Set-Up Guide Gears Tinker Set

How do gears work?

Do they change speed, direction, force?

Build your base and gears to find out!

If doing this activity with young children, have an adult set it up first. Once set up, this activity can be re-used without taking it apart! Kids can still modify and tinker with it year after year.

You Are Here

Choose how you would like to complete this activity.
Download these documents at teachergeek.com/gears

Set-Up Guide
Start here to build your tinker set. Tinker forever with the reusable base and gears.

Optional Labs
- -Fraction
- -Ratio & Proportion
- -Mechanical Advantage Reference Sheet

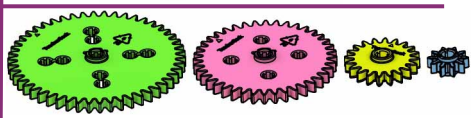
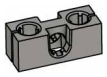
Optional Challenges
- -Obstacle Course
- -Kinetic Sculpture
- -Amusement Park

Optional Teacher Overview

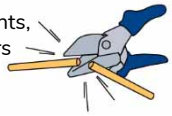
Set-Up Guide Gears Tinker Set

Supplies

These are the parts you need to build one Tinker Set. Extra parts are included for engineering challenges and creating your own designs.

NAME	QTY	PICTURE
Hole Plates SKU 1821-32	**2**	
Gear Sets SKU 1821-28	**2 sets** 8 Gears	 1 set Gear colors vary – they're not color coded
Blocks SKU 1821-34	**2**	
Slide Stop 8 cm (3 in) SKU 1821-20	**1**	
Dowels 5 cm (2 in) SKU 1821-20	**10**	

Have a Maker Cart, bulk components, or uncut dowels? Use Multi-Cutters to cut them before moving on.



You'll need to supply...

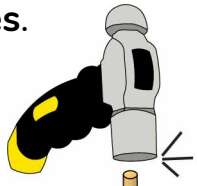
Scissors

Optional Tools

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

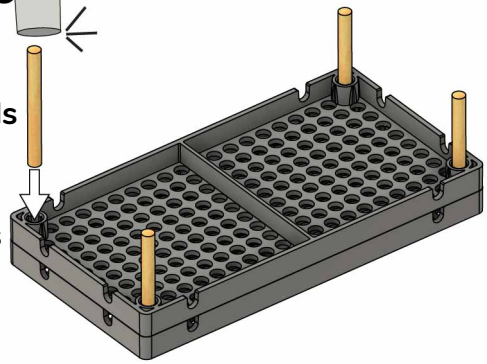
Build the Base

1. **Tap** or push **5 cm** (2 in) **dowels into two** stacked, upside-down **hole plates**.

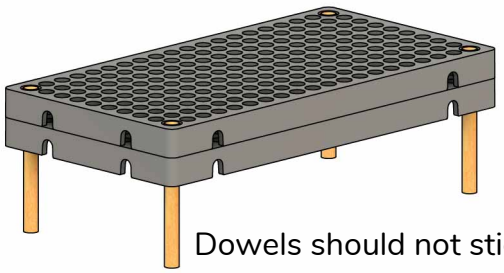


5 cm (2 in) **Dowels**

Hole Plates



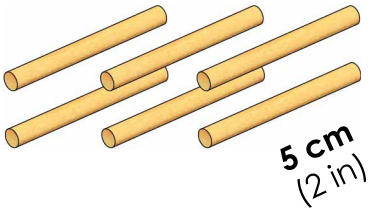
☑ **Congratulations**!
Your base is done.



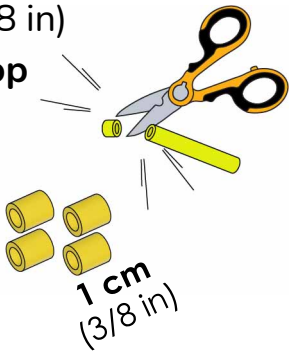
Dowels should not stick out the top of the base.

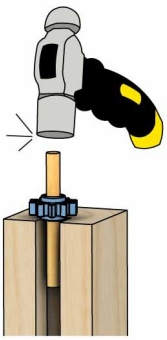
Make the Gears

2 **Get six 5 cm** (2 in) **dowels** to use as gear shafts.



3 **Cut four 1 cm** (3/8 in) pieces of **slide stop** to use as spacers.

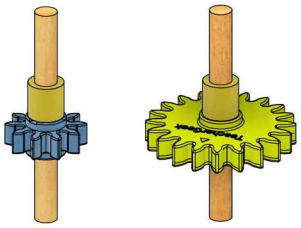




Tapping Block

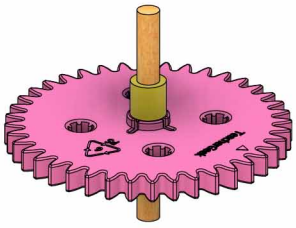
4 **Make one gear of each size.** Tap or wiggle the shaft through the gear's center hole.

You will have 2 shafts & 4 gears left over.



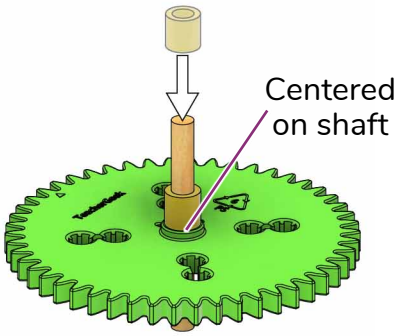
10 Tooth Gear

20 Tooth Gear



40 Tooth Gear

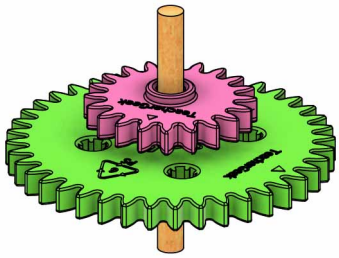
5 **Add slide stop** to the shafts.



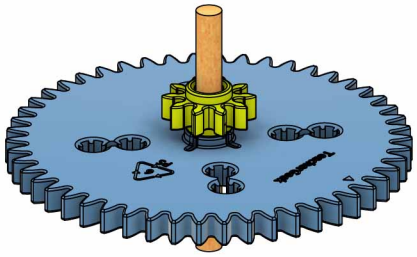
50 Tooth Gear

6 **Make the compound gears** below with your remaining shafts and gears.

Compound gears don't need slide stop.



20 Tooth & 40 Tooth



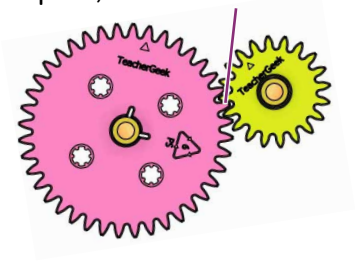
10 Tooth & 50 Tooth

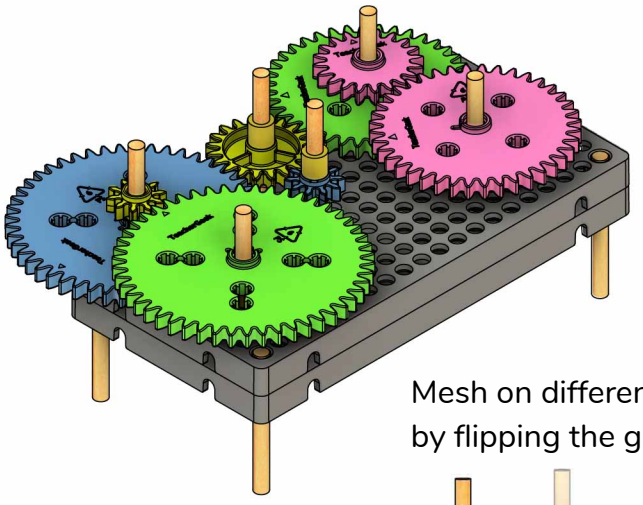
Set-Up Guide Gears Tinker Set

Mesh the Gears

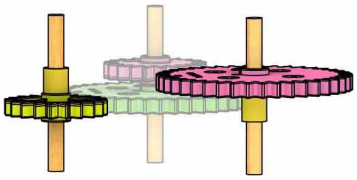
7 **Mesh** your **gears on** the **base. Tinker and experiment!**

Gears that are too close, or too far apart, won't mesh correctly.





Mesh on different layers by flipping the gears.



Congratulations! Your tinker set is done... but you aren't! It's time to do an optional lab or challenge!

Get the documents at **teachergeek.com/gears**

Labs:

- -Fraction Lab
- -Ratio & Proportion Lab
- -Mechanical Advantage Reference Sheet

Challenges:

- -Obstacle Course
- -Kinetic Sculpture
- -Amusement Park

OPTIONAL

Bigger Bases

Have a class set? Make a giant gear train!

Use **blocks** to combine bases.