



Learn about energy and friction by building and re-engineering your own mousetrap-powered vehicle!

You Are Here

Choose how you would like to complete this activity.

Download documents & videos at teachergeek.com/mousetrap

Go Guide

Start here! Build your Vehicle, evolve your design, and begin the Long Shot Challenge!

Optional Lab

-Lever Lab
(Ages 8+)

Optional Challenges


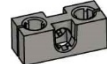






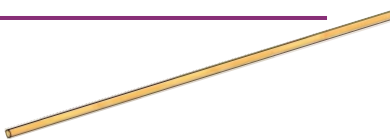
-Long Shot Challenge*
-Sprint Challenge*
-Target Challenge*

*See Page 9

Supplies

Mousetrap Vehicle Parts

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

NAME	QTY	PICTURE
Strips 30 cm (12 in) SKU 1821-31	6	
Blocks SKU 1821-34	8	
Wheels SKU 1821-30	4	
Tire Rubber Bands SKU 1821-64	2	
Mousetrap SKU 1821-46	1	 Maker Cart users must supply their own Mousetraps.
Mousetrap Screws #6 x $\frac{5}{8}$ in	4	 Mini Hub Screws on the Maker Cart can be substituted for these.
Slide Stop 8 cm (3 in) SKU 1821-49	1	
Clips SKU 1821-60	1	
Zip Ties 12 cm (5 in) SKU 1823-50	6	
String 60 cm (24 in) SKU 1823-47	3	
Dowels various sizes SKU 1821-20	3 - 30 cm (12 in) 2 - 15 cm (6 in) 2 - 8 cm (3 in) 6 - 5 cm (2 in)	

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



Included Tools



TeacherGeek Reamer
SKU 1823-87

Materials You Supply

- Phillips Screwdriver
- Scissors
- Recycling Bin Materials
to incorporate into your designs



Optional Tools

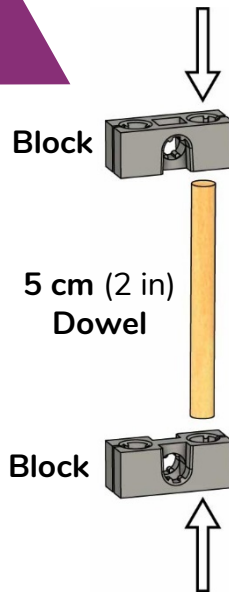


Modify materials to make
even more creative designs
with the **Maker Tool Set**
SKU 1823-84

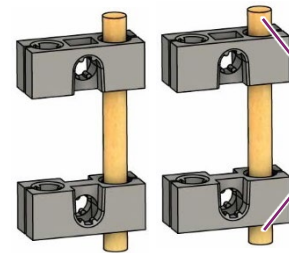
Make Your Frame

- 1 Wiggle or tap 5 cm (2 in) dowels into blocks to make two supports.

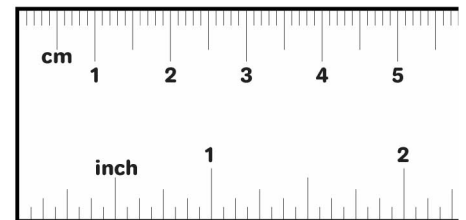
Don't Ream



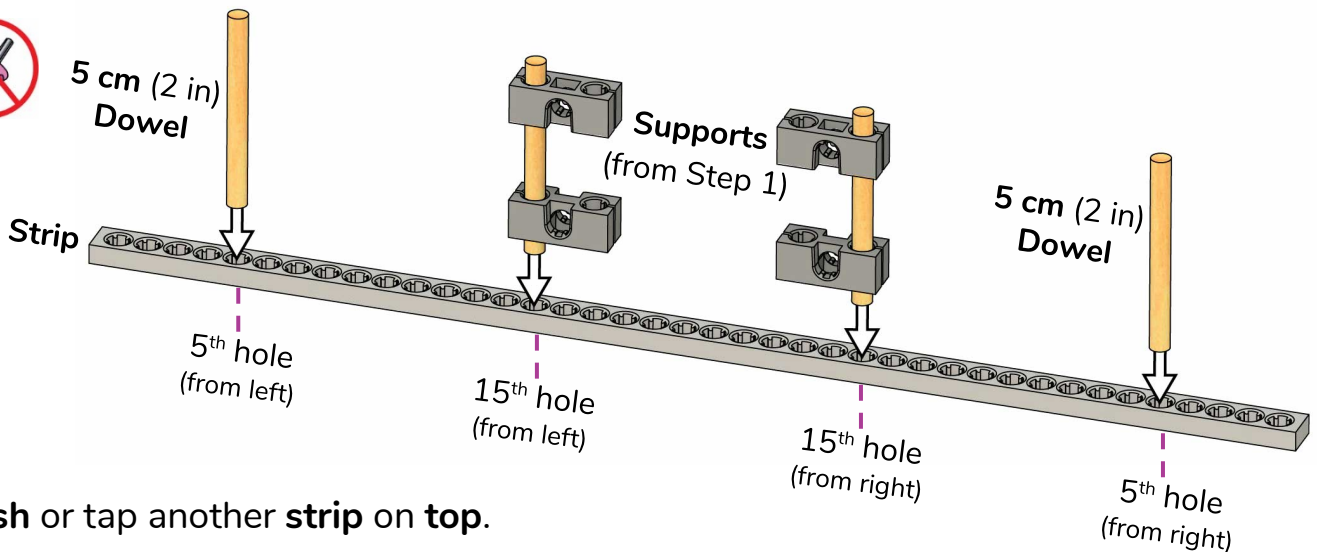
Finished Supports



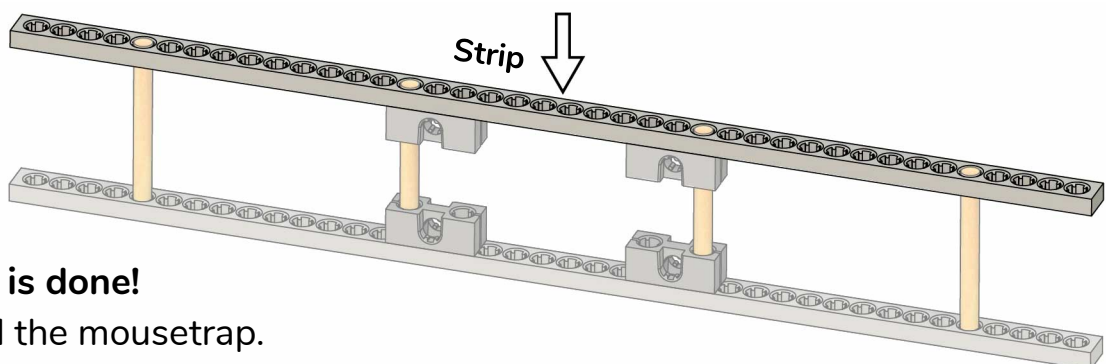
Dowels should stick out 5 mm (3/16 in)



- 2 Wiggle or tap two 5 cm (2 in) dowels and the two supports from Step 1 into a strip.



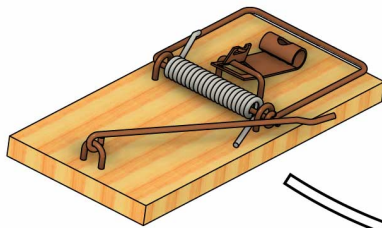
- 3 Push or tap another strip on top.



- ✓ Your frame is done!
Time to add the mousetrap.

Add The Mousetrap

- 4** Screw the **mousetrap** onto the frame using 4 mousetrap screws.



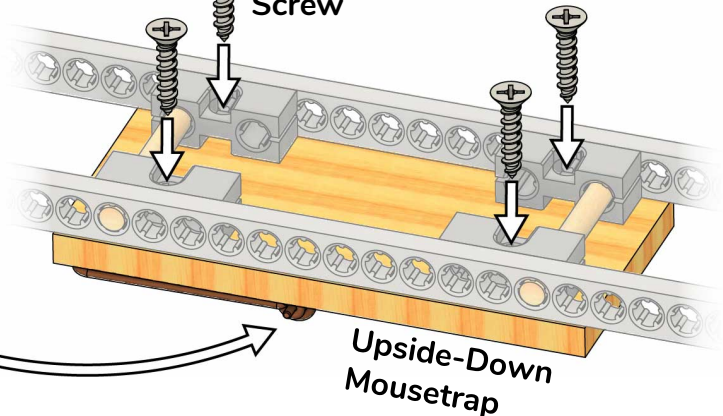
It doesn't matter which way your mousetrap faces (but it must be upside down).



The screws will make their own holes in the mousetrap.

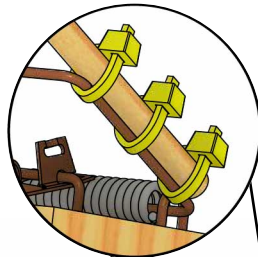


Mousetrap Screw

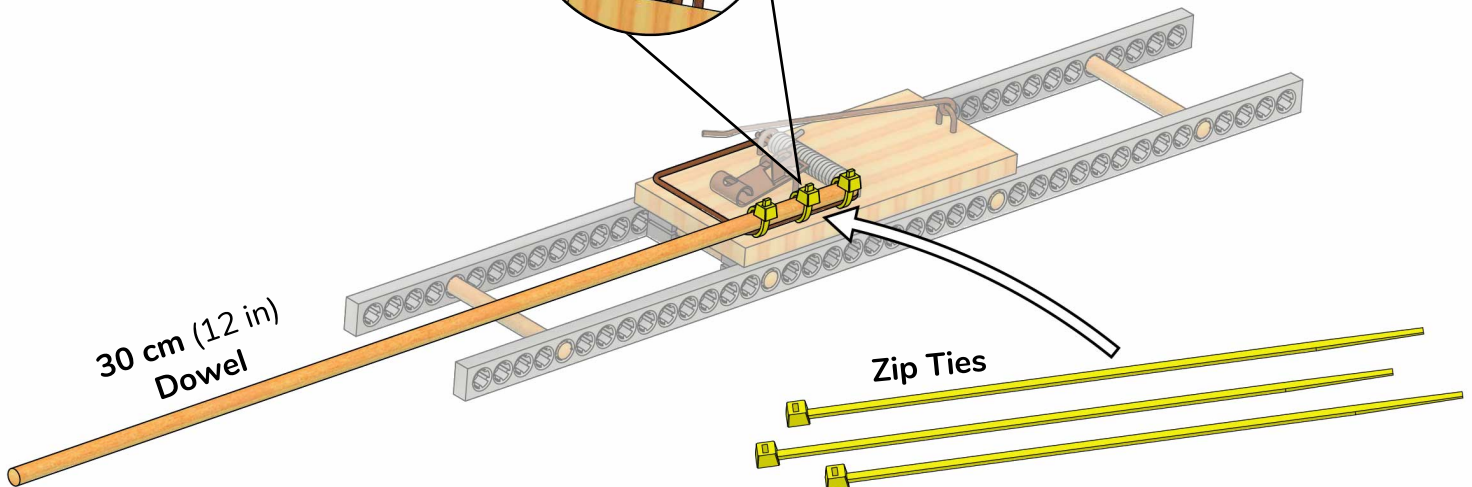


Upside-Down Mousetrap

- 5** Attach a 30 cm (12 in) **dowel** to the mousetrap using three **zip ties**.



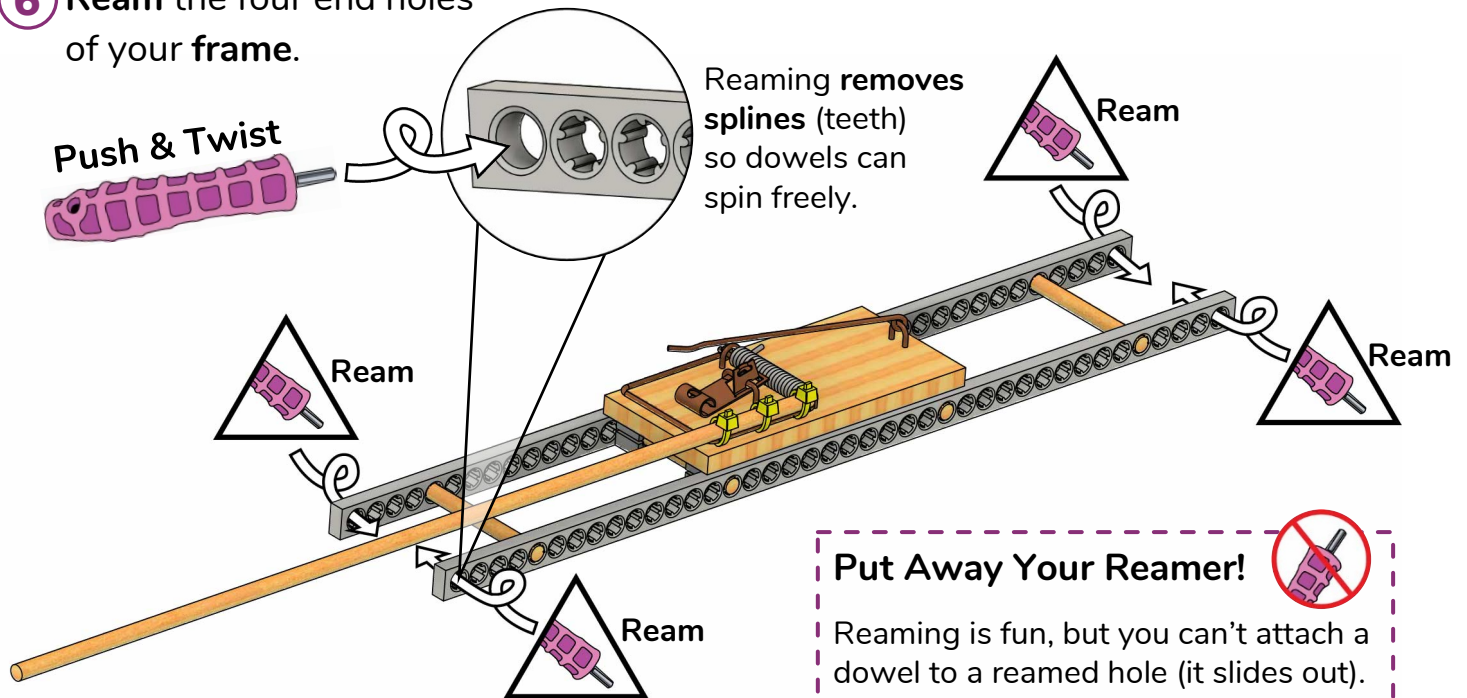
Make sure they're tight!



✓ **Congratulations!** Your mousetrap is mounted. You're ready to add the wheels.

Wheels On

- 6** Ream the four end holes of your frame.

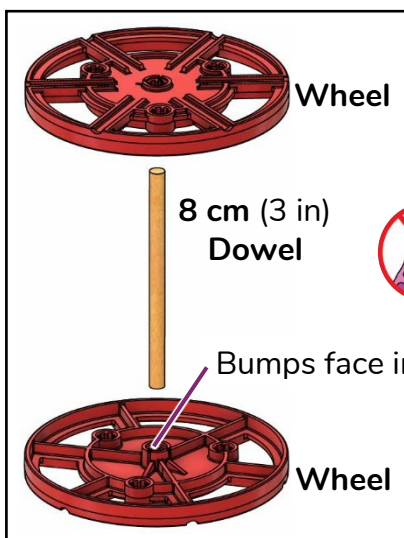


Put Away Your Reamer!

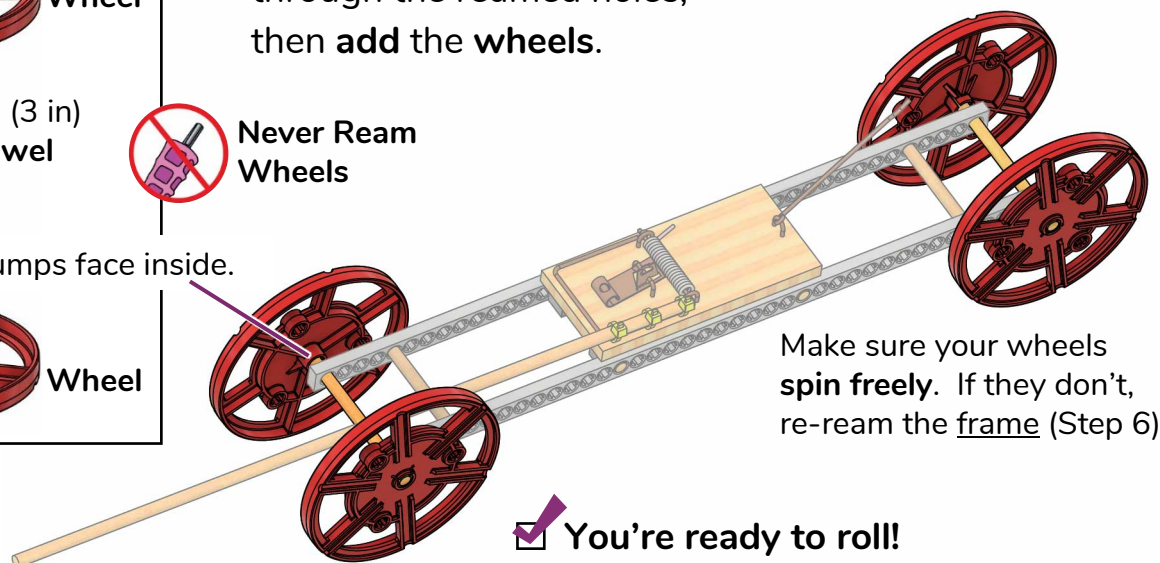


Reaming is fun, but you can't attach a dowel to a reamed hole (it slides out). Don't ream any more holes until you're experimenting with your own designs.

- 7** Slide two 8 cm (3 in) dowels through the reamed holes, then add the wheels.



Never Ream Wheels



Tie It Together!

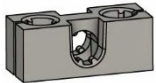
Push hard to attach the clip!



- 8** Snap a clip onto the back axle.



- 9** Wiggle a block onto the end of the lever arm (dowel).



Block

- 10** Tie a loop in the string.

String

≈47 cm
(≈19 in)

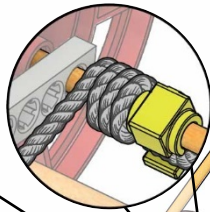
- 11** Tie the string to the block.

Race It!

- 12** Hook the string loop on the clip.



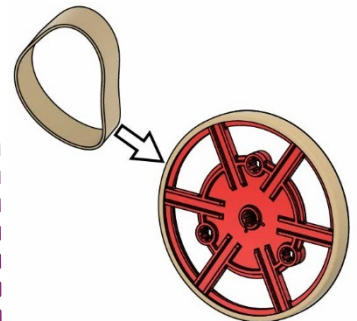
- 13** Turn the wheels to wind up the car.



Tip: pull the lever as you turn the wheels.

Get A Grip!

Wheels spinning out?
Add tire rubber bands!



- 14** Let it go!

VROOOM!!!

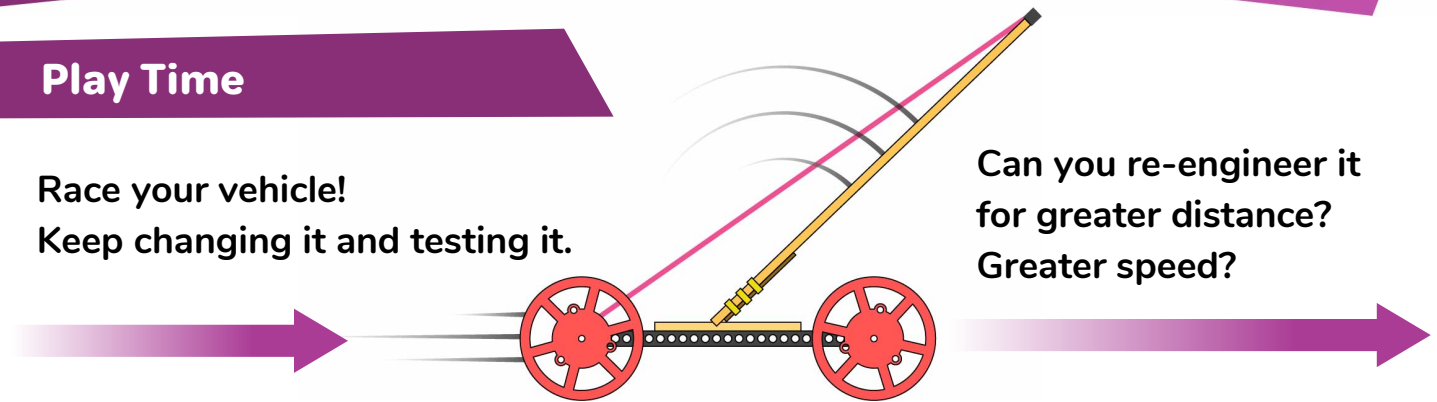
✓ Your example build is done, but you're just getting started! Try the [Lever Lab](#) or continue on to create your own unique design and begin a challenge!

Download the Lever Lab at teachergeek.com/mousetrap

Play Time

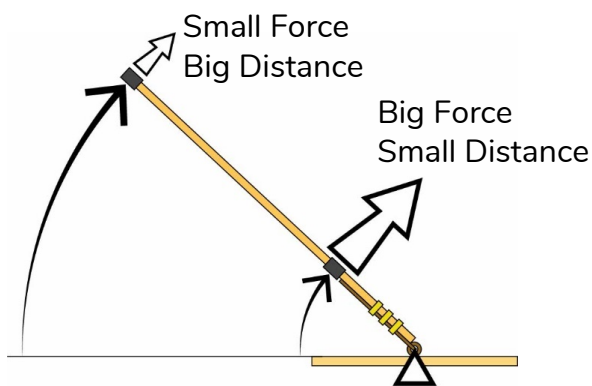
Race your vehicle!
Keep changing it and testing it.

Can you re-engineer it
for greater distance?
Greater speed?



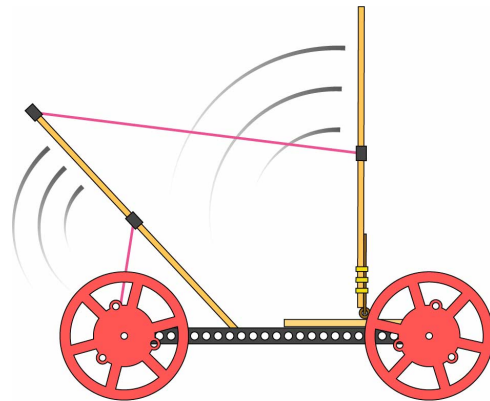
Change the Lever's Length

Trade between force and distance by sliding the block/string along the dowel.



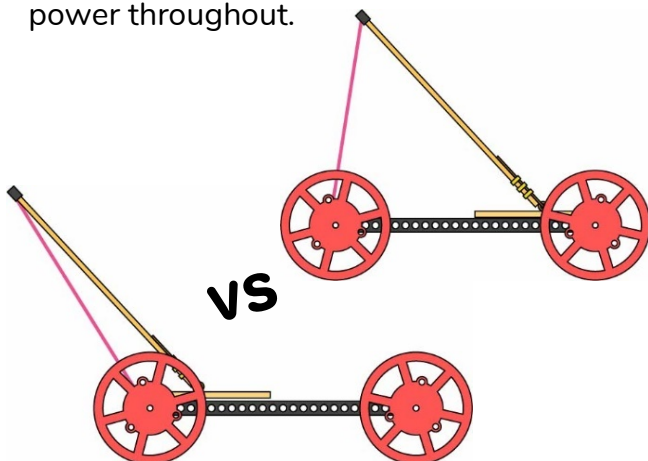
Add a 2nd Lever

Experiment with additional levers to get even more control over your power delivery.



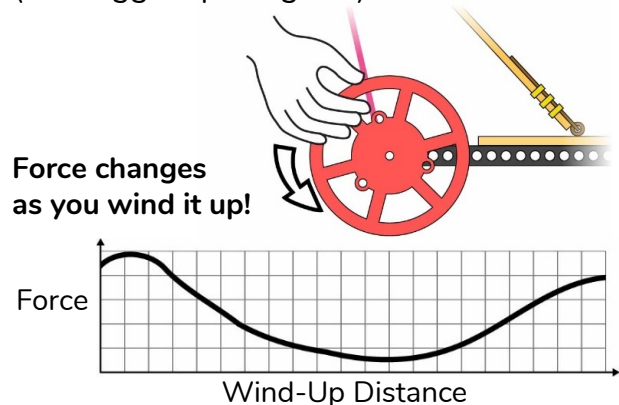
Move the Mousetrap

The lever's position can give you a big speed boost off the start line, or more consistent power throughout.



Test Your Power Delivery

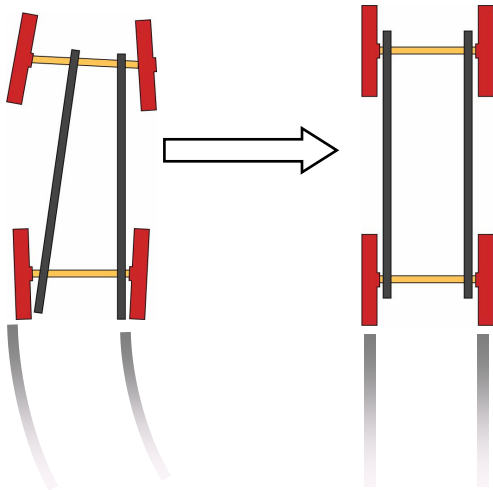
Feel how hard it is to turn the wheel as you're winding up. Easier to turn means more distance, harder means more force (and bigger speed gains).



Keep Playing!

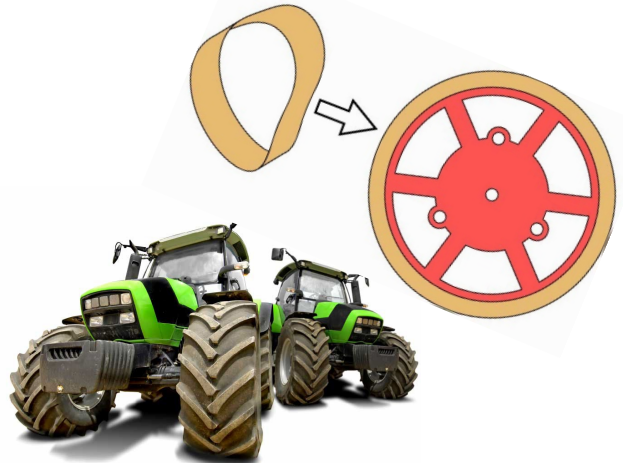
Tracking

Is your car making a turn for the worse? Make sure the frame and wheels are straight and symmetrical. Also, longer frames go straighter than shorter ones.



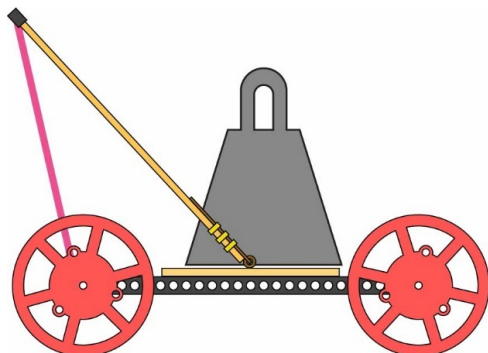
Traction & Rolling Resistance

Are you so fast you're spinning out? Tires will give you more traction, so you can gain speed quicker! But tires also increase rolling resistance, which slows your car down over longer distances.



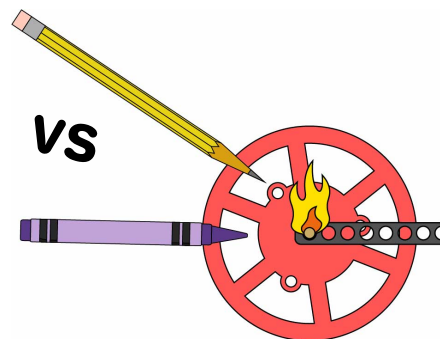
Inertia

Going for massive distance? More inertia (mass) makes it harder for your racer to slow down, but it also makes it harder for your racer to gain speed.



Axle Friction

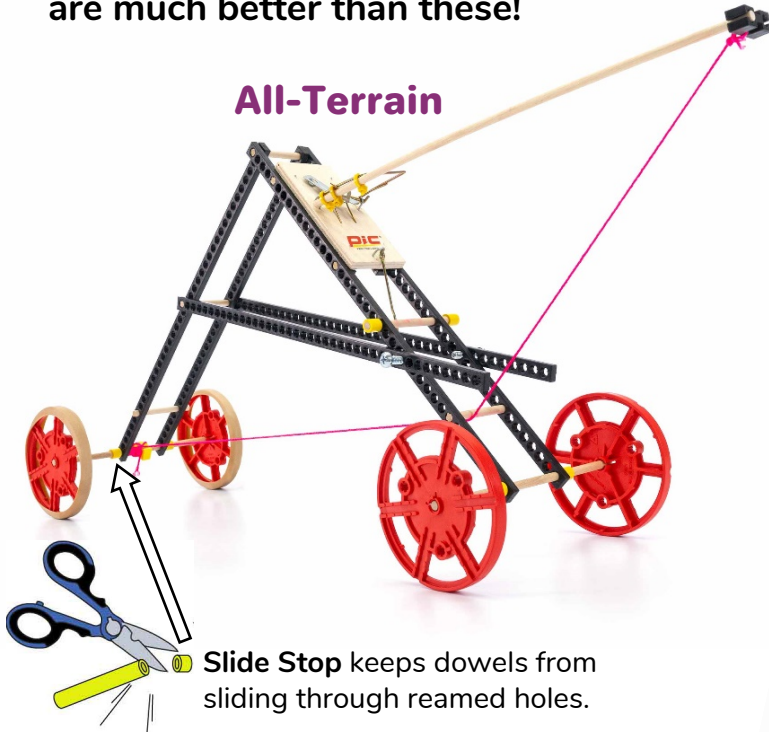
Wherever parts rub, there's friction! Don't let friction in your axles slow you down. Try lubricating with wax (crayon) or graphite (pencil lead).



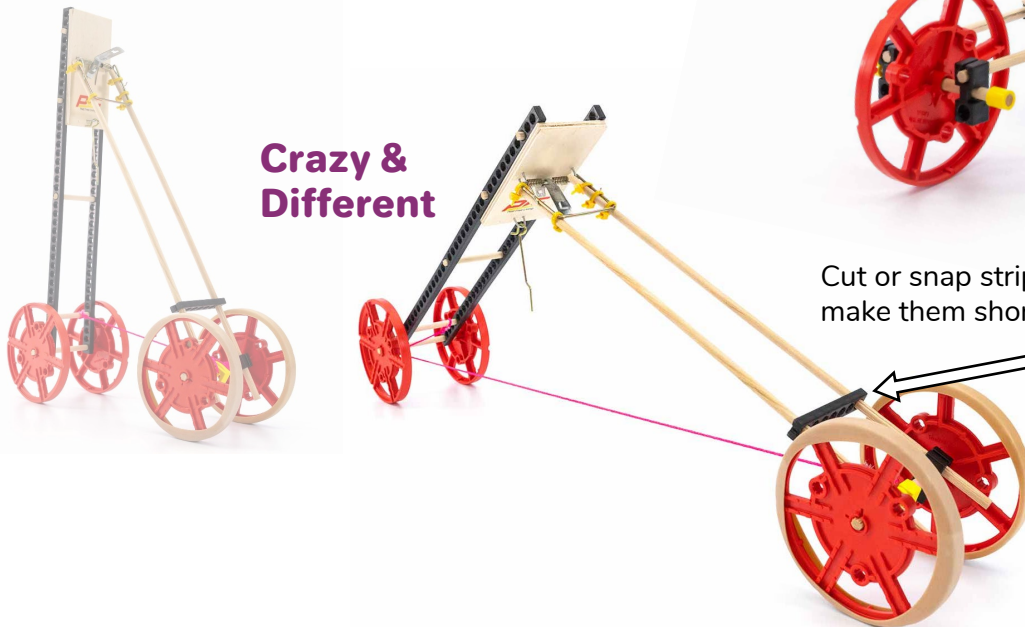
Re-Engineer Your Vehicle

These builds are just examples to get you started. Keep re-engineering and testing your vehicle – you can make designs that are much better than these!

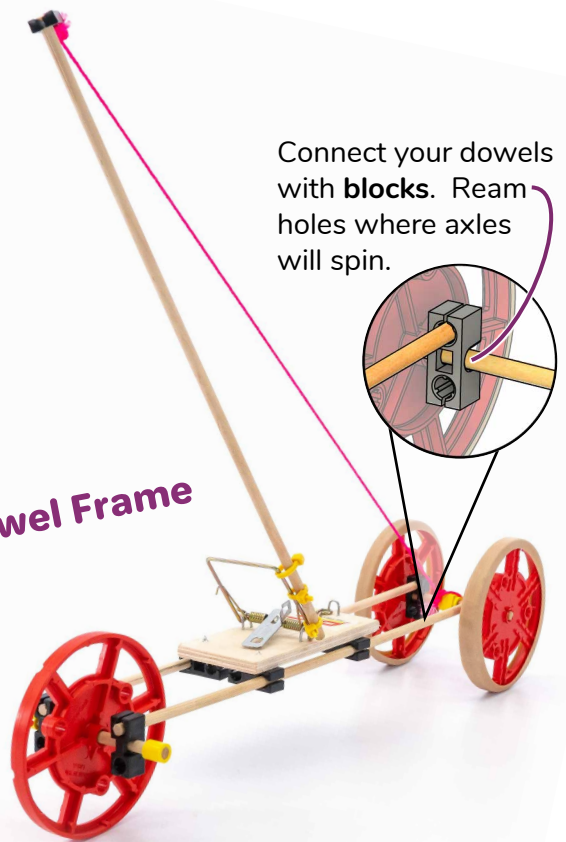
All-Terrain



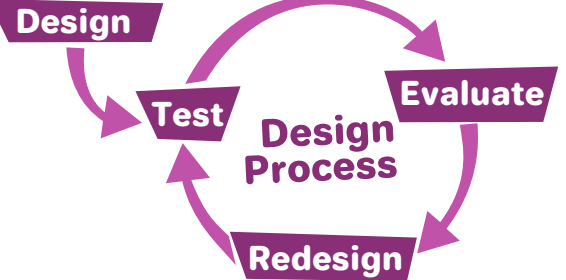
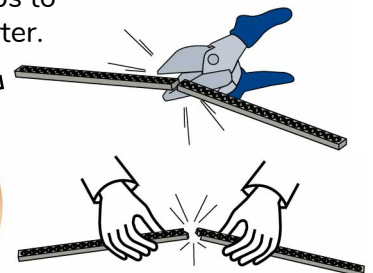
Crazy & Different



Dowel Frame



Cut or snap strips to make them shorter.



The engineering design process never ends. There is no perfect design!

Long Shot Challenge

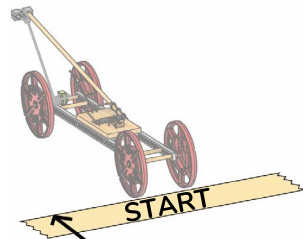
Redesign your vehicle go the farthest distance possible!

Criteria:

(what your design must do)

Your vehicle must travel down the track the **greatest distance from the start line.**

Measure in a straight line from the start line to the front of where the vehicle stops.



Constraints:

(rules and limits for your design)

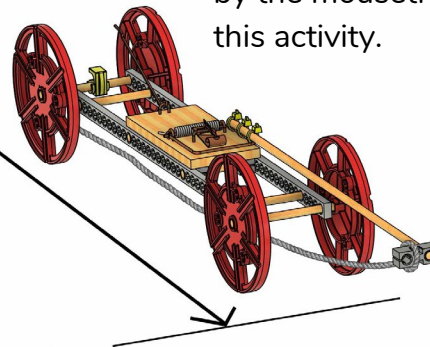
You may only use the TeacherGeek components listed on Page 1.



There is no limit on recycling bin materials.

Your vehicle can only be powered by the mousetrap that came with this activity.

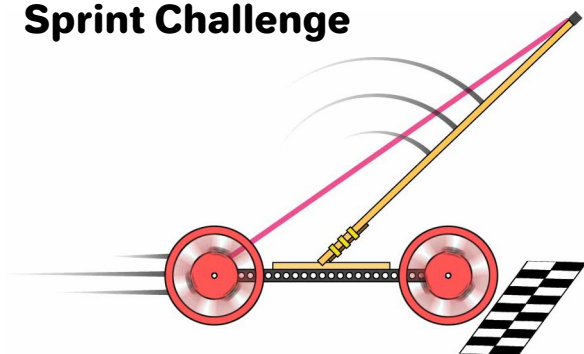
Do not modify the mousetrap, except by adding screws to mount it.



Optional Challenges

These challenges use the same constraints as the Long Shot Challenge (above).

Sprint Challenge



Compete for the fastest time on a 3 m (10 ft) track. The fastest vehicle wins!

Target Challenge



You can also use a finish line as a target.

Design your racer to stop as close to the bullseye as possible. The closest vehicle wins!