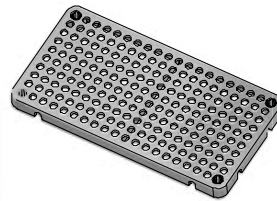
10 - Blocks



5 - Dowels  
30cm (12")



2 - Connector  
Strips



1 - Hole Plate



1 - Ping Pong  
Ball



2 - Nuts  
#10



2 - Lock Nuts  
#10



1 - 38mm  
Screw  
38mm (1½") #10



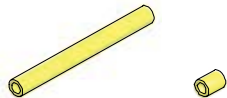
1 - 25mm  
Screw  
(1") #10



10 - Rubber  
Bands



2 - Stop Clips



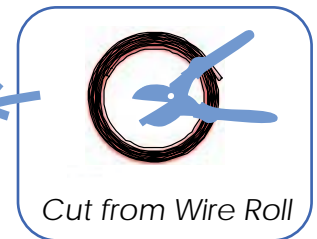
1 - Slide Stop  
76mm (3")



1 - Metal Wire  
7.5cm (3")



1 - Plastic  
Coated Wire  
8cm (3¼")



Cut from Wire Roll

► Components available in the TeacherGeek [Ping Pong Launcher Activity](#),  
TeacherGeek [Maker Cart](#), or at [teachergeek.com](http://teachergeek.com)



# Projectile Launcher Basic Build Guide



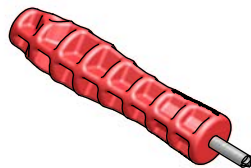
## TeacherGeek Tools You'll Need

Easy to Share  
in Groups

This isn't a kit. You're going to really build (cut, ream, screw) your launcher. Here are the tools you'll need.



**Multi-Cutter**  
[SKU 1823-81](#)



**Reamer**  
[SKU 1823-87](#)



**Screwdriver**  
[SKU 1823-90](#)



**Pliers**  
[SKU 1823-86](#)

Tools available at [teachergeek.com](http://teachergeek.com)

## Materials You Supply

You will need these non-TeacherGeek supplies:



**Tape**  
Masking, Painter's, Duct;  
Any kind of tape will work.



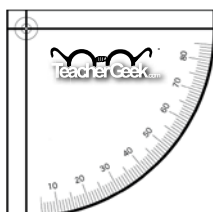
**Safety Goggles**  
Should be worn during  
the activity. Inventing  
can be projectile!



**Recycling  
Materials**  
Add to your design



**Scissors**  
For cutting out the  
protractor and  
recycling materials.



### TeacherGeek Protractor

Print on cardstock or thicker paper for a sturdier protractor.

Printable Protractor Download:

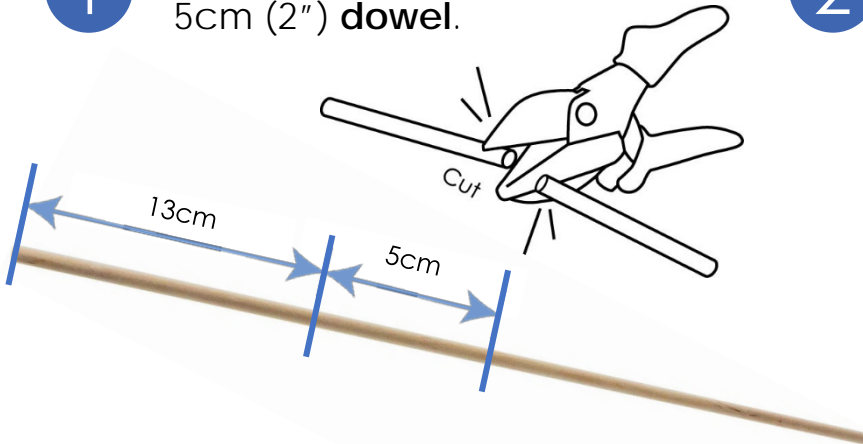
[http://teachergeek.org/protractor-angle\\_finder.pdf](http://teachergeek.org/protractor-angle_finder.pdf)



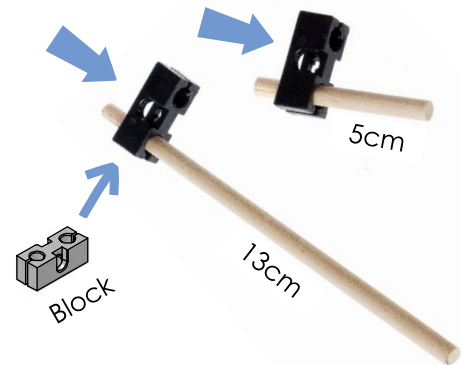
# Projectile Launcher Basic Build Guide

## Make the Launch Pad

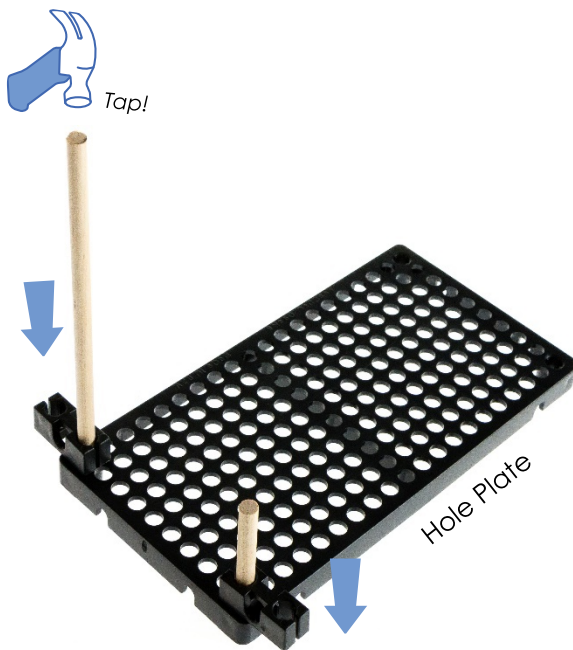
- 1 Cut a 13cm (5") and 5cm (2") dowel.



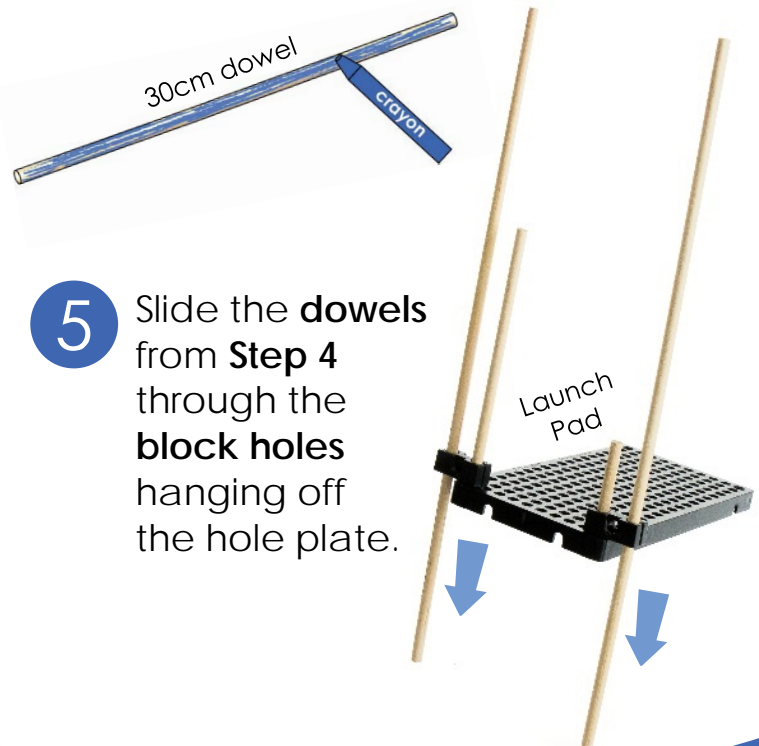
- 2 Push or tap each dowel from Step 1 into a block as shown, so the dowels stick out a little.



- 3 Push or tap the dowels from Step 2 into the hole plate, as shown.



- 4 Rub a crayon or bar of soap on two full (30cm) dowels. This helps the dowels slide.




- 5 Slide the dowels from Step 4 through the block holes hanging off the hole plate.

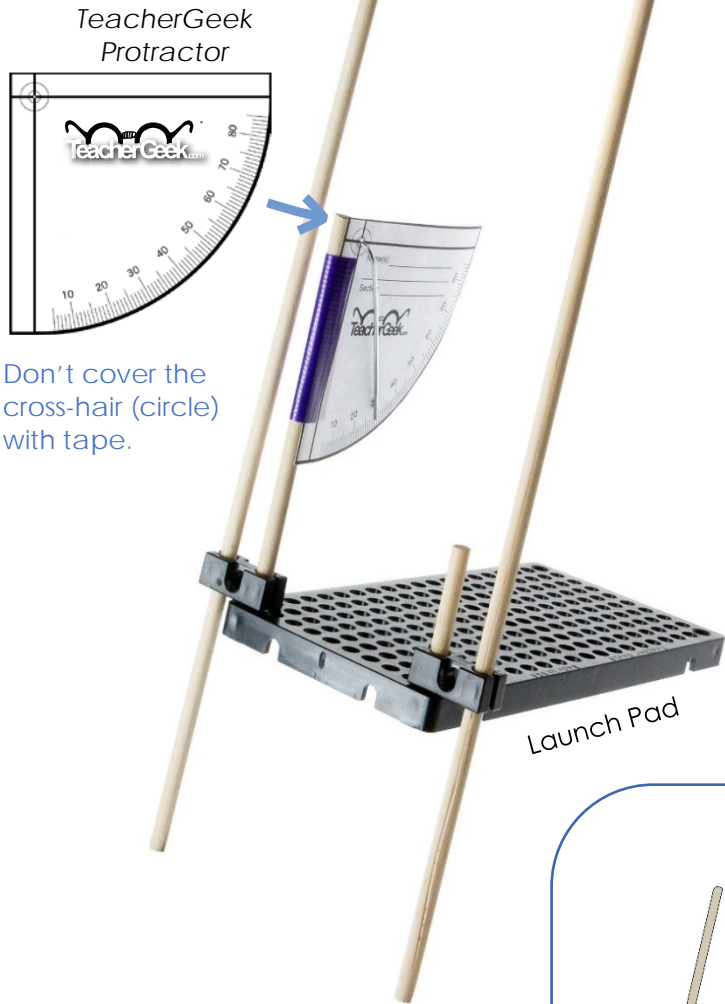


# Projectile Launcher Basic Build Guide

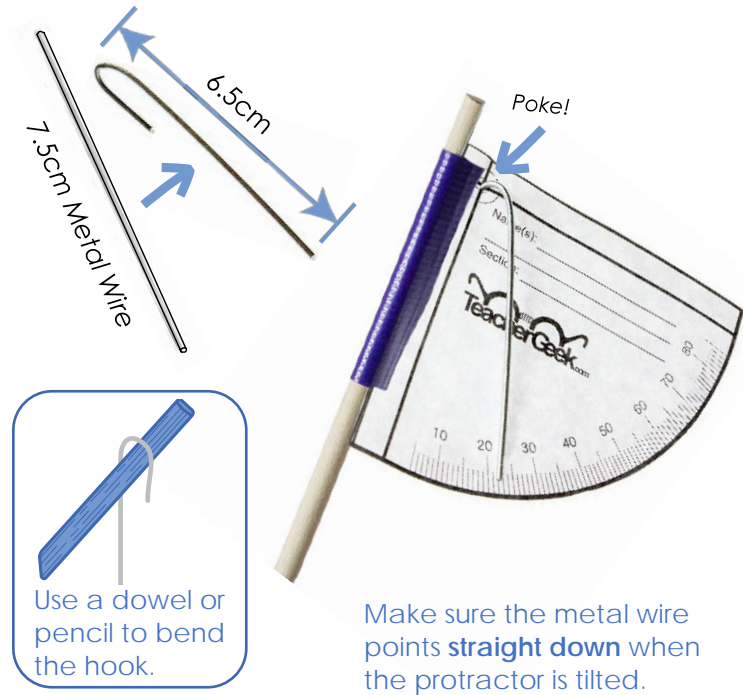


**6** Print, cut, and tape your **protractor** to the launcher, as shown.

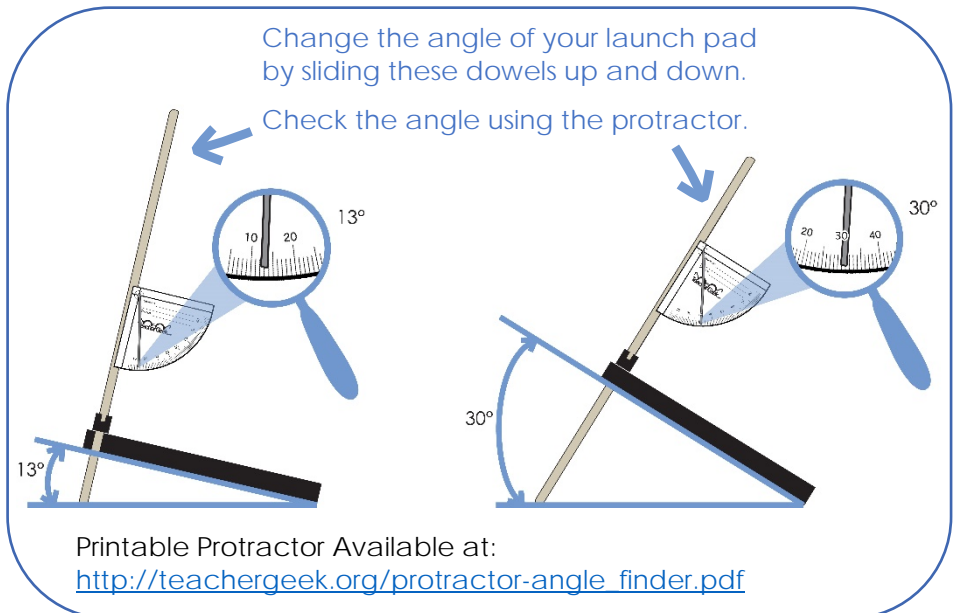
**7** Bend a 1.5cm hook on the 7.5cm **metal wire**. Poke it through the **protractor** at the . Hang it on the paper as shown.



Don't cover the cross-hair (circle) with tape.



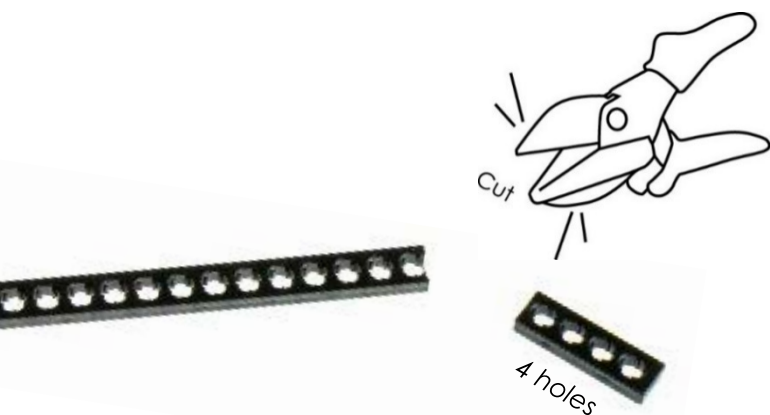
► **Congratulations!**  
Your Launch Pad is finished!  
Now, it's time to create the Launching Mechanism.



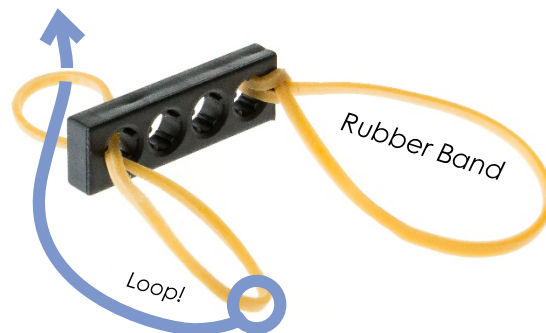


## Launch Mechanism

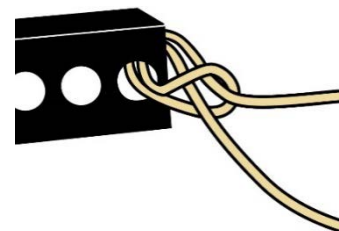
- 8 Cut a piece of **connector strip**, four **holes** long.



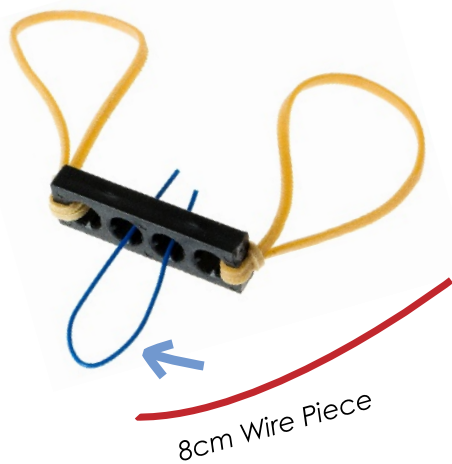
- 9 Loop a **rubber band** through each **hole** on either side.



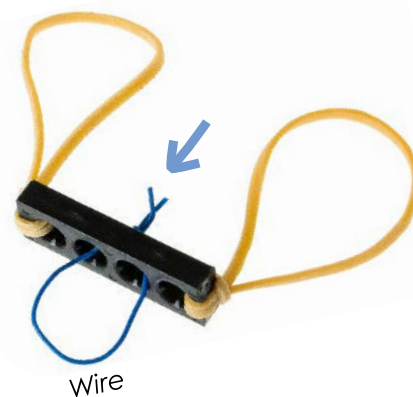
Getting it right  
can be tricky.  
Take your time!



- 10 Cut, or find a 8cm (3") piece of plastic coated **wire**. Bend it in half and put the ends through the **connector strip**, as shown.



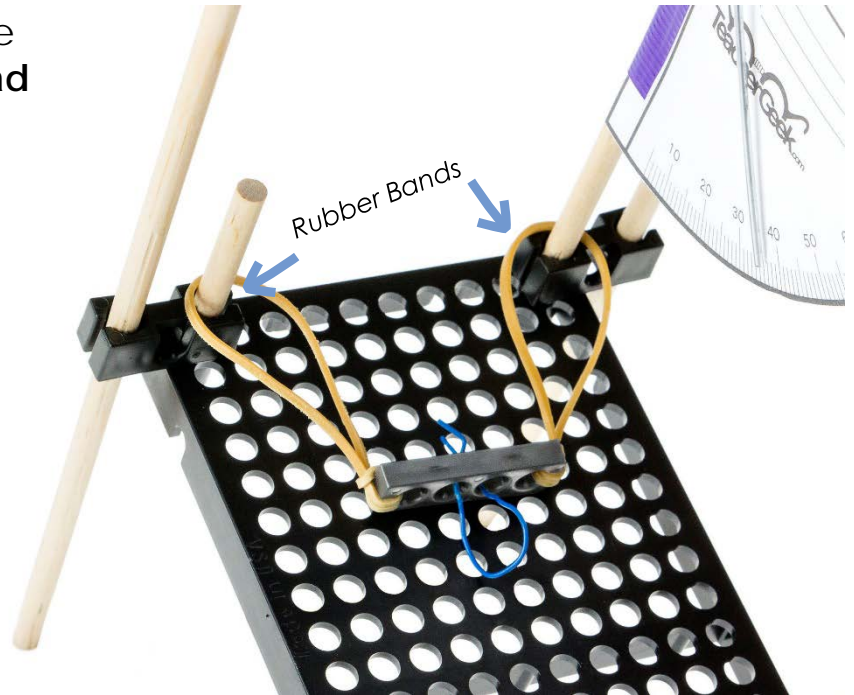
- 11 Twist **wire** ends together to create a **loop**.





# Projectile Launcher Basic Build Guide

- 12** Slide the **rubber bands** over the inner **dowels** of your **Launch Pad** from **Step 5**, as shown.

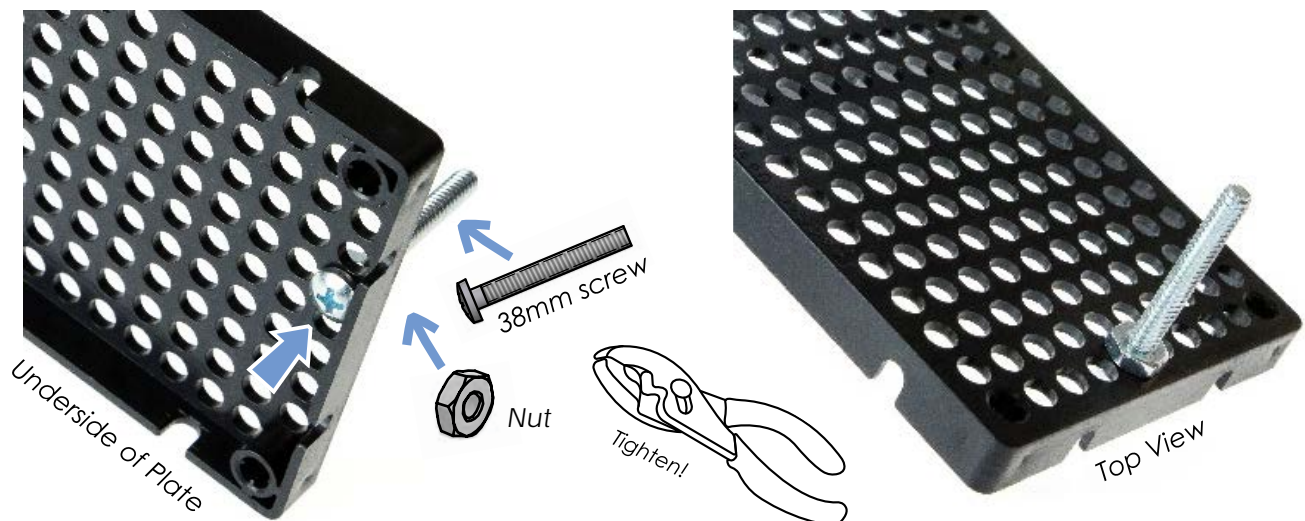


## Congratulations!

Your Launch Mechanism is finished. Now, let's create a trigger to fire a ping-pong ball.

## Trigger Build

- 13** On the other side of the **hole plate**, put a **38mm screw** through the **underside** (bottom) of the plate. **Fasten** with a **nut**.



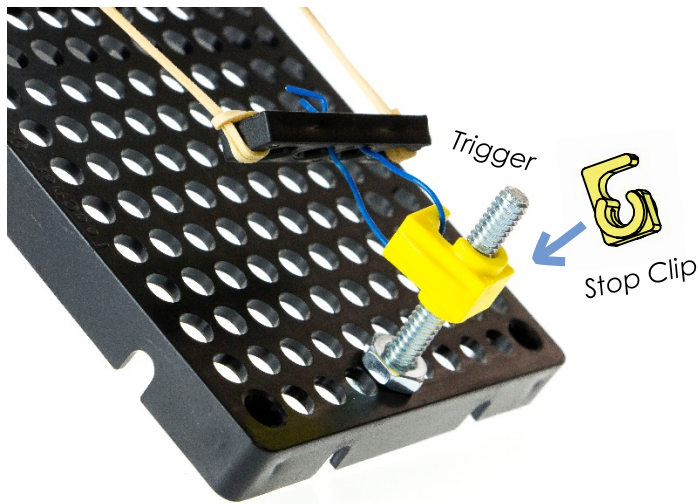




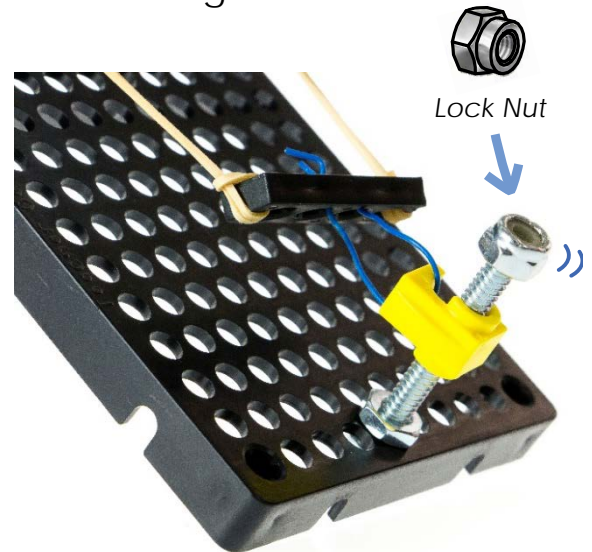
# Projectile Launcher Basic Build Guide



- 14 Push a **stop clip** on the **screw** to create your **trigger**.

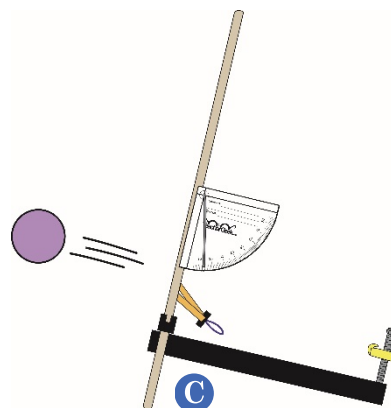
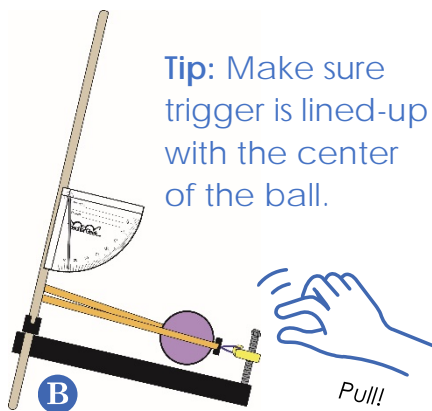


- 15 Cap the **screw** with a **lock nut**. This will prevent the **stop clip** from sliding off.



## Launching

- A Pull back the **launching mechanism** and **attach** it to the **trigger** (stop clip).
- B Place a ping-pong ball into the **launch mechanism**.
- C Turn the **trigger** (stop clip) to fire!



**Caution:** Wear safety glasses.  
Never launch at another person.

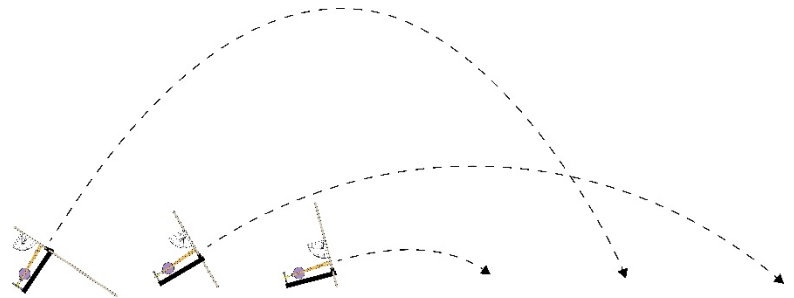


# Projectile Launcher Basic Build Guide



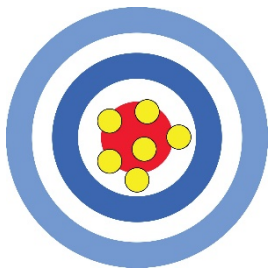
## ► You Did It!

Your example Launcher is finished, but its design works just okay. You can make it so *much* better.

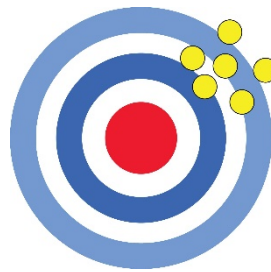


## Precision & Accuracy

Your launcher should launch balls with **precision** and **accuracy**.



**Accuracy** is how close you get to the actual (true) target or goal, such as the center of a target.



**Precision** is how consistent (repeatable) your results are.

## Power

The example launcher is a little wimpy. Can you make your launch mechanism and trigger more **powerful**, as well as **accurate** and **precise**?

