Launcher Build Guide

STEM TRUE STEAM

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

GO → Example Launcher Build → Accuracy & Precision Lab (optional) → Design & Engineering Challenge →

↑ You Are Here

For use with TeacherGeek Ping-Pong Launcher Activity, or Maker Cart. Find documents and activity materials at **teachergeek.com**.

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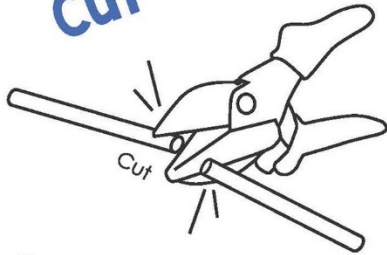
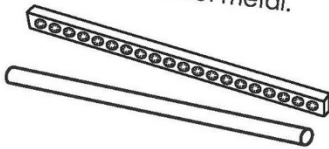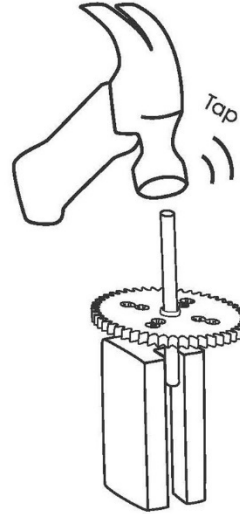**Multi-Cutters** cut wood & plastic (like **dowels** and **connector strips**). They do not cut metal.

Push, Wiggle,

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

Push

Wiggle

Tap

Tap

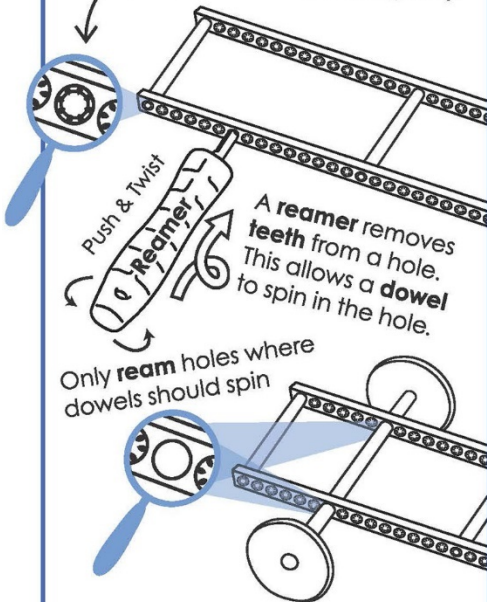Use a **hammer** and **slider block** to tap **dowels** farther through holes.

Quick Tip!

CRAYON
SOAP

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).
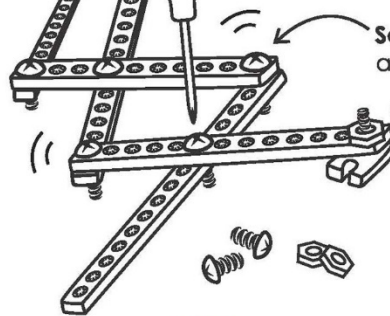
Push & Twist
Reamer

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.
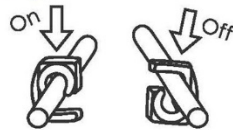
Screws & Nuts

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

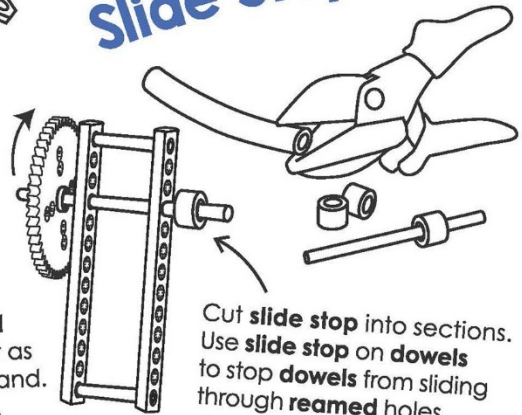Screws (without nuts) can connect parts, and allow them to rotate.

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

Stop Clip

On
Off

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.
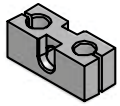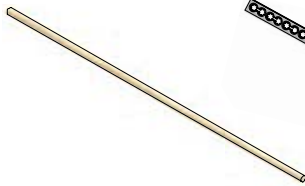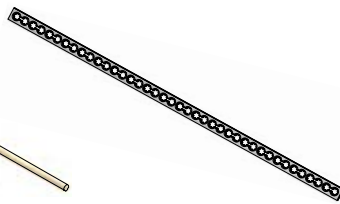
TeacherGeek Components

For One Launcher

TeacherGeek components for the example Launcher,
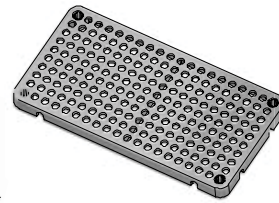and extras to turn it into your own unique design.

10 - Blocks

5 - Dowels
300mm (12")

2 - Connector Strips

1 - Hole Plate

1 - Ping Pong Ball
(for launching)

2 - Nuts
#10

2 - Lock Nuts
#10

1 - Screw
1½" #10

1 – Screw
1" #10

10 - Rubber Bands
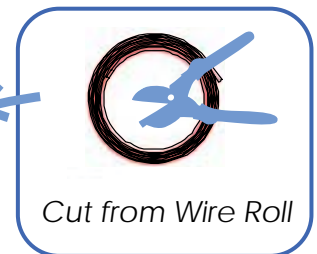
2 - Stop Clips

1 - Slide Stop
100mm (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

TeacherGeek Tools You'll Need
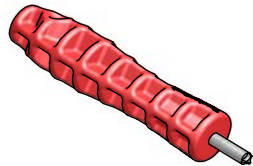
Easy to Share in Groups

Multi-Cutter
SKU 1823-81

Reamer
SKU 1823-87

Screwdriver
SKU 1823-90

Pliers
SKU 1823-86

Tools available at **teachergeek.com**

Materials You Supply

You will need these non-TeacherGeek supplies:

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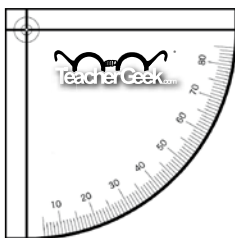Masking, Painter's, Duct;
Any kind of tape will work.

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

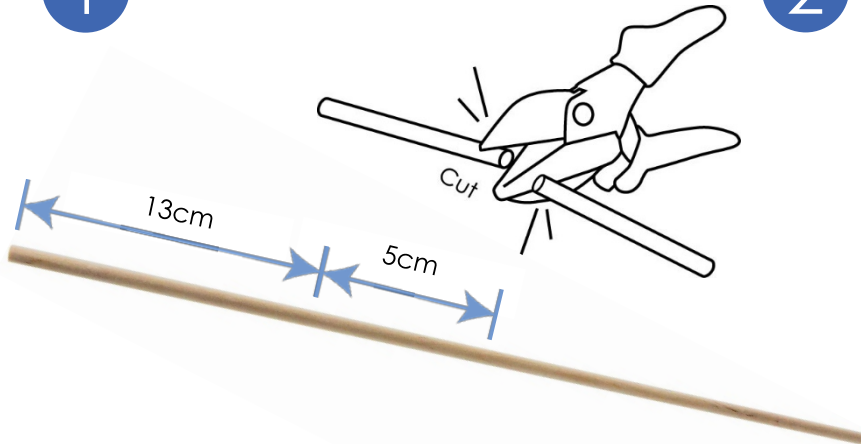Print on cardstock or thicker paper for a sturdier protractor.

Printable Protractor Download:
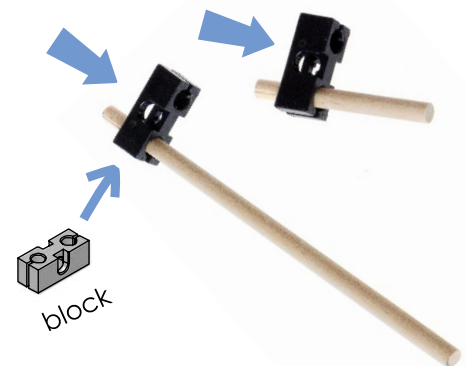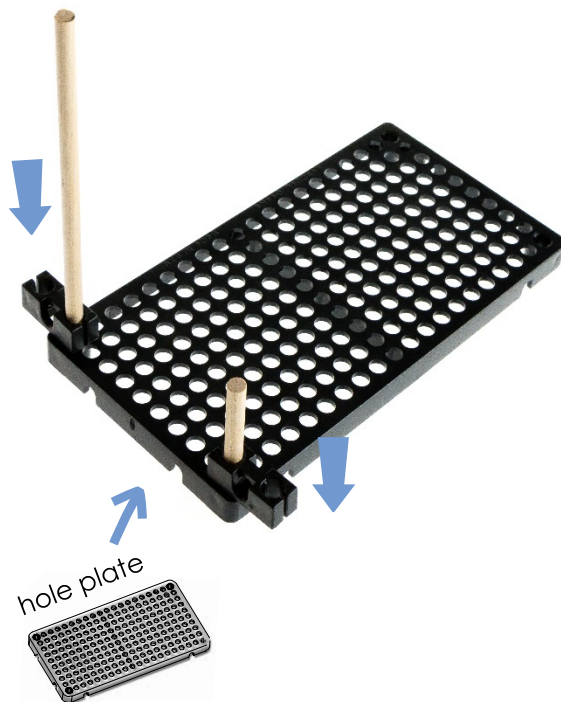http://teachergeek.org/protractor-angle_finder.pdf

Make the Launch Pad
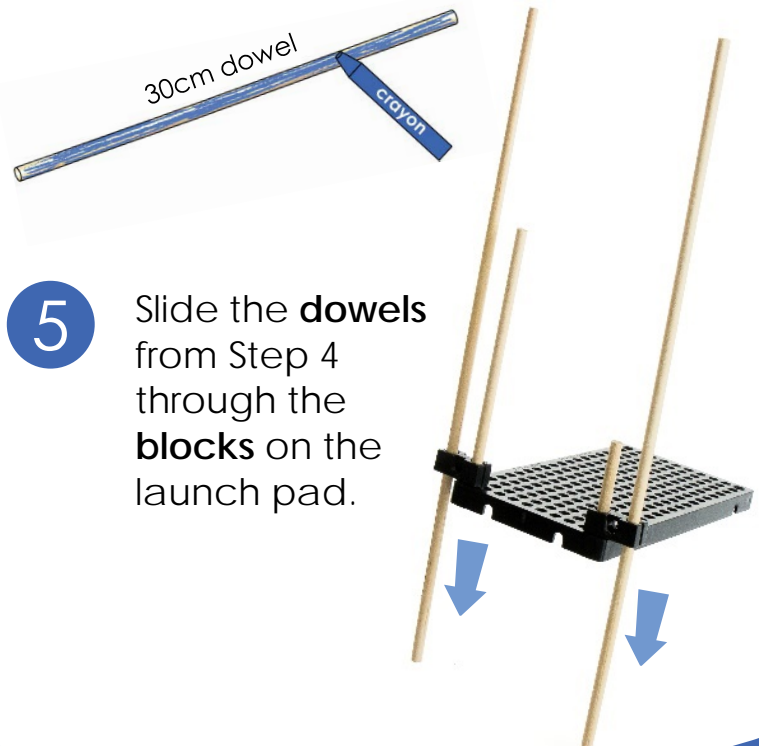
1 Cut 13cm and 5cm **dowel**.

13cm

5cm

Cut

2 Push or tap 5cm and 13cm **dowels** onto **blocks**, so they stick out a little bit.
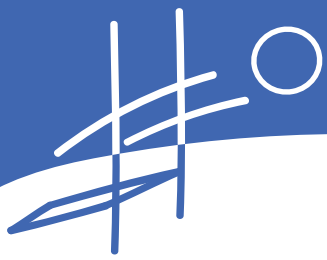
block

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

hole plate

4 Rub a crayon or bar of soap on two full (300mm) **dowels**. This will help the dowel slide.

30cm dowel

crayon

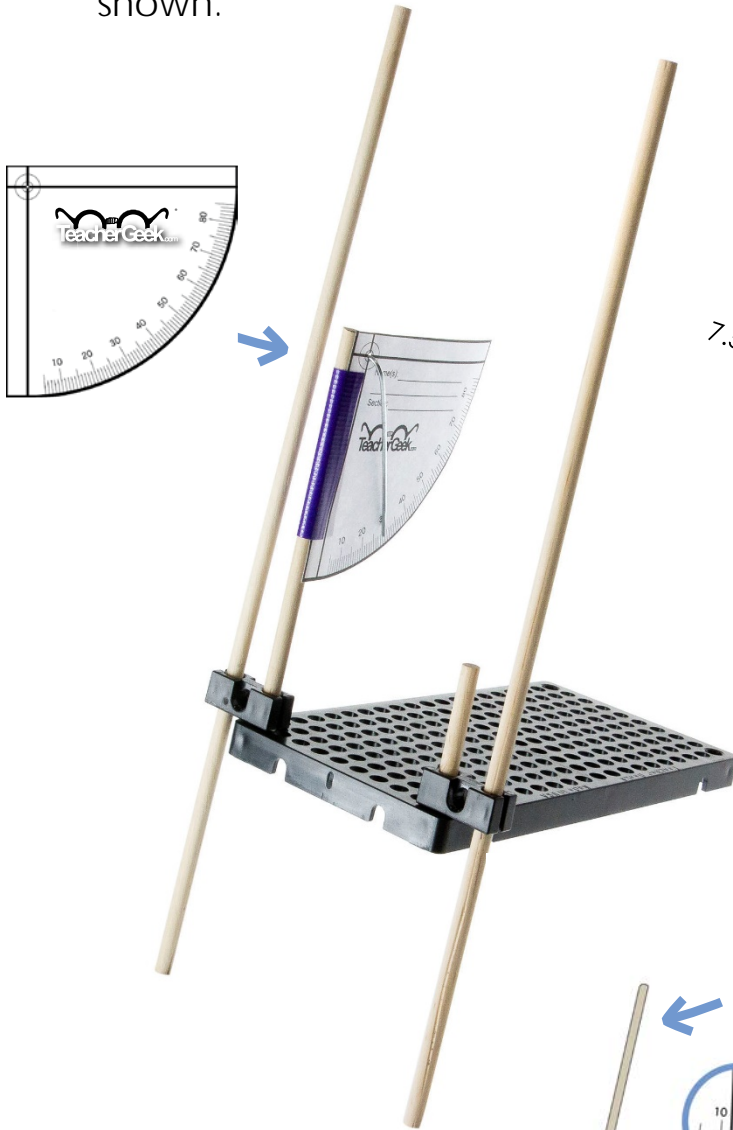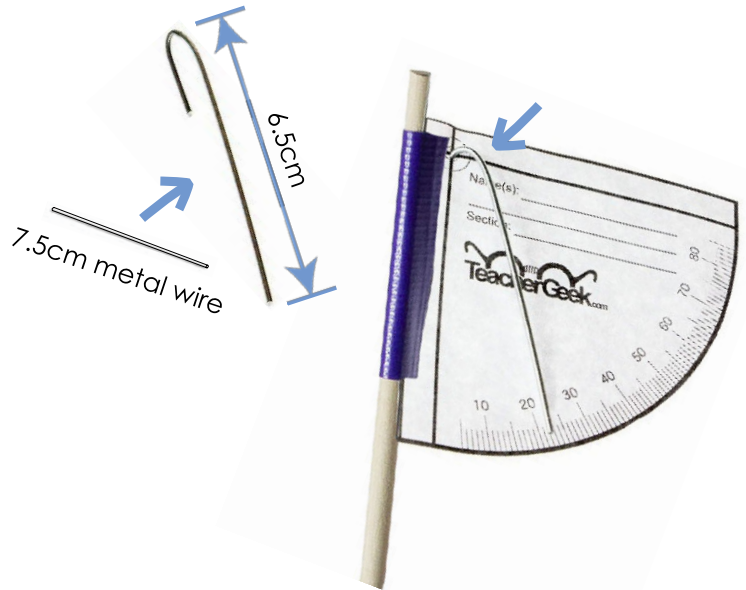**5** Slide the **dowels** from Step 4 through the **blocks** on the launch pad.

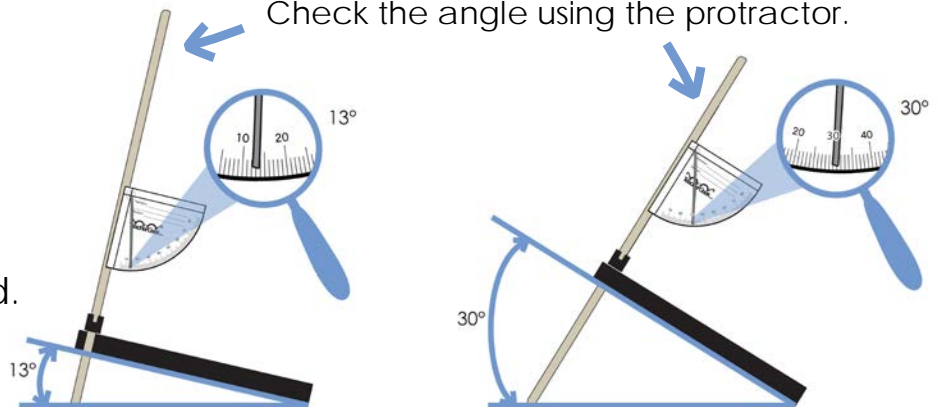**6** Print, cut, and tape your **protractor** to the launcher, as shown.

7 Bend a hook (at 6.5cm) on the 7.5cm **metal wire**. Poke it through the **protractor** at the ⊕ Hang it on as shown.

6.5cm

7.5cm metal wire

Change the angle of your launch pad by sliding these dowels up and down.

Check the angle using the protractor.

13°

10 20

30°

20 30 40

30°

13°

You did it!
You just made the Launch Pad.
Now, let's make the
Launching Mechanism…

Printable Protractor Available at:
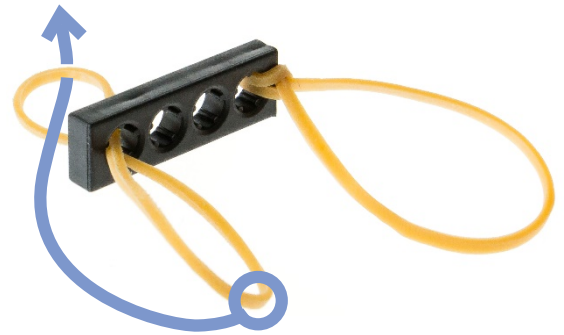http://teachergeek.org/protractor-angle_finder.pdf
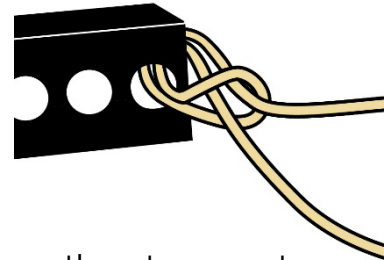
Launch Mechanism

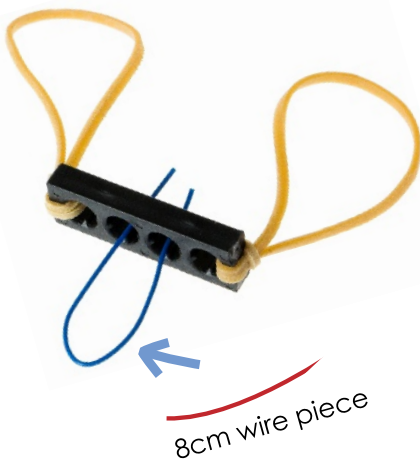**8** Cut a piece of **connector strip** that has four holes.
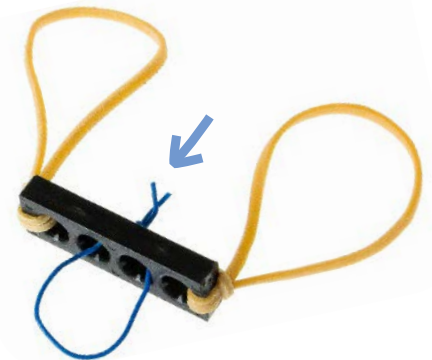
Cut

9 Loop **rubber bands** through holes.

Getting it right can be tricky. Take your time.

10 Cut an 8cm piece of **wire.** Bend it in half and put the ends through the **connector strip** as shown.
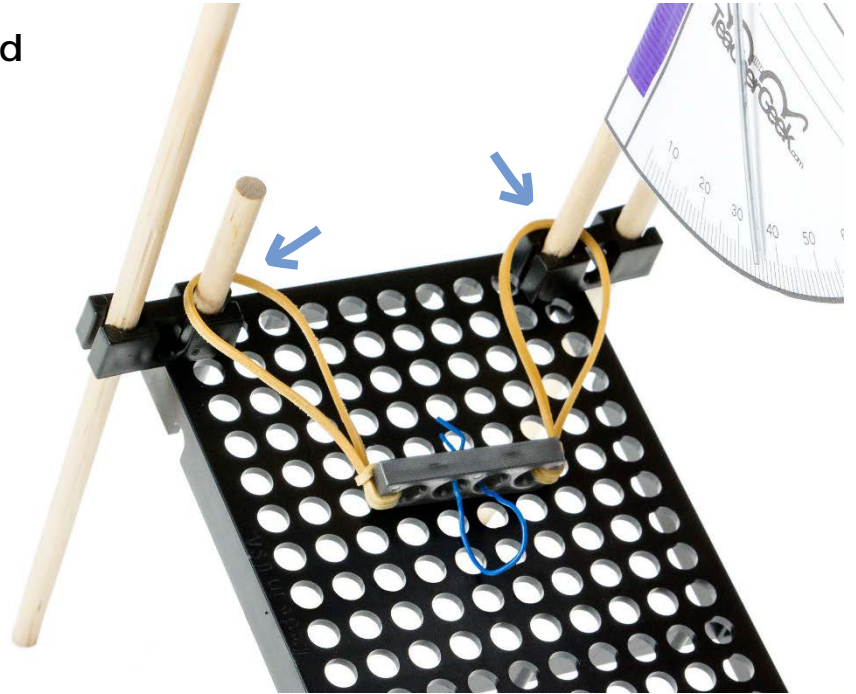
8cm wire piece

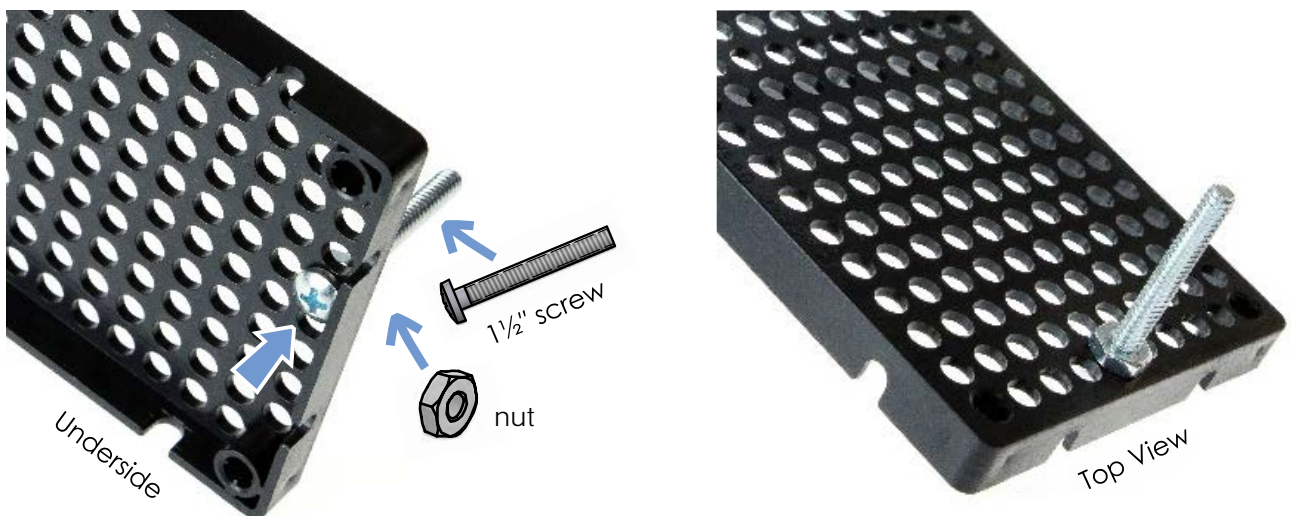**11** Twist **wire** ends together to create a loop.

12 Slide the **rubber bands** over the **dowels** of your **Launch Pad** as shown.

Congrats!
Your Launch Mechanism is finished. Now, let's make a trigger to fire it.
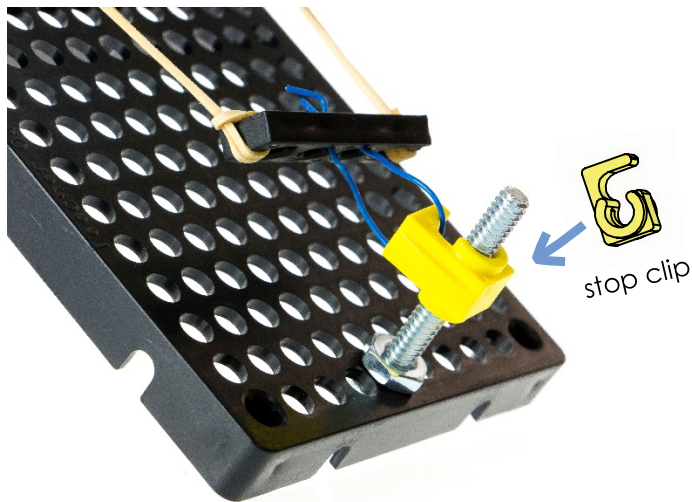
Trigger Build

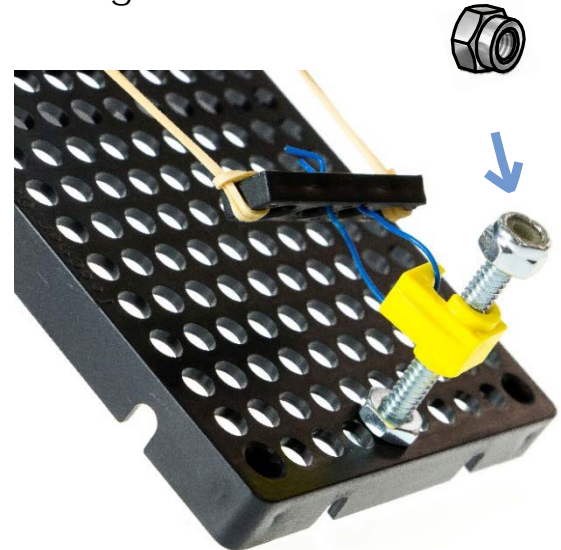**13** At the bottom of the **hole plate**, put a **screw** through the underside. Fasten with a **nut**.

Underside

1½" screw

nut

Top View

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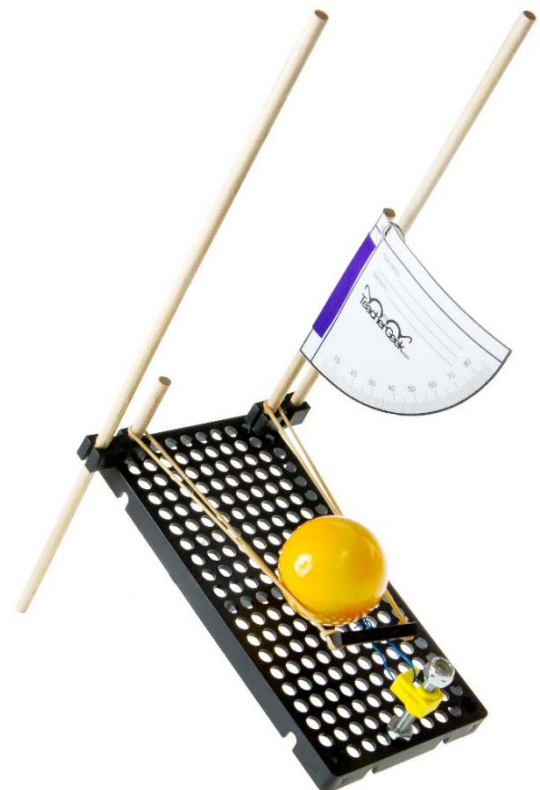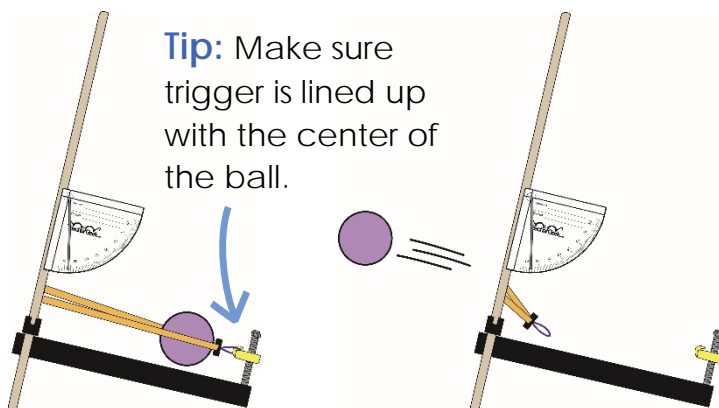
stop clip

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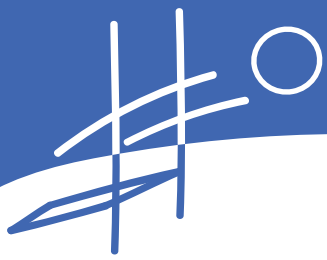
Launching

1. Pull back the launching mechansism and attach it to the trigger (stop clip).

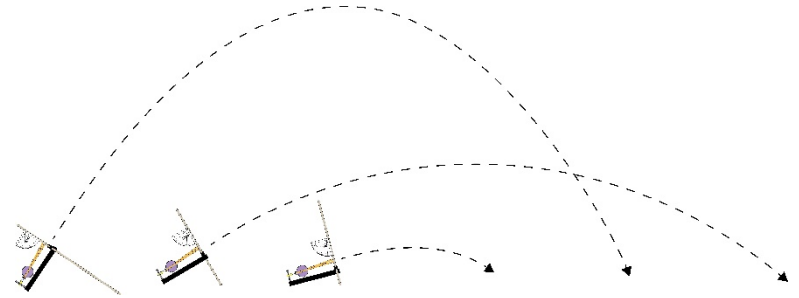2. Place the ball into the launcher.

3. Turn the trigger to fire!

Tip: Make sure trigger is lined up with the center of the ball.

Caution: Wear safety glasses. Never launch at a person.
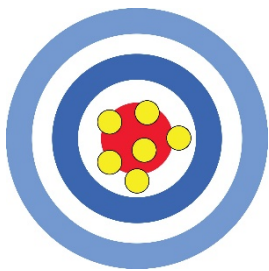
Launcher Build Guide

Your example Launcher is finished, but it's not a great design. You can make it much better.
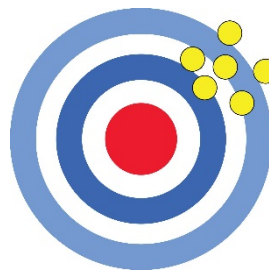
Precision & Accuracy

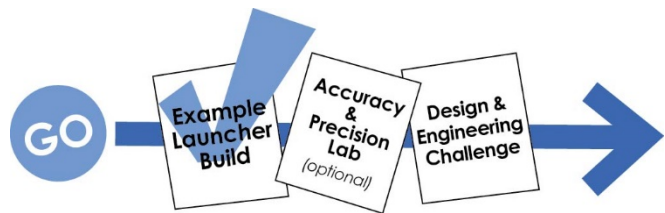Your launcher should launch balls with **precision** and **accuracy**.

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.

Learn more in the Accuracy & Precision Lab. Documents at teachergeek.com/learn

Power

The example launcher is a little wimpy. Can you make your launcher more powerful, as well as accurate and precise? Check out the next page for some ideas to get you started.

Engineering Challenges

It's time to redesign your launcher (turn it into your own amazing design). Move on to a Design & Engineering Challenge.

Documents at teachergeek.com/learn

Ideas