

Learn about projectile motion by designing and building your very own Launcher!

You Are Here

Choose how you would like to complete this activity.

Download documents & videos at teachergeek.com/launcher2.0

Go Guide

Start here! Build your launcher, evolve your design, and begin the Bullseye Challenge!

Optional Labs

- Precision & Accuracy Lab (Ages 13+)
- Hit the Target Lab (Ages 13+)

Optional Challenges







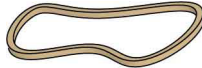

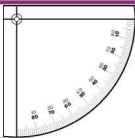


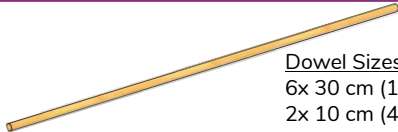
- Moving Target Challenge*
- Distance Challenge*
- Siege Challenge*

*See Page 8

Supplies

TEACHERGEEK PARTS

These are the parts you need to build one launcher, plus some extras, so you can make your own unique designs.

NAME	QTY	PICTURE
Hole Plates SKU 1821-32	1	
Strips 30 cm (12 in) SKU 1821-31	2	
Blocks SKU 1821-34	7	
Screws 2.5 cm (1 in) SKU 1821-22	8	
Screws 5 cm (2 in) SKU 1821-27	1	
Nuts #10 Hex SKU 1821-25	8	
Rubber Bands SKU 1823-41	8	
Ping Pong Balls SKU 1821-44	1	 You will need to supply these if using a Maker Cart.
Protractors	3	 Protractors & rulers are on the last page, or you can print them from teachergeek.com/launcher2.0
Rulers	1	
Paperclip	1	 You can also use 10 cm (4 in) of steel building wire if you have a Maker Cart.
Dowels various sizes SKU 1821-20	8	 Dowel Sizes 6x 30 cm (12 in) 2x 10 cm (4 in)

Have a Maker Cart?
Use Multi-Cutters to
cut your own dowels.



MATERIALS YOU SUPPLY

- Phillips Screwdriver
- Scissors
- Tape
- Pliers (optional)
- Crayon (optional)
- Recycling Bin Materials
to incorporate into your designs



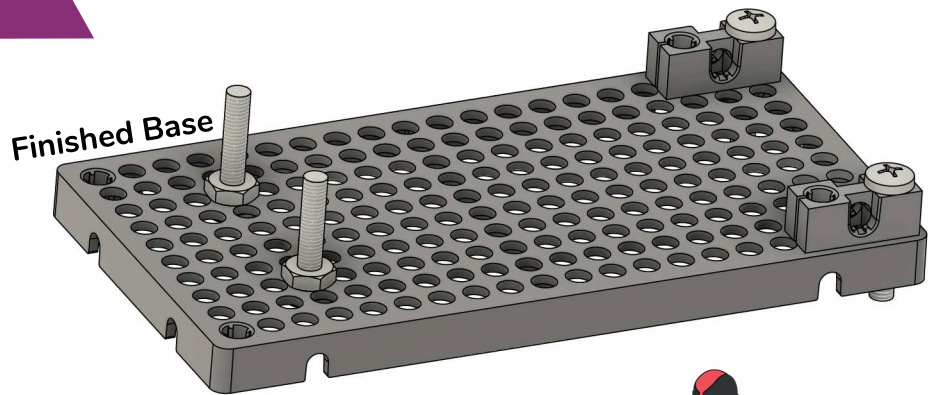
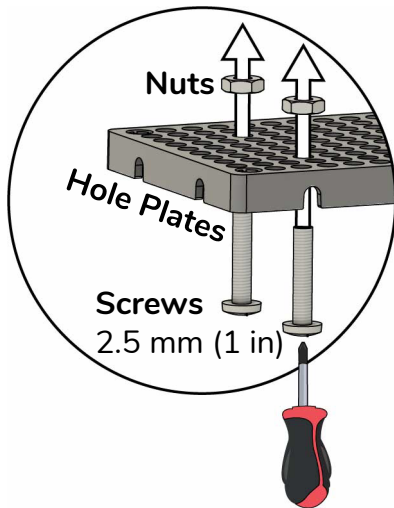
Optional Tools



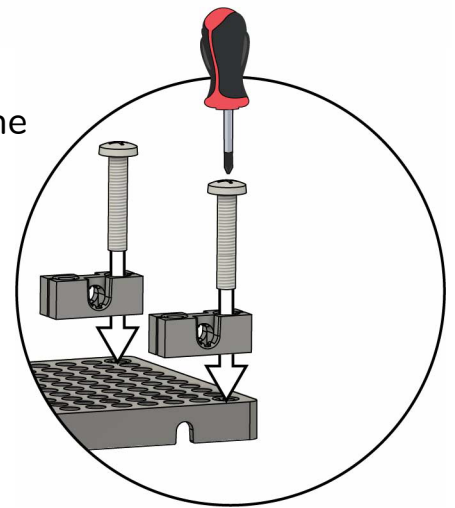
Modify materials to make
even more creative designs
with the **Maker Tool Set**
SKU 1823-84

Build the Base

- 1 Push **two 25 mm (1 in) screws** through the bottom of the **hole plate**, then **spin nuts** onto them.

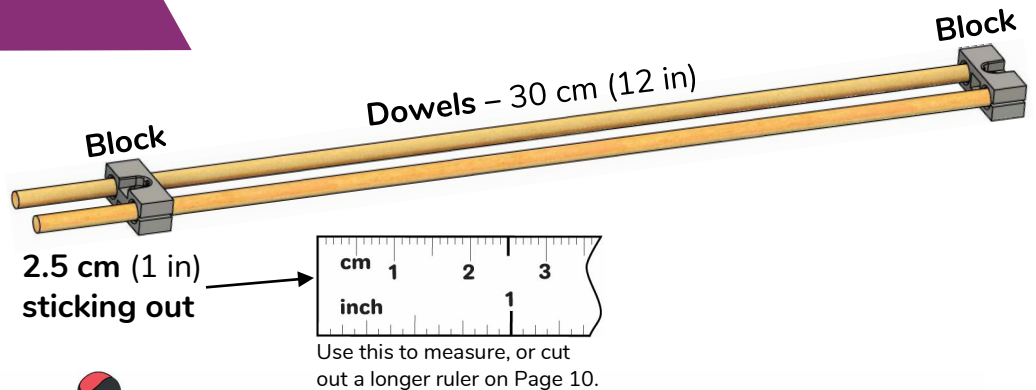


- 2 Attach **two blocks** to the corners of a **hole plate** with **two 2.5 cm (1 in) screws**.

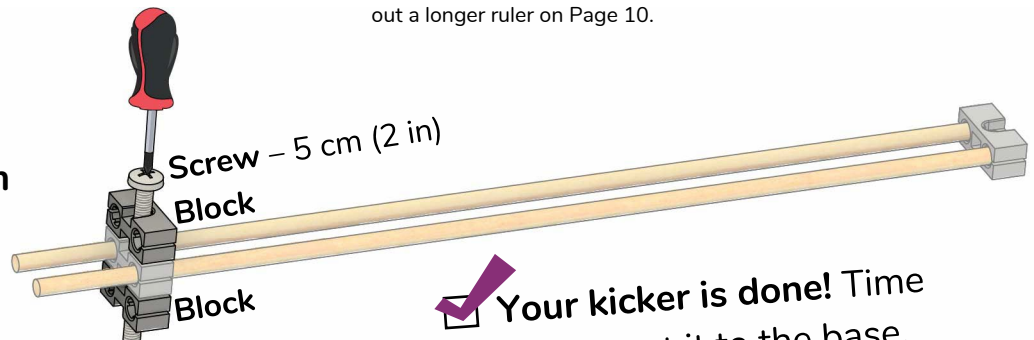


Build the Kicker

- 3 Tap or wiggle two **30 cm (12 in) dowels** through **two blocks**, as shown.



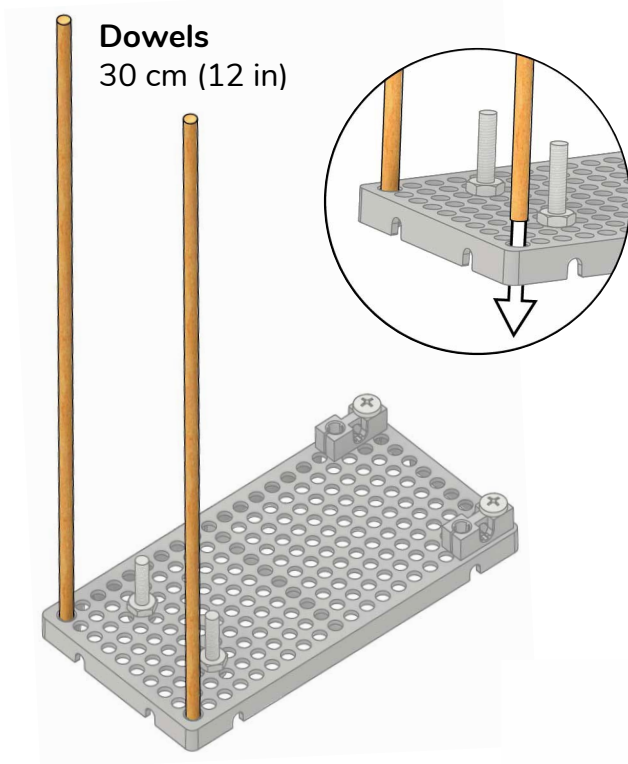
- 4 Connect **two more blocks** using a **5 cm (2 in) screw**.



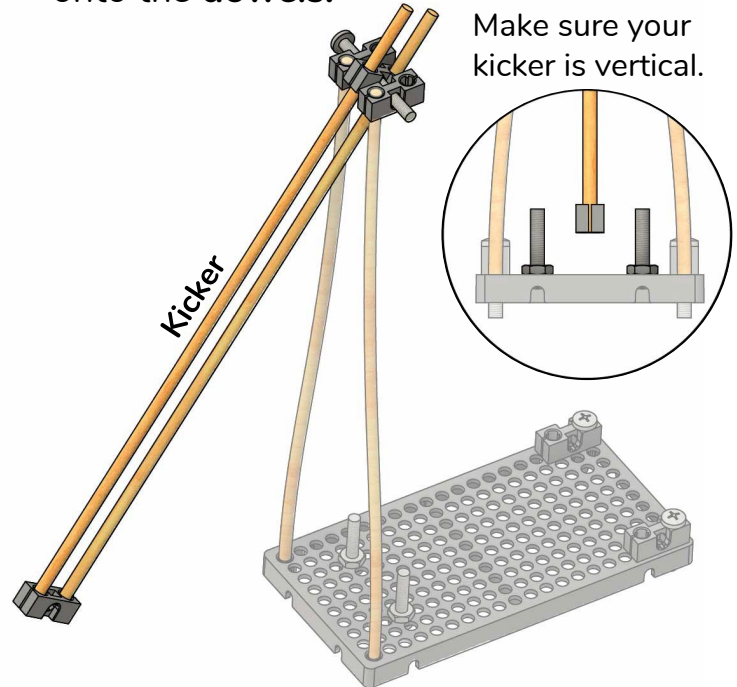
✓ **Your kicker is done!** Time to connect it to the base.

Connect the Kicker

- 5** Tap or wiggle two 30 cm (12 in) dowels into the hole plate.

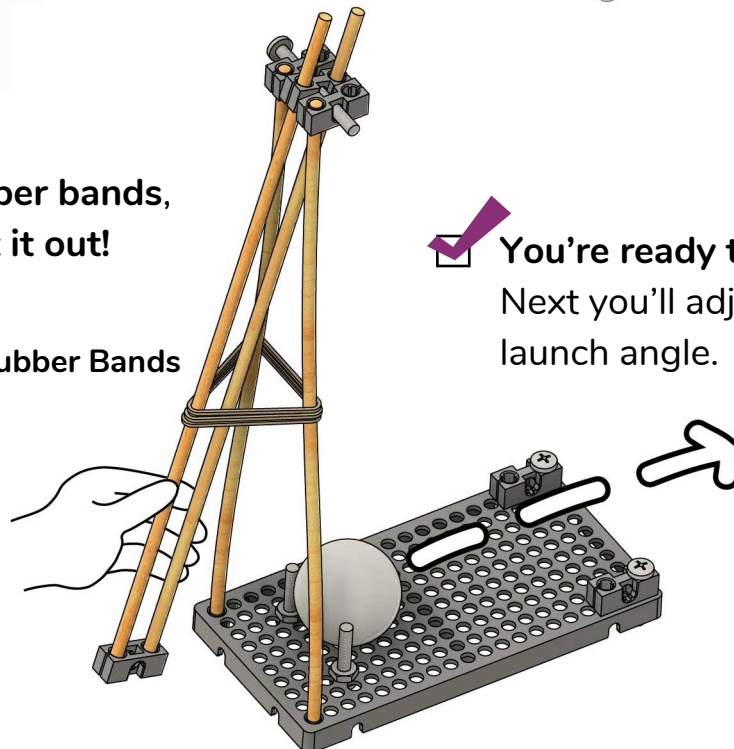
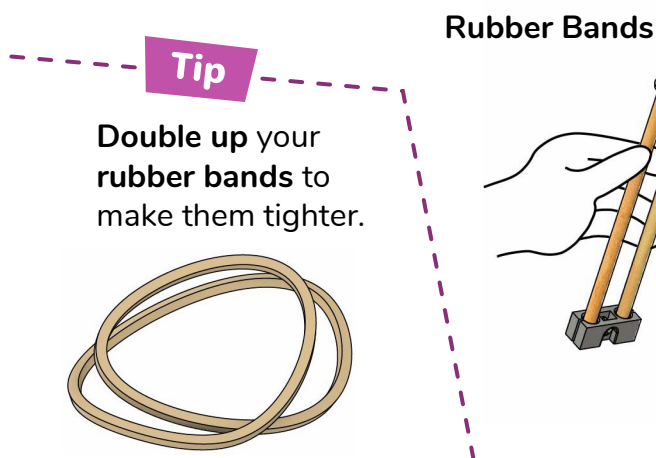


- 6** Tap or push the kicker, from Step 4, onto the dowels.

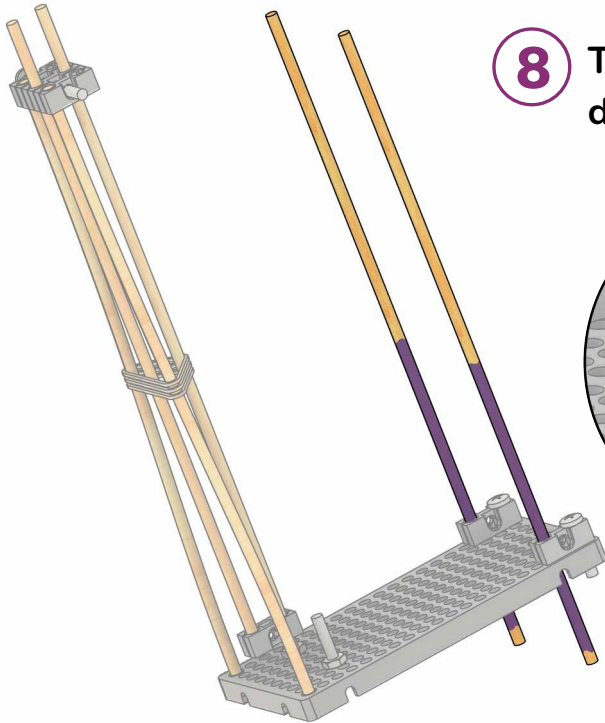


- 7** Add rubber bands, then test it out!

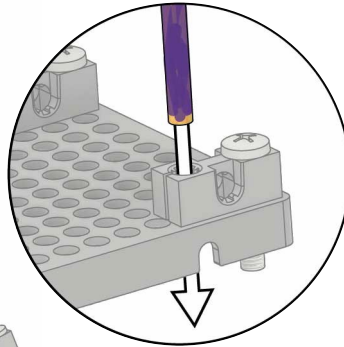
- ☒ **You're ready to launch!**
Next you'll adjust the launch angle.



Change the Launch Angle

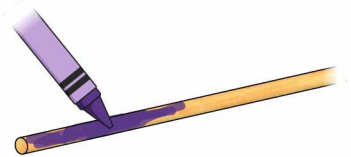


- 8** Tap or wiggle two 30 cm (12 in) dowels into the front of your base.



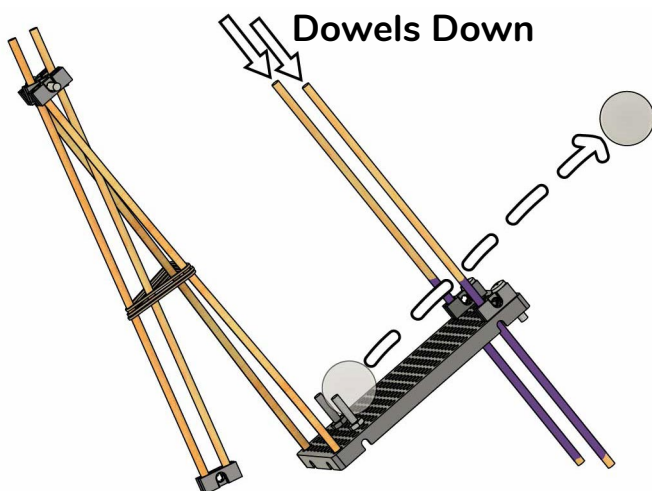
Tip

Make the dowels **slide easier** by **coloring** them with **crayons** or a **pencil**.



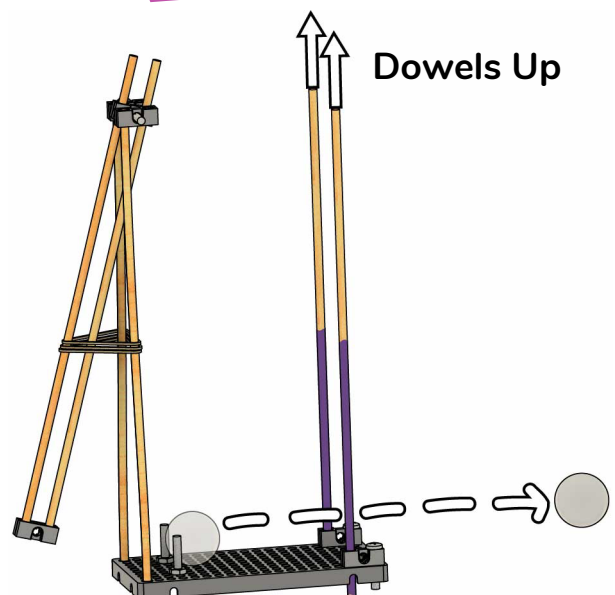
- 9** Test it out! Slide the dowels up and down to **change the launch angle**.

Steep Angle



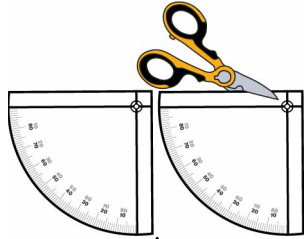
OR

Flat Angle

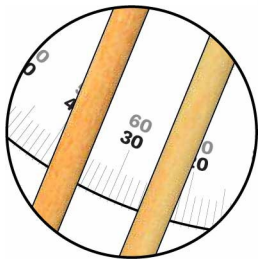


Add Protractors

- 10** Cut out two protractors from Page 10 and **tape** them on.

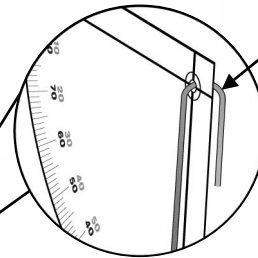
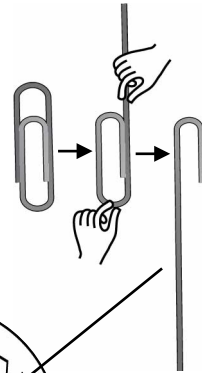


Protractor

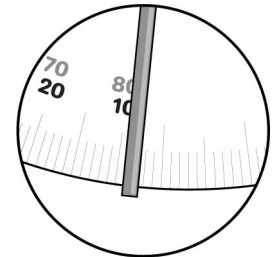


Use the protractor to measure how far you pull the kicker back.


- 11** Make the **front protractor** into an **inclinometer** by **poking a bent paperclip** (or wire) through it.



Inclinometer



The bent paperclip points downward at your launch angle.

 **Your example launcher is done, but you aren't...**
Make it better, try a lab, or start a challenge!



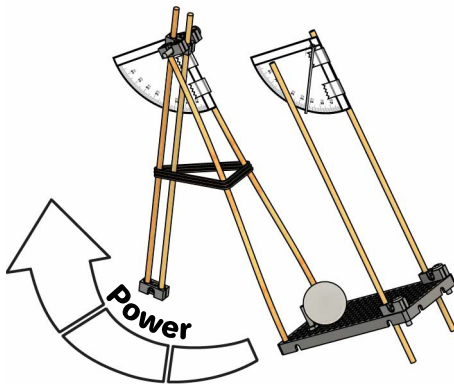
Get optional labs and more at
teachergeek.com/launcher2.0

Tinker with your Launcher

There are tons of ways to adjust your launcher! Here are just a few variables you can tinker with.

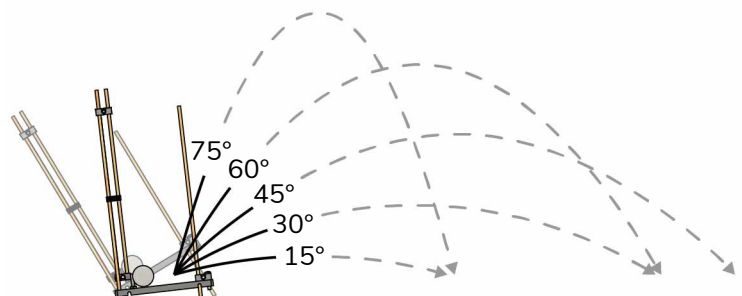
Wind Up

The farther you wind up your launcher, the farther the ball goes! Use the protractor to keep track of your wind-up angle.



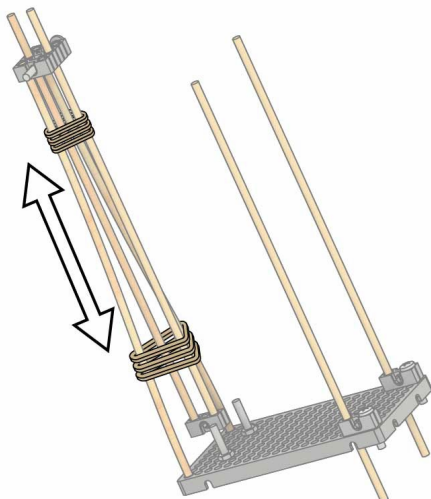
Launch Angle

Change the distance and trajectory by adjusting the launch angle, which you can measure with the inclinometer.



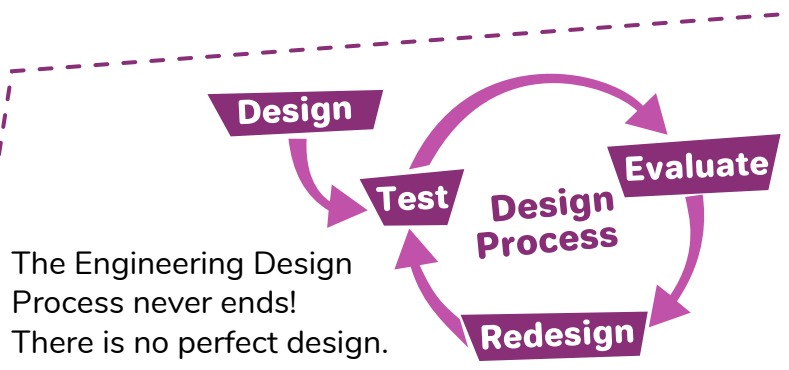
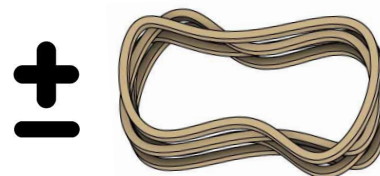
Leverage

Move the rubber bands up and down the kicker to change their leverage.



Rubber Bands

Adjust the power by changing the number of rubber bands or how they're attached (doubled up, tripled up, etc.).

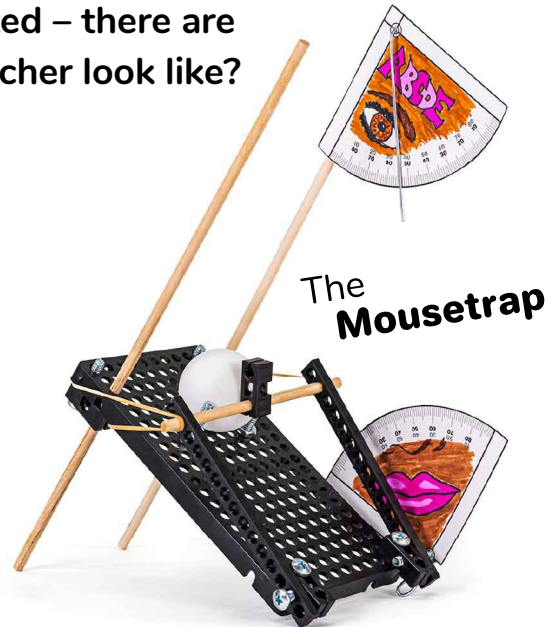


Redesign Your Launcher

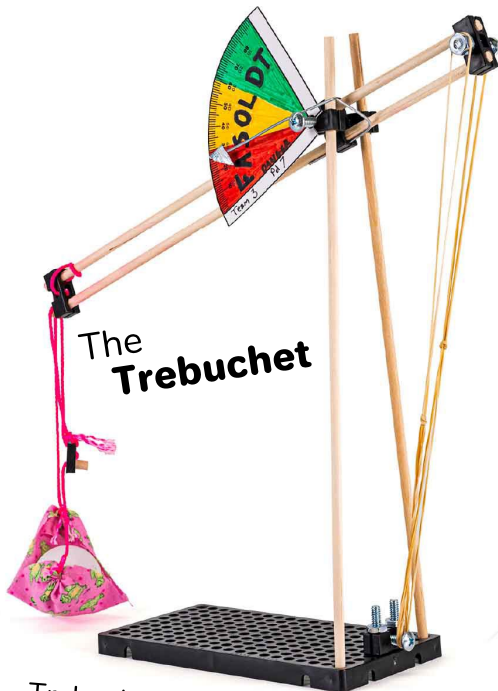
The Punter is just a design to get you started – there are much better designs! What will **your** launcher look like?



The
Side-Kicker



The
Mousetrap

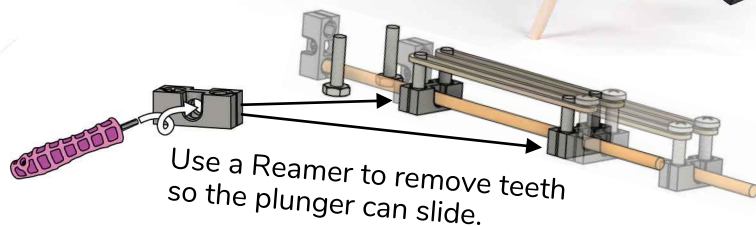


The
Trebuchet

Trebuchets are very tricky to make! It takes a lot of trial and error to make these successfully.



The
Plunger
(tools required)



Bullseye Challenge

The most accurate launcher wins!

Criteria:

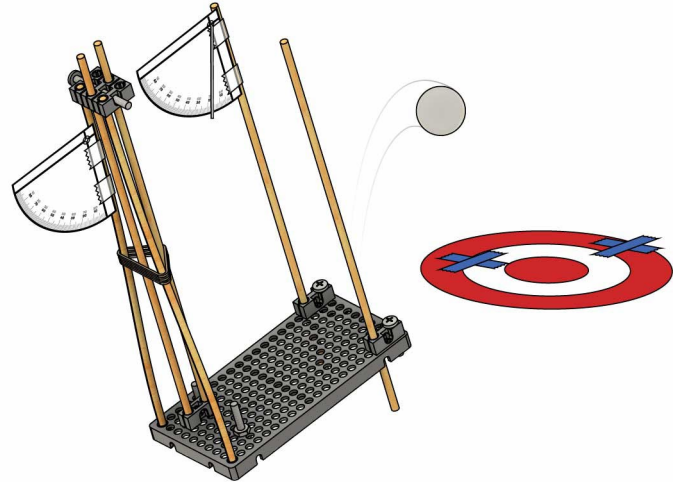
(what your design must do)

- The launcher that hits closest to the center wins!
- Each team gets three launches – only the best launch counts.
- Each launcher must launch from the same position towards the same target.

Constraints:

(rules and limits for your design)

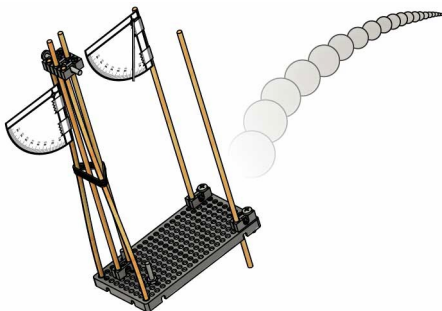
- You may use no more than 8 rubber bands to power your launcher.
- You may only use the supplies listed on Page 1.
- There is no limit on recycling bin materials.



Additional Challenges

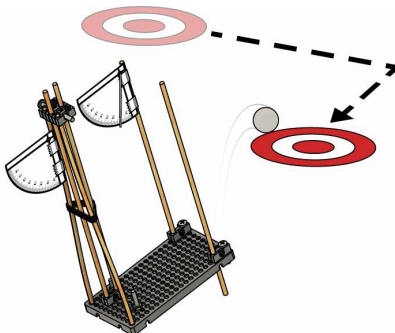
Use the constraints above for these challenges.

Distance Challenge



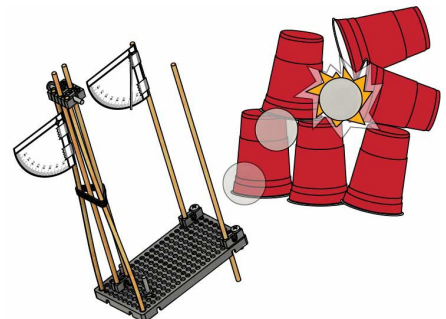
The launcher that sends the ball the greatest distance wins!

Moving Target Challenge



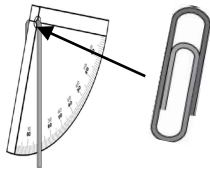
Complete 3 rounds, moving the target each time. Measure each shot's distance from the bullseye, and add them at the end. The launcher with the least total distance wins!

Siege Challenge



One team stacks disposable cups to make a wall, and another shoots it down. The launcher that knocks every cup down in the shortest time wins!

Cut out the rulers and protractors to add more precision to your design!



Add a paperclip or wire to the protractor to make an inclinometer (which measures launch angle). See Page 5.

