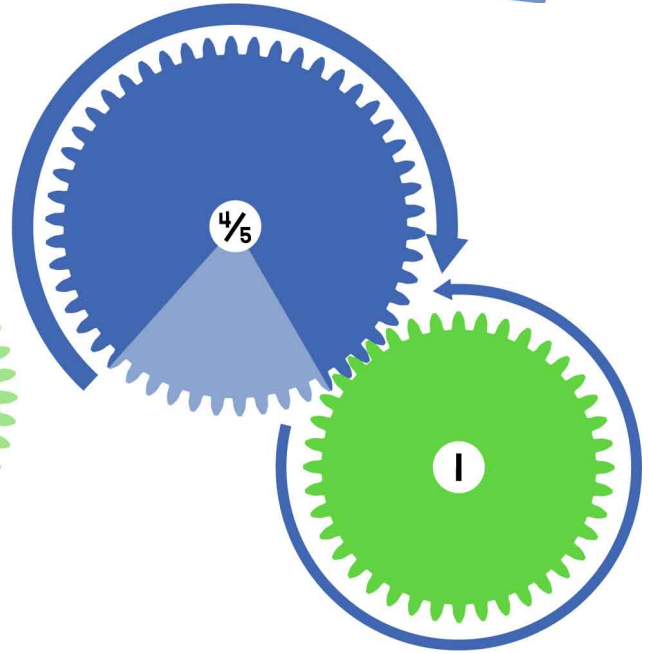
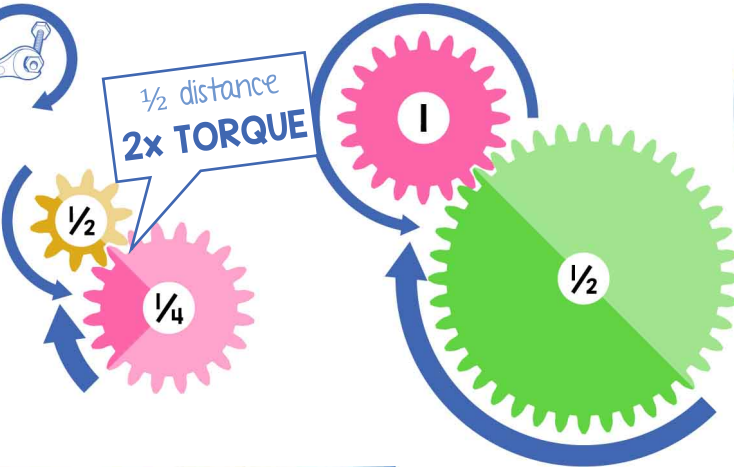


# MECHANICAL ADVANTAGE GEAR TINKER SET



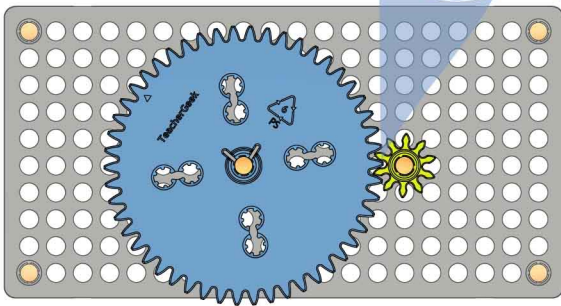
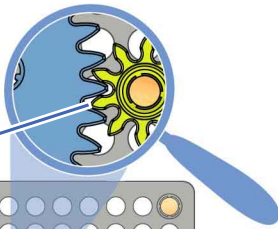
Mechanical advantage lets you amplify **torque** or distance, but you have to trade one to get the other!



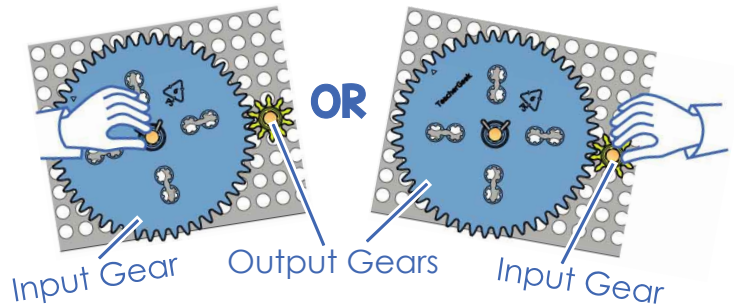
## FEEL THE ADVANTAGE

Mesh two different sized gears.

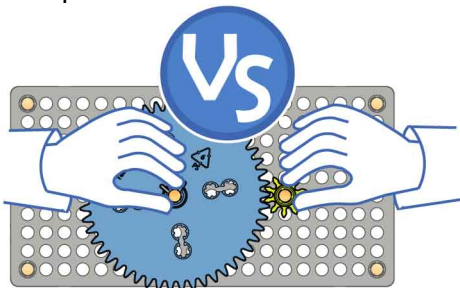
Meshing



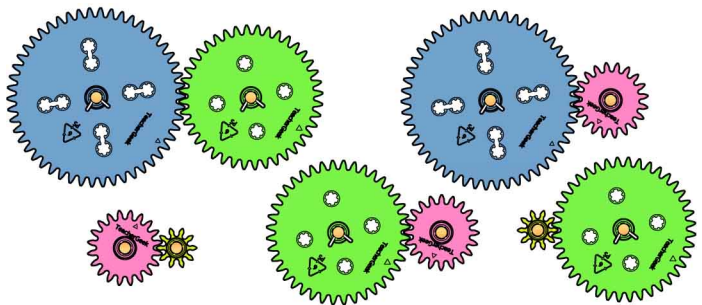
Try spinning your gears, switching the input and output gears. Which way amplifies speed?



Have a twisting contest with a partner! Which gear amplifies force?

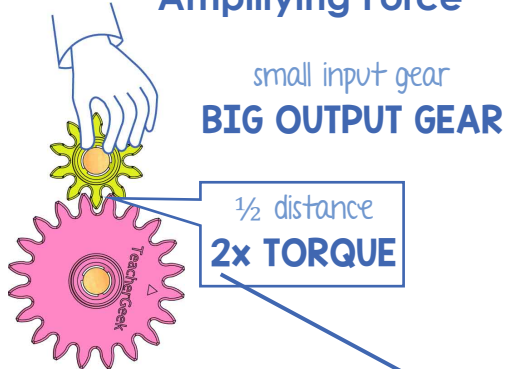


Try different sets of gears!



### HOW'S IT WORK?

#### Amplifying Force



Mechanical Advantage = 2

#### Amplifying Speed

#### BIG INPUT GEAR

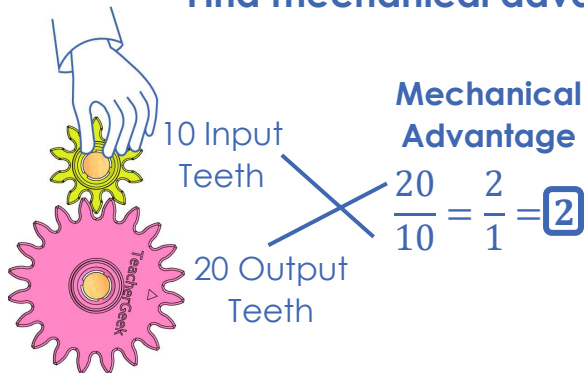
small output gear

**2x DISTANCE**  
 $\frac{1}{2}$  torque

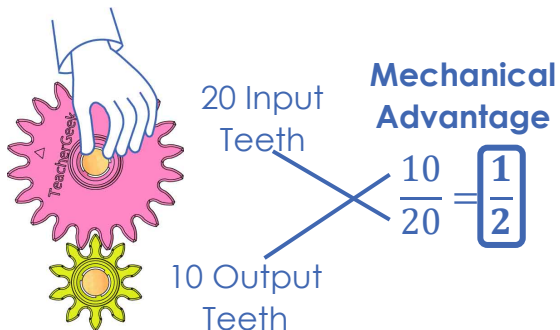


Mechanical Advantage =  $\frac{1}{2}$

Find mechanical advantage using the gears' teeth.



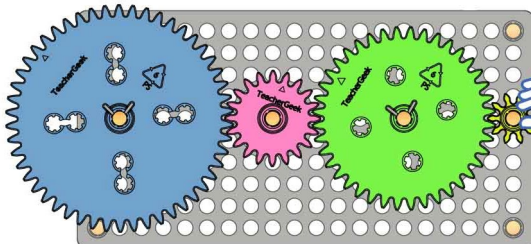
When mechanical advantage is bigger than 1, force goes up (and speed goes down).



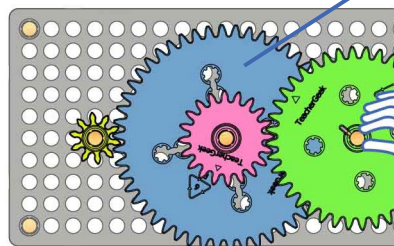
When mechanical advantage is less than 1, force goes down (and speed goes up).

### OPTIONAL GEAR TRAINS

Make a gear train! Can you get more speed? Force?



What if you use compound gears in your gear train?



Compound gears are two gears on the same axle.

