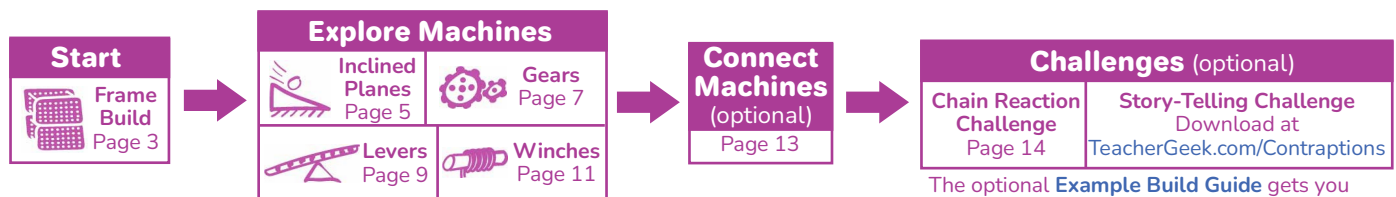


Build a frame, then add machines to make your own Crazy Contraption!



Activity Sequence:



Teachers: You can make each machine into a station/center.

The optional **Example Build Guide** gets you started with a step-by-step example. Download it at [TeacherGeek.com/Contraptions](https://www.teachergeek.com/contraptions)

CONTRAPTION PARTS

These are the parts you need to build one Contraption, plus some extras, to make your own unique designs!

NAME	QTY	PICTURE
Hole Plates	4	
Strips	4	
Blocks	6	
Gear Set	1 set (4 gears)	
Wire 5 m (16 ft)	1	
Portion Cup	1	
Rubber Bands	4	
Slide Stop 8 cm (3 in)	2	
Screws 25 mm (1 in)	5	
String 90 cm (36 in)	1	
Chipboard 22 cm x 5 cm (8.5 in x 2 in)	4	
Bouncy Ball or Marble	1	
Dowels various sizes	12 – 8 cm (3 in) 6 – 10 cm (4 in) 6 – 13 cm (5 in) 6 – 15 cm (6 in) 4 – 30 cm (12 in)	

MATERIALS YOU SUPPLY

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



Optional Tools



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

Using a Maker Cart?

You'll need to supply your own bouncy ball.

Kids will need about 10 full length (30 cm/12 in) dowels if you aren't precutting them.

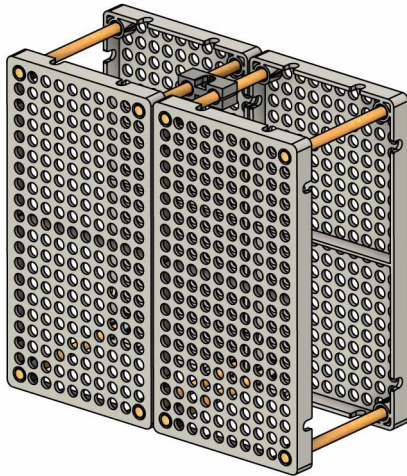




Frame Build

Crazy Contraptions 2.0

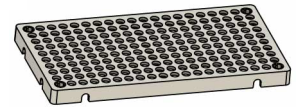
Build a frame to hold your machines!



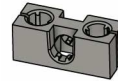
Frame Components



8 – Dowels
8 cm (3 in)



4 – Hole Plates



1 – Block



1 – Cut Wire Piece
10 cm (4 in)



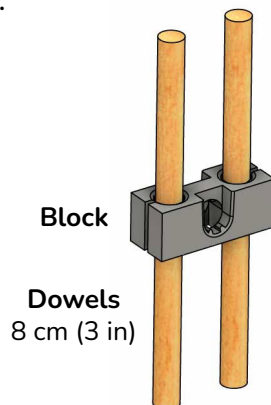
Teacher Tips

An adult may need to help build the frame.

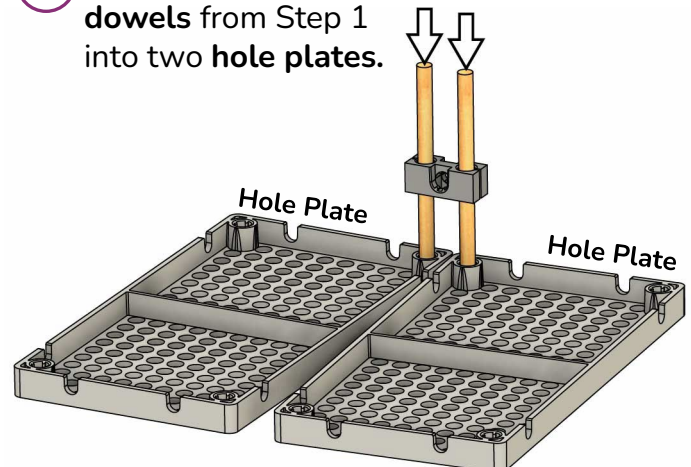


Frames may be reused year after year.

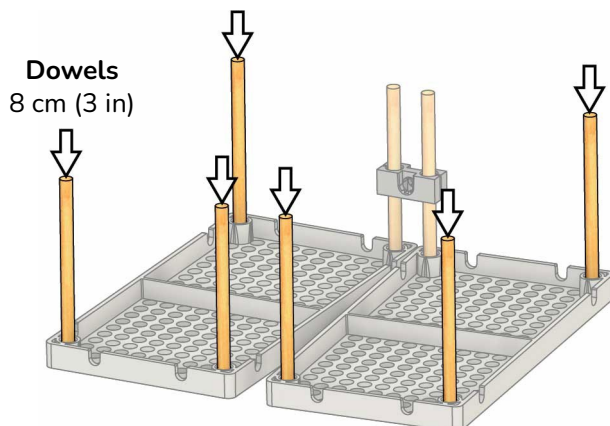
- 1** Your 1st challenge: Wiggle or tap two 8 cm (3 in) dowels into a block.



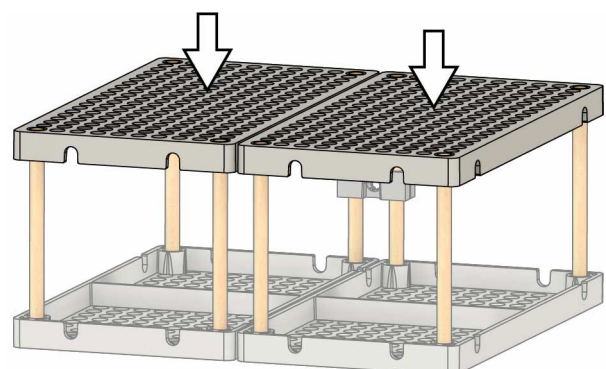
- 2** Wiggle or tap the dowels from Step 1 into two hole plates.



- 3** Add six more 8 cm (3 in) dowels to the corners of the hole plates.

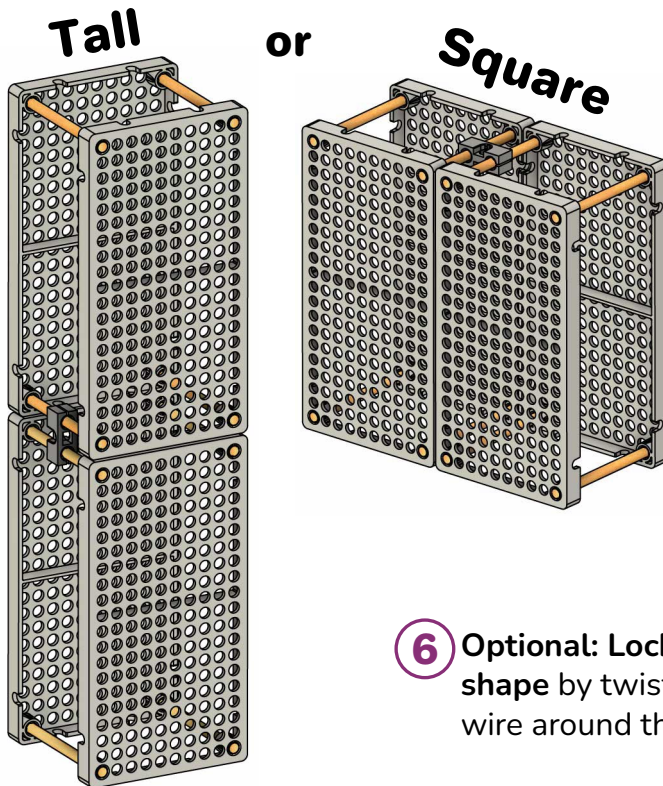
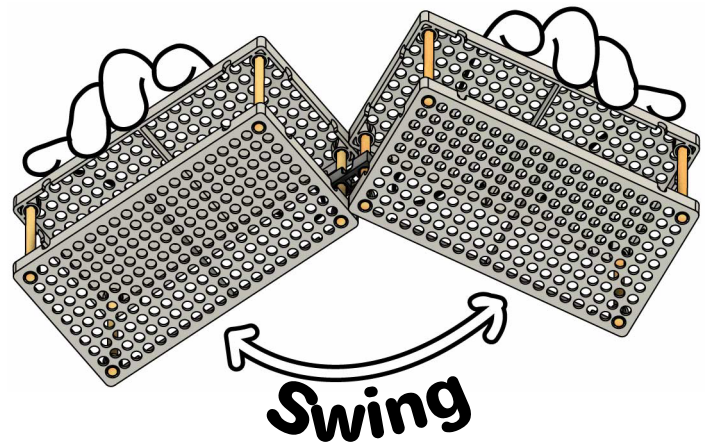


- 4** Add two more hole plates to the top of your dowels.



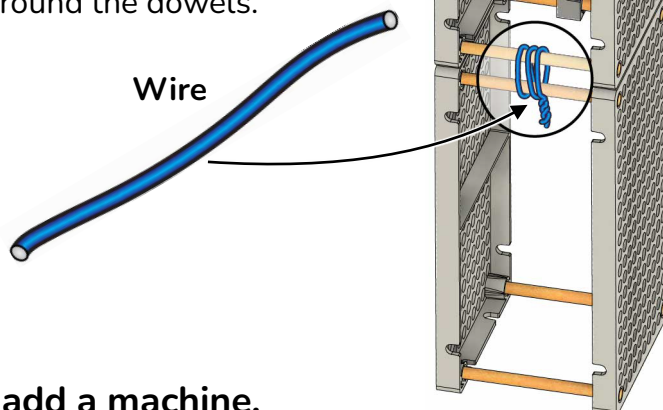


Your frame changes to make different shapes!



- 5** Choose a shape for your frame. You can always change it later.

- 6** Optional: Lock your frame's shape by twisting a piece of wire around the dowels.



☒ **Your frame is done! It's time to add a machine.**



Inclined Planes
Page 5



Gears
Page 7



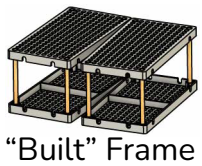
Levers
Page 9



Winches
Page 11



TeacherGeek Components



"Built" Frame

6 – Dowels
15 cm (6 in)

4 – Chipboard
22 x 5 cm (8.5 x 2 in)

Slide Stop



Bouncy Ball
or Marble



Other Components
(optional for more
creative designs)

You Supply



Tape



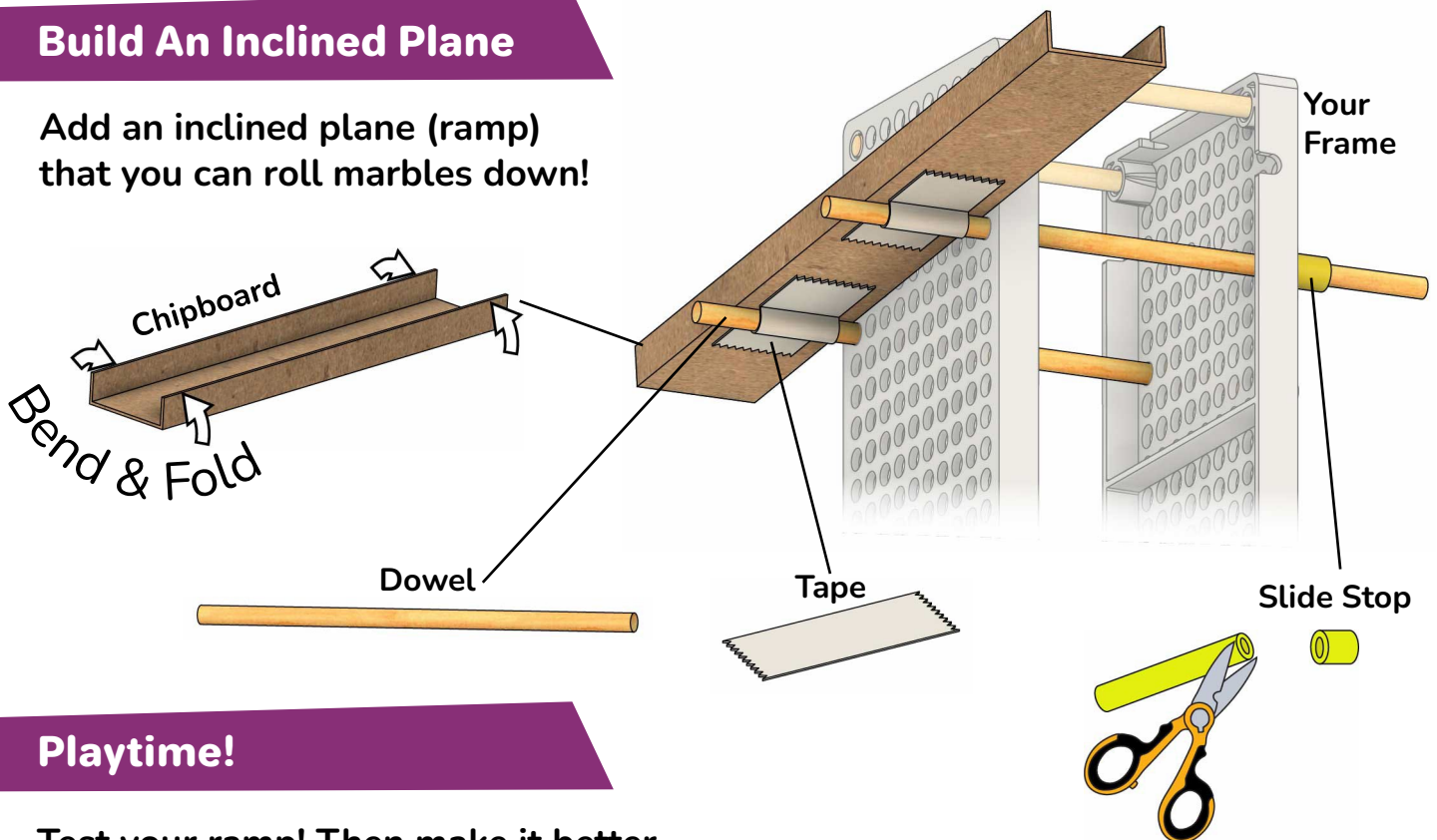
Scissors



Recycling Bin
Materials
(optional for more
creative designs)

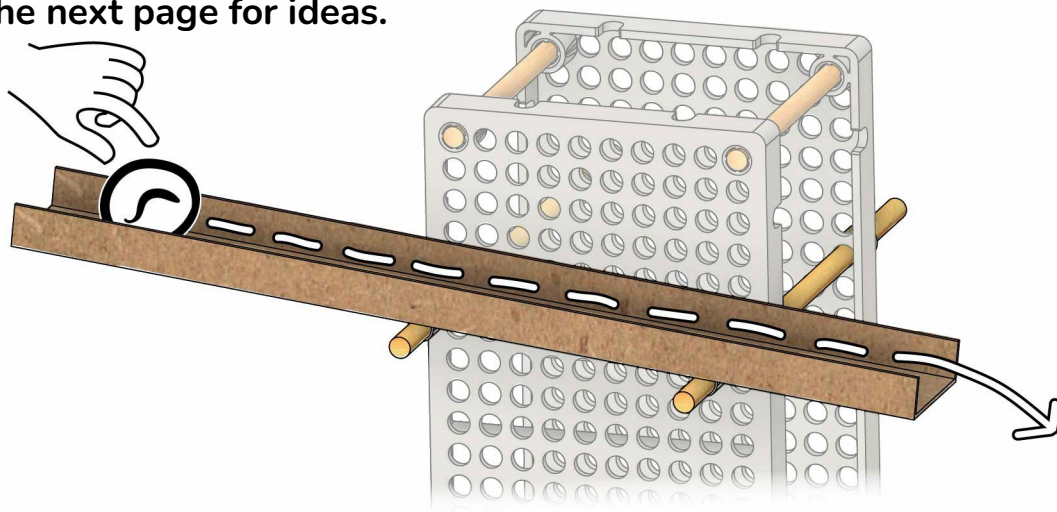
Build An Inclined Plane

Add an inclined plane (ramp)
that you can roll marbles down!



Playtime!

Test your ramp! Then make it better.
Check out the next page for ideas.

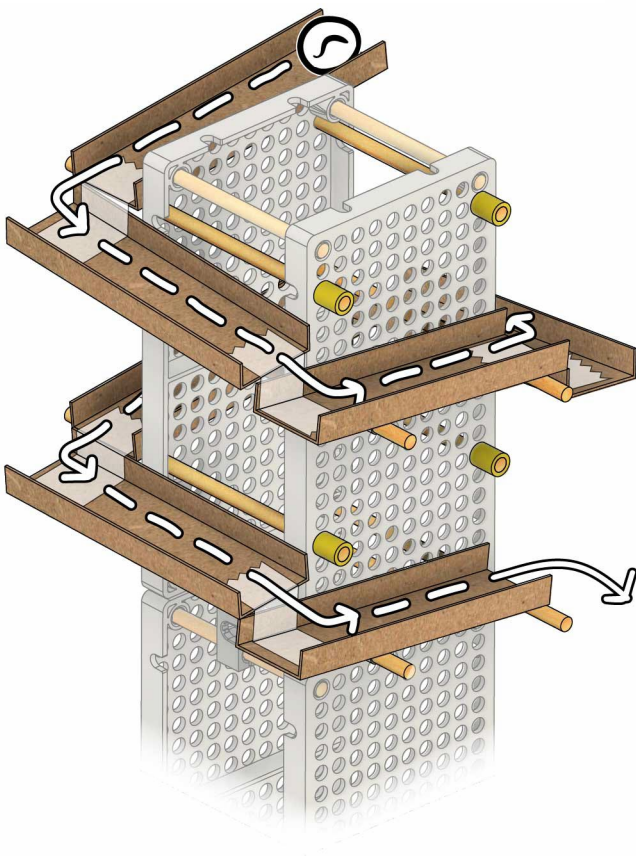




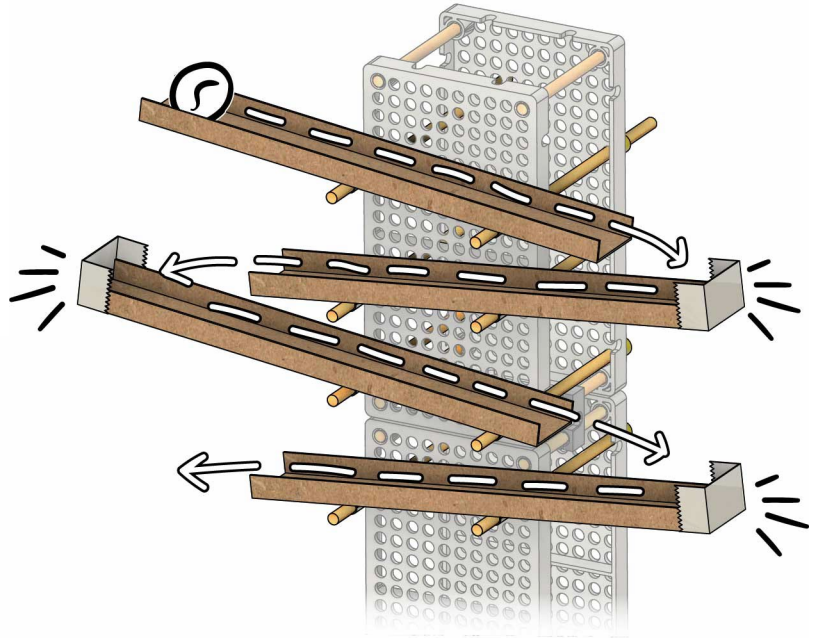
Engineer Your Own Inclined Planes

Add more ramps, move them, cut them, or make them perform a task!

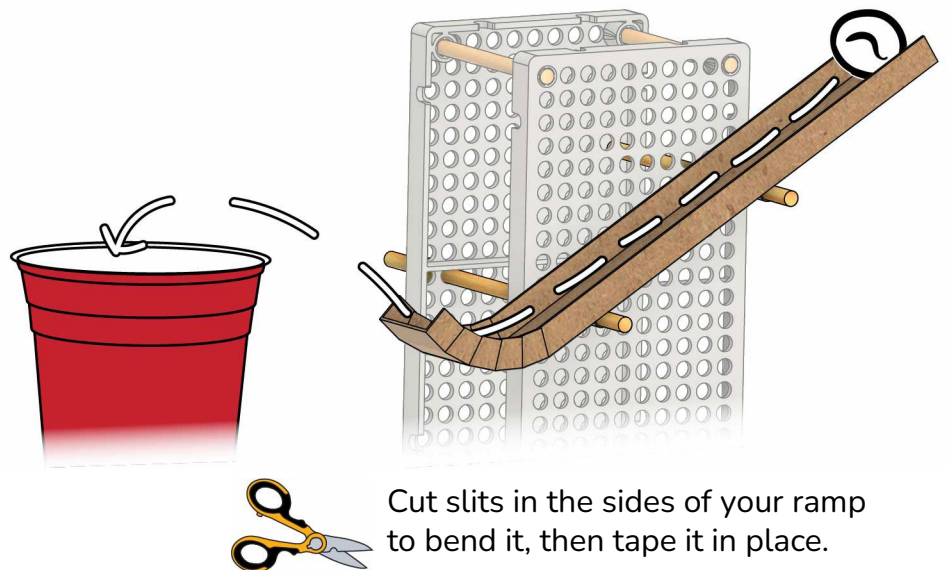
Wrap Ramps



Stack Ramps



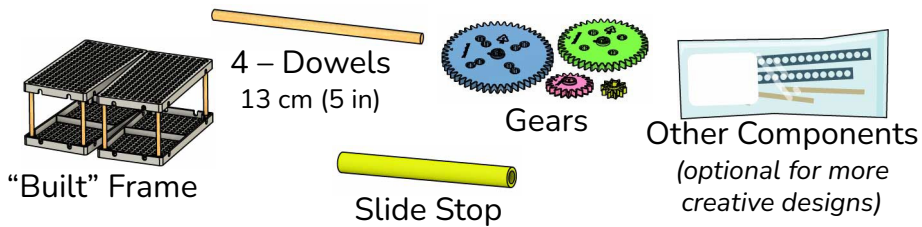
Make A Jump



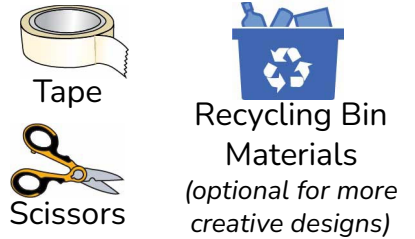
Cut slits in the sides of your ramp to bend it, then tape it in place.



TeacherGeek Components

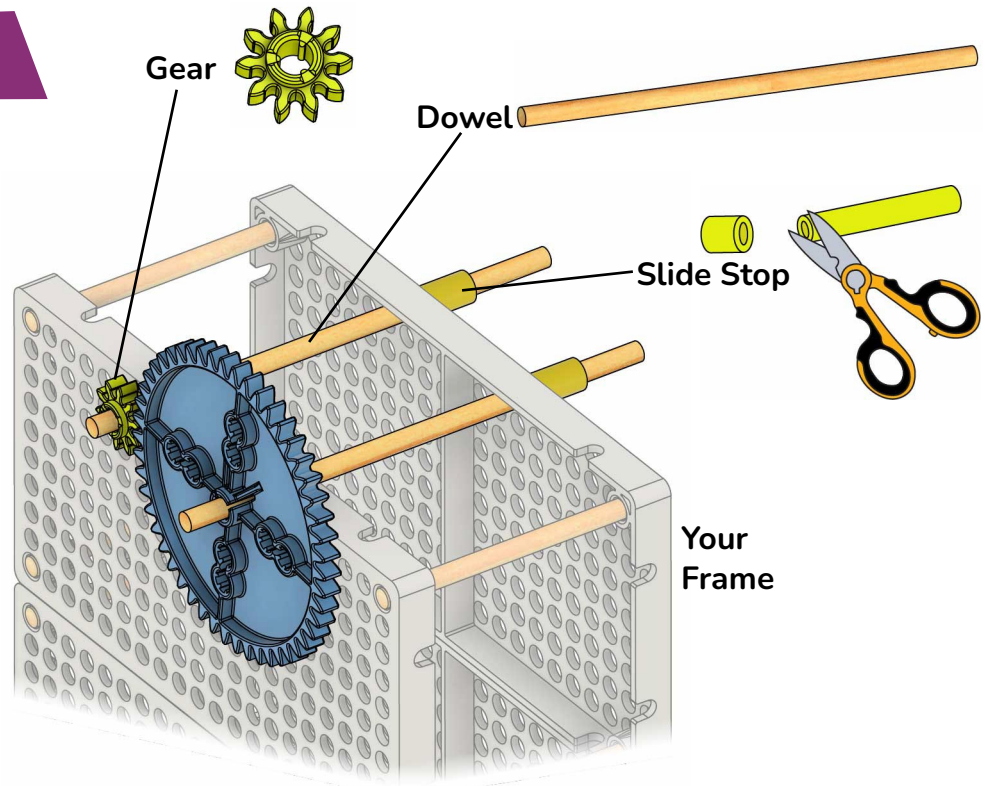
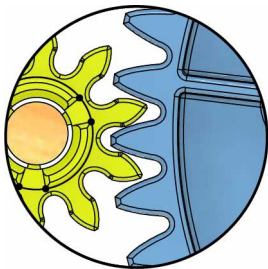


You Supply



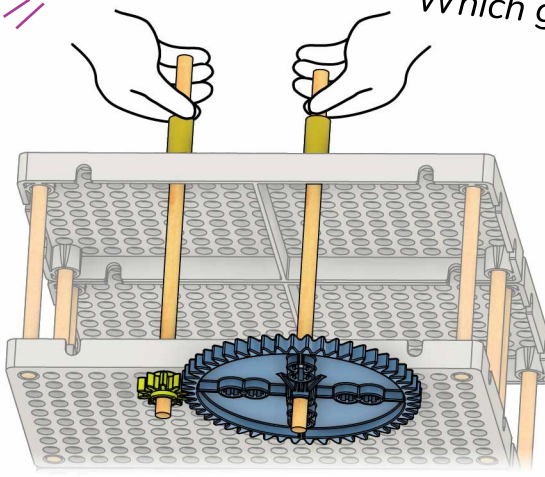
Build Your Gears

Mesh gears to make them spin each other!

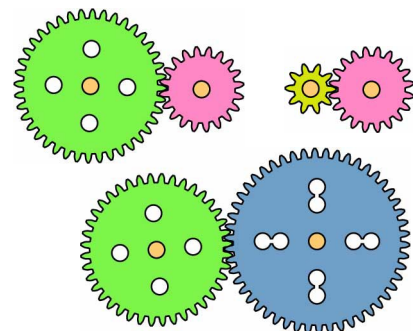


Playtime!

Spin them as **FAST** as you can! Have a twisting war!
Which gear wins?



Try different gear combinations:





Engineer Your Own Gears

Mesh more gears, change the order, or make them perform a task.

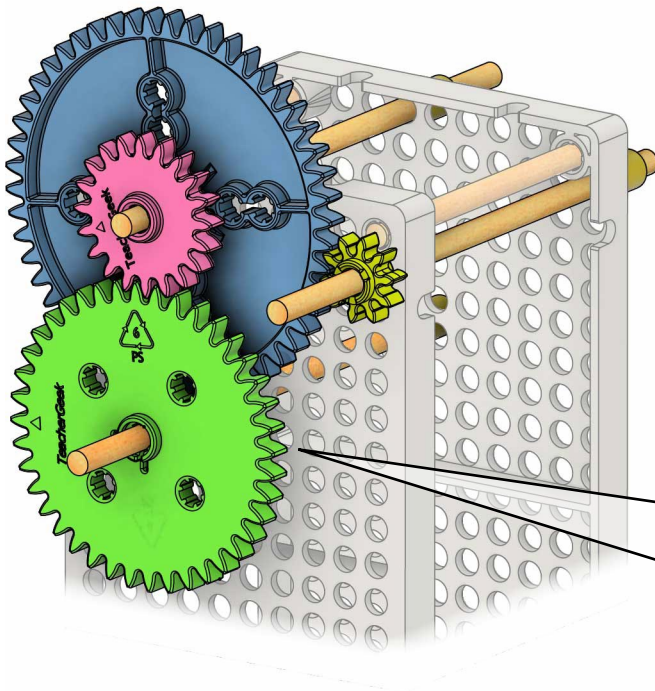
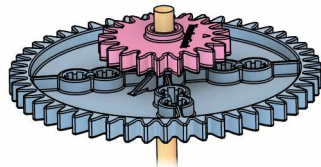


Want to learn more about gears?

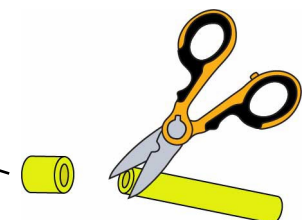
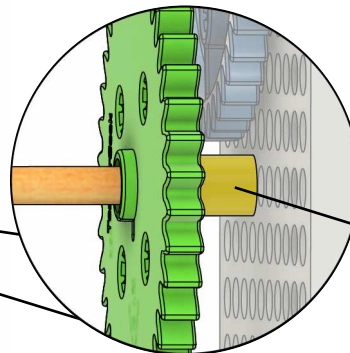
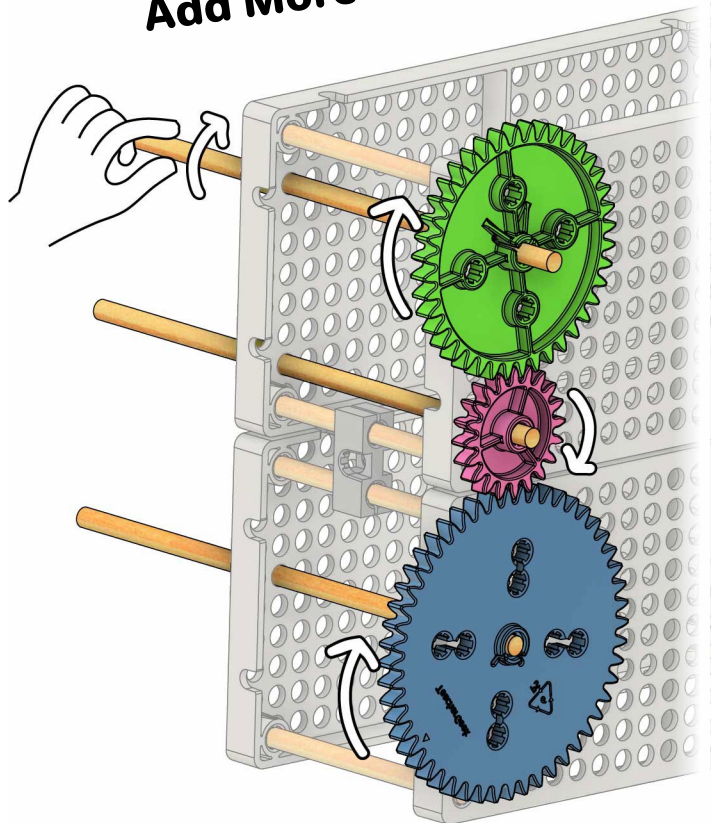
Download the
[Gears Mechanical Advantage Sheet](https://www.teachergeek.com/Contraptions)
at [TeacherGeek.com/Contraptions](https://www.teachergeek.com/Contraptions)

Make Compound Gears

Compound gears are two gears on the same axle (dowel).



Add More Gears



Use Slide Stop
as a spacer.



Levers

TeacherGeek Components



"Built" Frame



1 – Dowel
15 cm (6 in)



1 – Strip



Slide Stop



Other Components
(optional for more creative designs)

You Supply



Tape



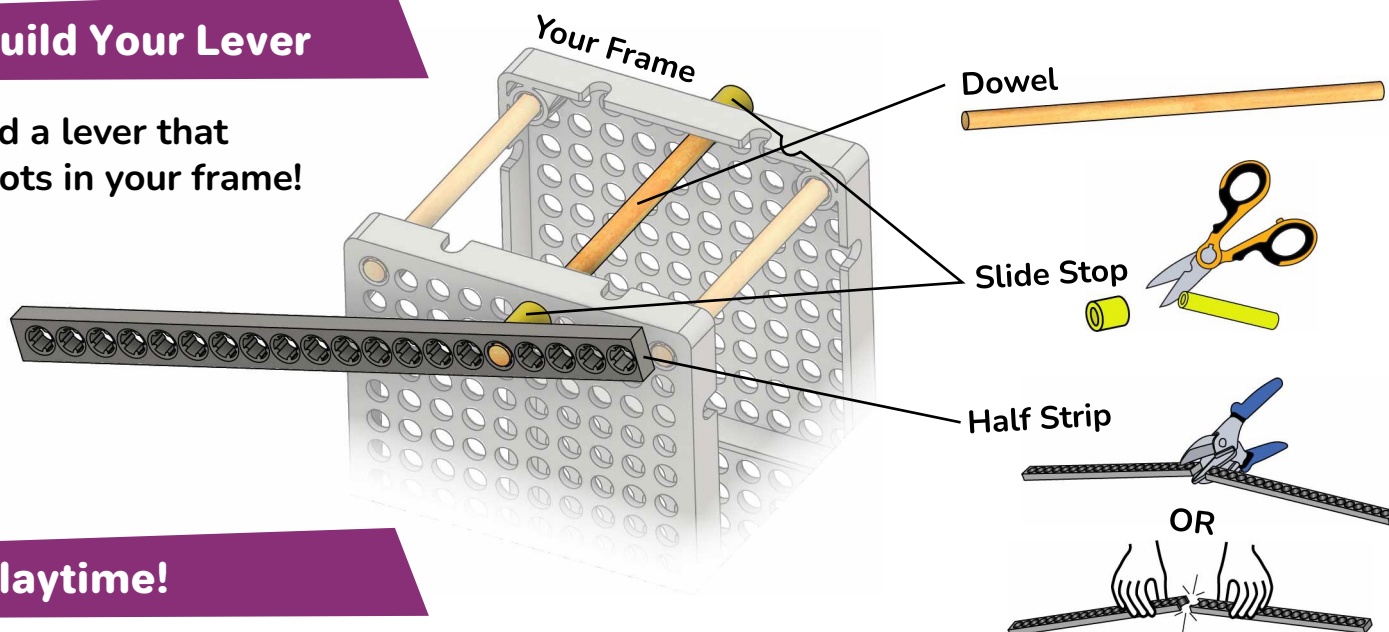
Scissors



Recycling Bin
Materials
(optional for more creative designs)

Build Your Lever

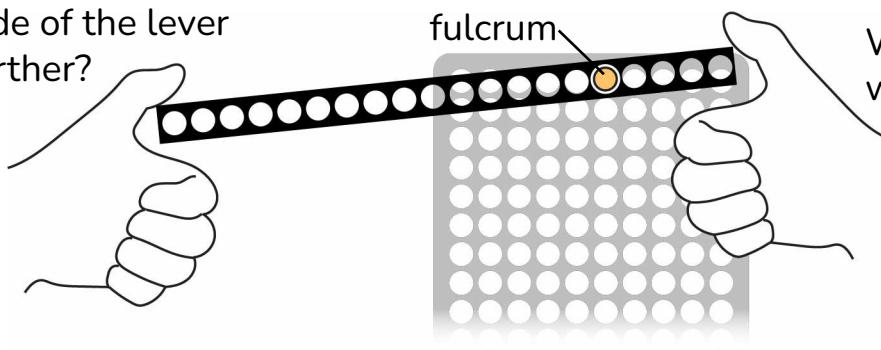
Add a lever that pivots in your frame!



Playtime!

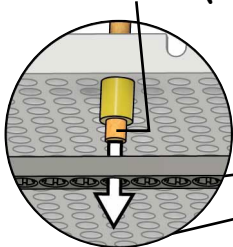
Feel the lever trade between force and distance!

Which side of the lever moves farther?

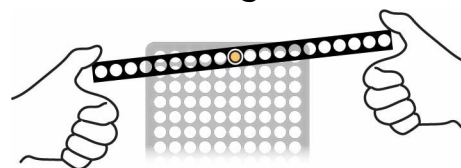
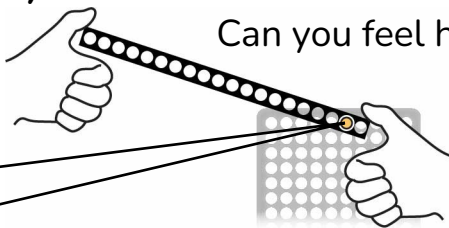


Which side pushes with more force?

Move the fulcrum (dowel)



Can you feel how the lever changes?





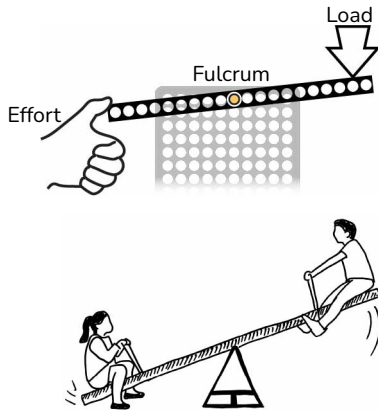
Levers

Try Different Types of Levers

Levers can be made in 3 ways, called classes.

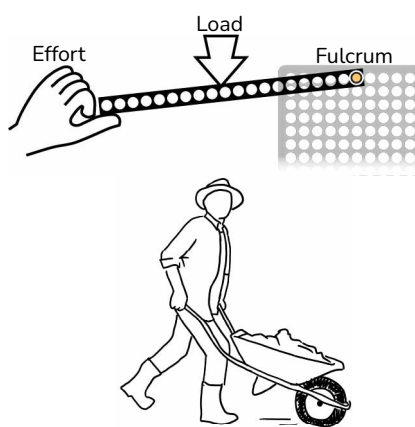
Class 1

(fulcrum in the middle)



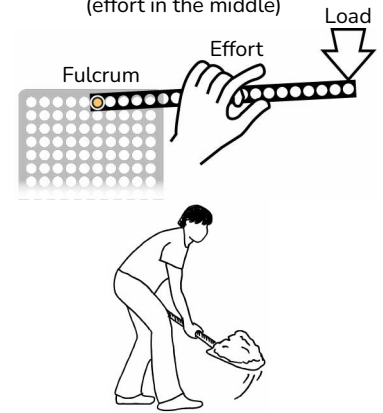
Class 2

(load in the middle)



Class 3

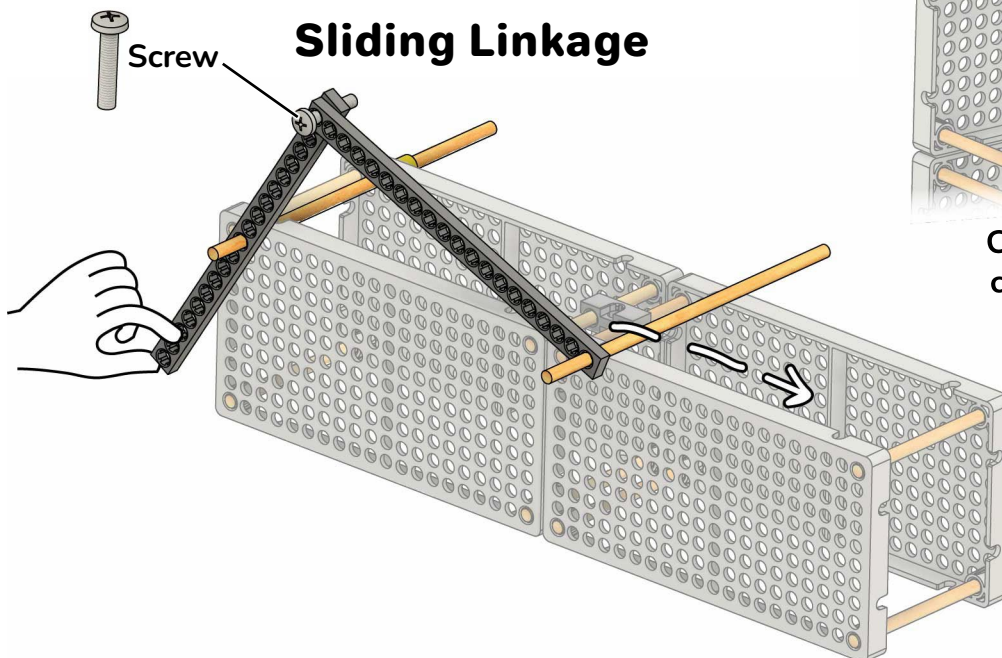
(effort in the middle)



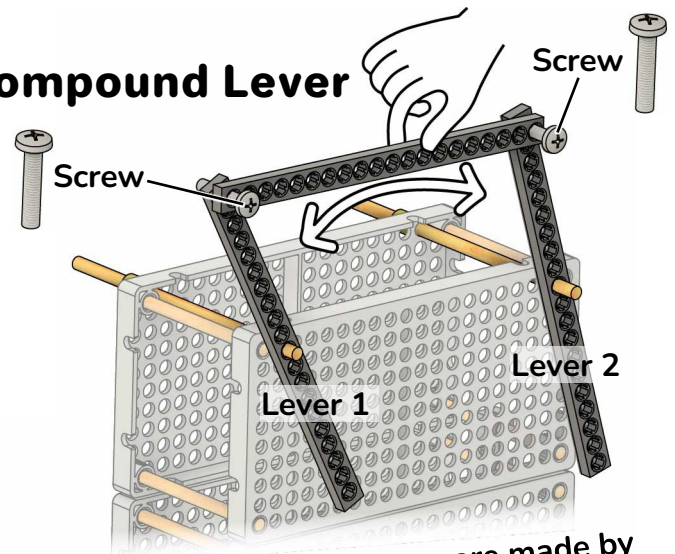
Engineer a Linkage

Make a linkage by connecting your lever to strips, dowels, and even other levers!

Sliding Linkage



Compound Lever



Compound levers are made by connecting at least 2 levers.



TeacherGeek Components



"Built" Frame



String



Slide Stop



Other Components
(optional for more
creative designs)



1 – Dowel
15 cm (6 in)

You Supply



Tape



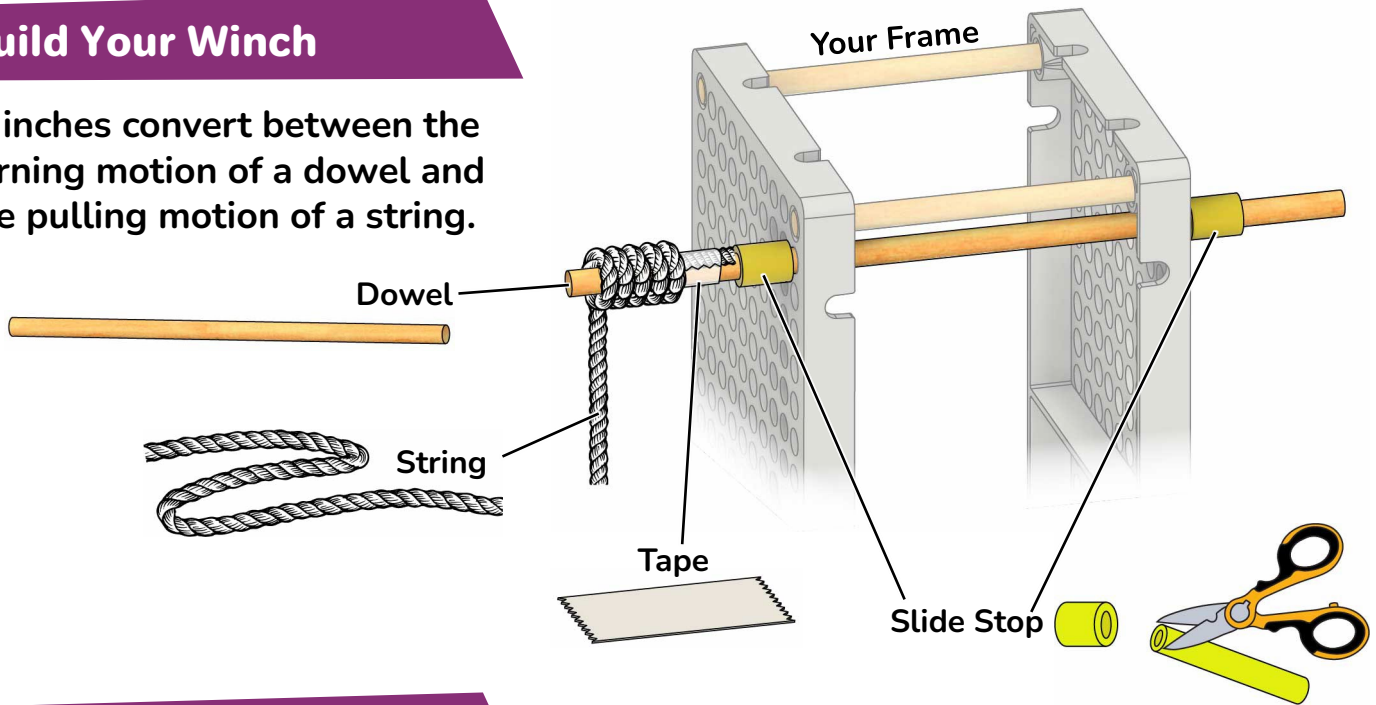
Scissors



Recycling Bin
Materials
(optional for more
creative designs)

Build Your Winch

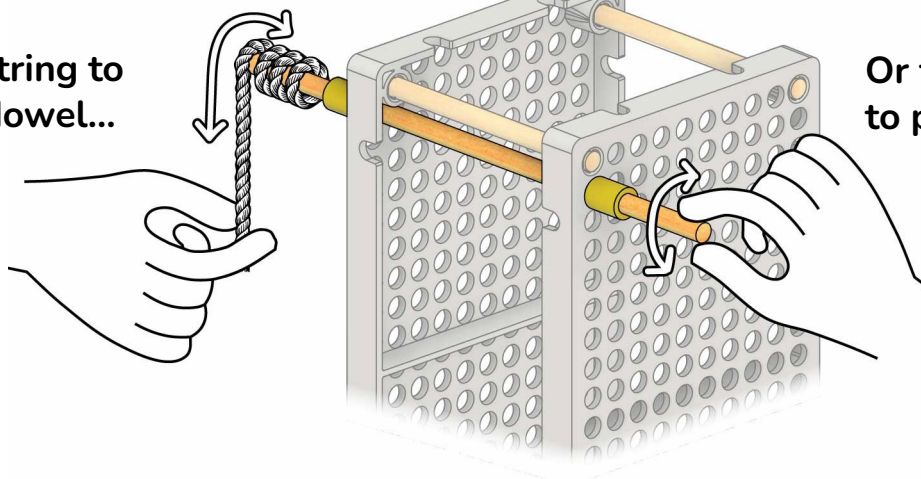
Winches convert between the turning motion of a dowel and the pulling motion of a string.



Playtime!

Test your winch! Then make it better.
Check out the next page for ideas.

Pull the string to
turn the dowel...



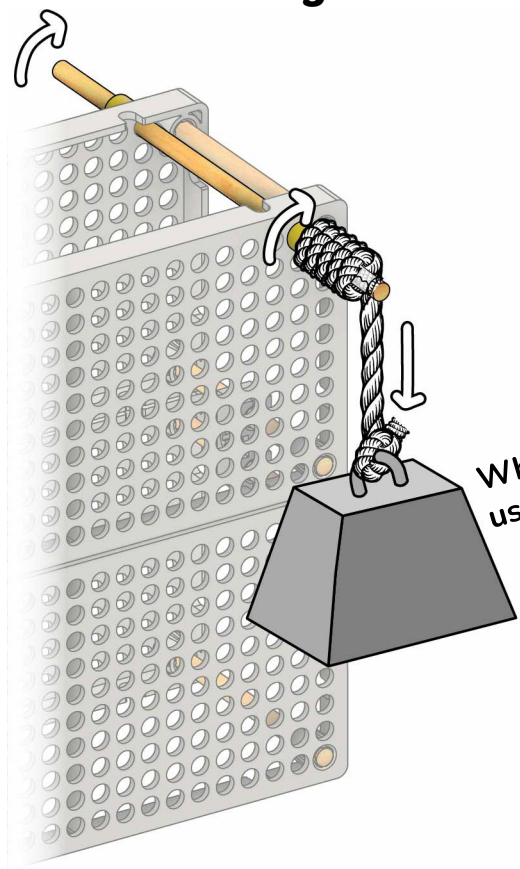
Or turn the dowel
to pull the string!



Engineer Your Own Winch

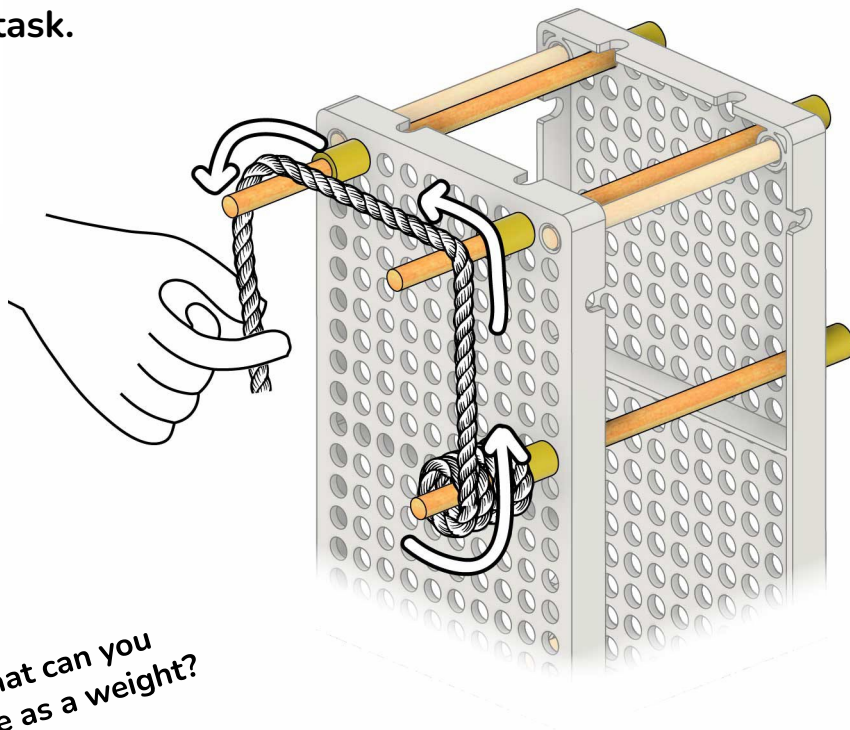
Add pulleys, make a “double-winch,” or make your winch perform a task.

Connect Weights

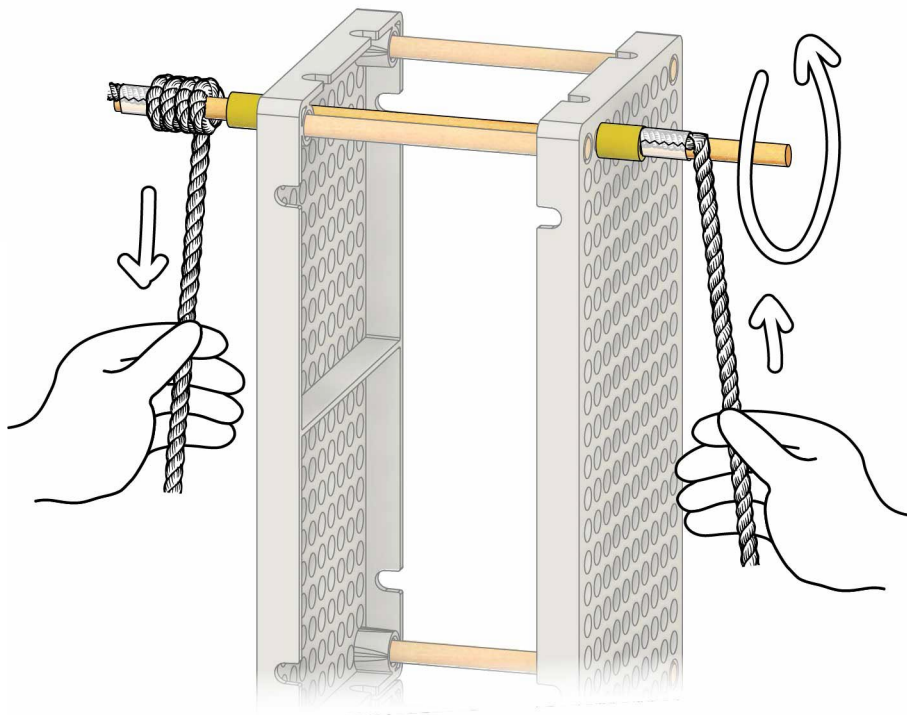


What can you use as a weight?

Add Pulleys



Make A Double Winch

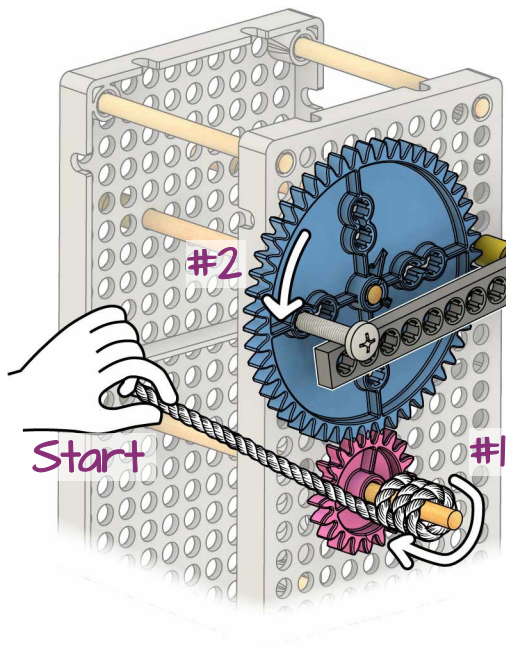
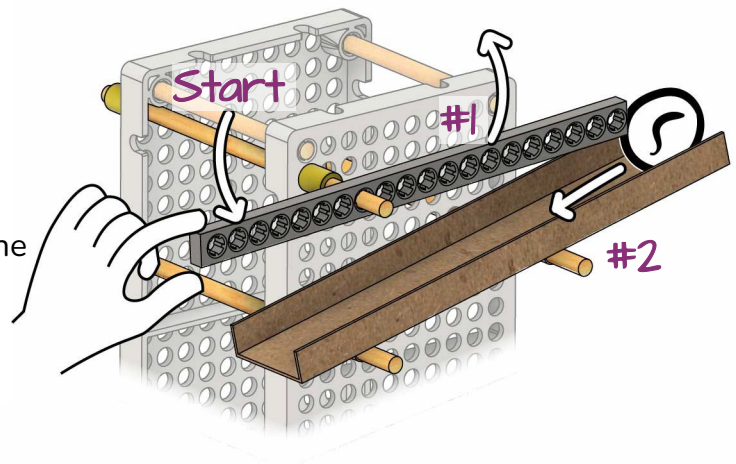


Connect your machines to make a contraption! Start with two, then add more. Here are some ideas to get you started.

2 Machines

Idea #1 – Ball Roller

- Start – Hand pushes lever
- #1 – Lever pivots, releasing ball
- #2 – Ball rolls down inclined plane



Idea #2 – Flag Waver

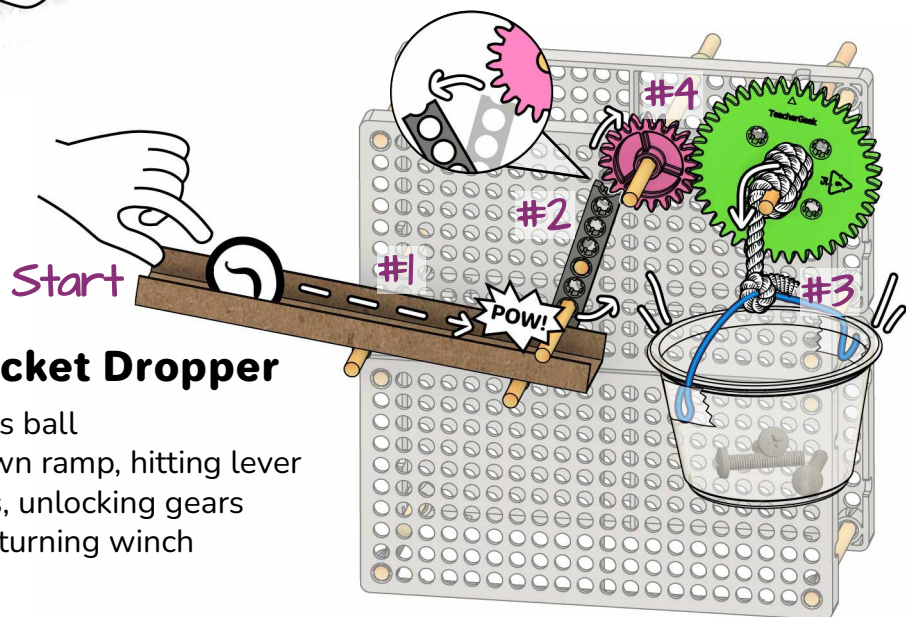
- Start – Hand pulls string
- #1 – Winch spins, turning gears
- #2 – Gears turn, pushing lever
- #3 – Lever waves up and down

3 Machines

4 Machines

Idea #3 – Bucket Dropper

- Start – Hand drops ball
- #1 – Ball rolls down ramp, hitting lever
- #2 – Lever swings, unlocking gears
- #3 – Bucket falls, turning winch
- #4 – Gears spin

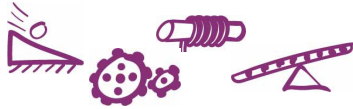


Chain together as many machines as you can!

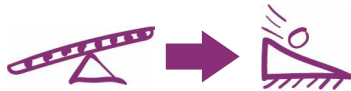
The contraption with the most points wins.

Scoring

+1 Point for each type of machine used



+1 Point per transition from one type of machine to another



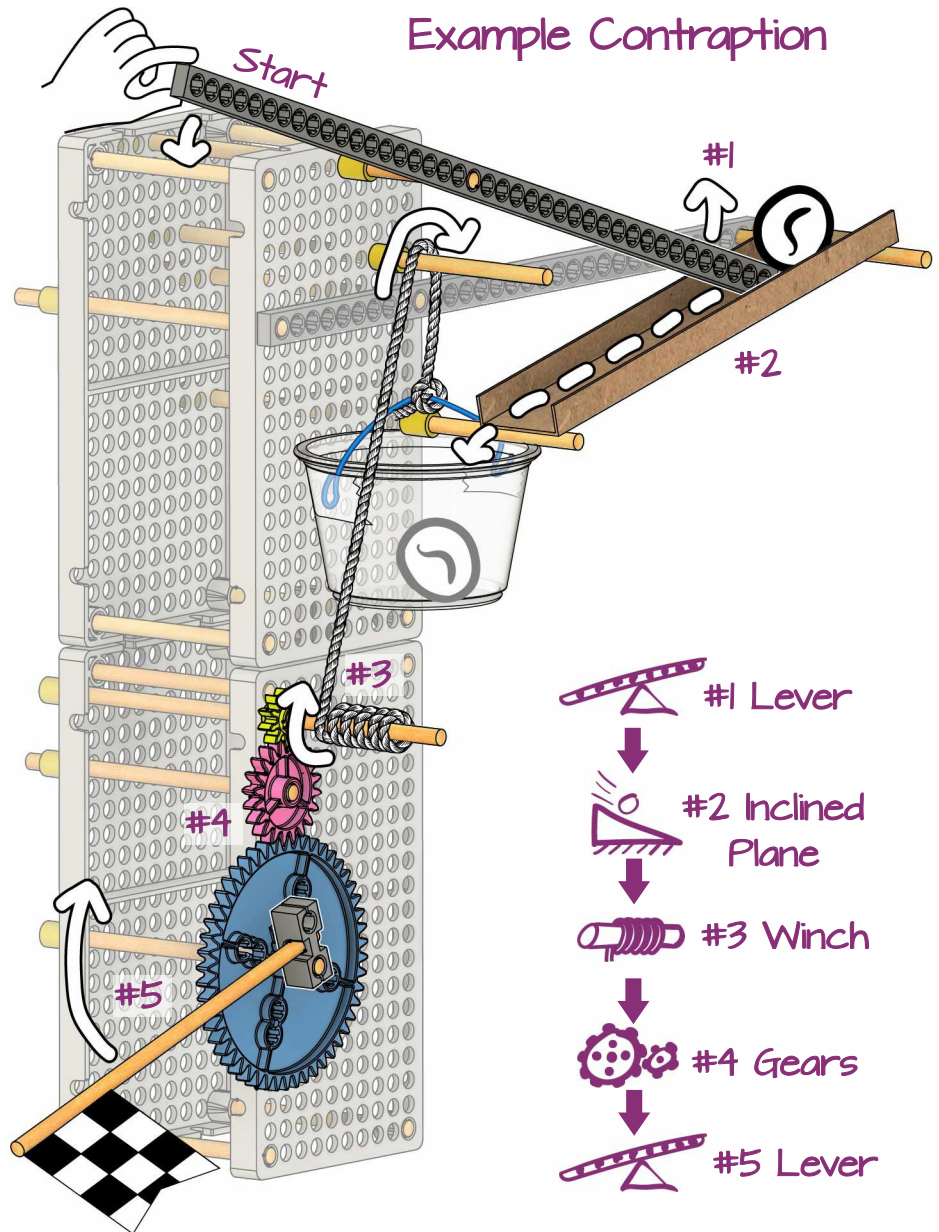
Constraints

Your contraption must:

- Be safe
- Work without help
- Only use the supplies listed on Page 2



Example Contraption



Example Score

4 different types of machines
+4 transitions
8 Total Points



Want to try a different challenge?

Download the
[Story Telling Challenge](https://www.teachergeek.com/contraptions) at
[TeacherGeek.com/Contraptions](https://www.teachergeek.com/contraptions)