Hello!

What are we doing ?

intro

part one	Intro to gear mechanisms. Explain common components/parts to each other.
part two	Group activity - Make a mechanism on paper!
extra time	Intro to mechanical advantage + some examples.

end

Why do we need mechanisms?

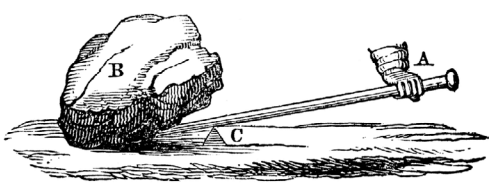
To convert input forces and movement to specific output forces and movements

---

COMMON USES

convert mechanical energy from engines or motors

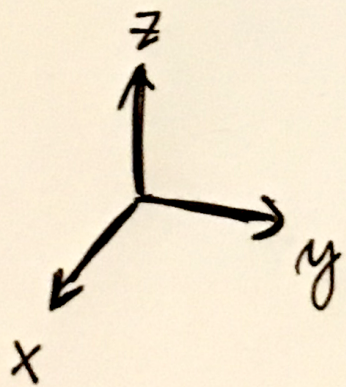
make it easier to do tasks that require a lot of force



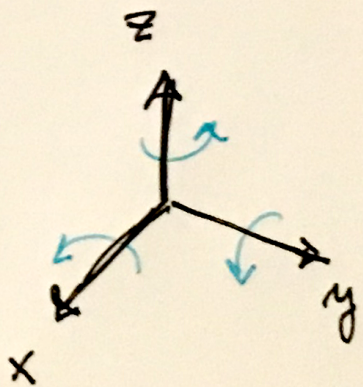
6 Types of Motion

6 types

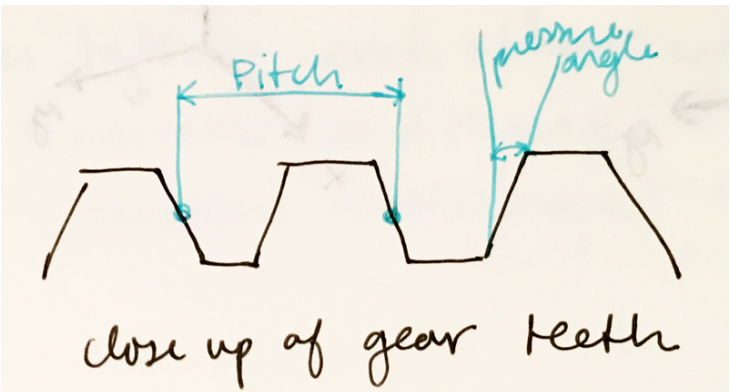
3 axes of translation

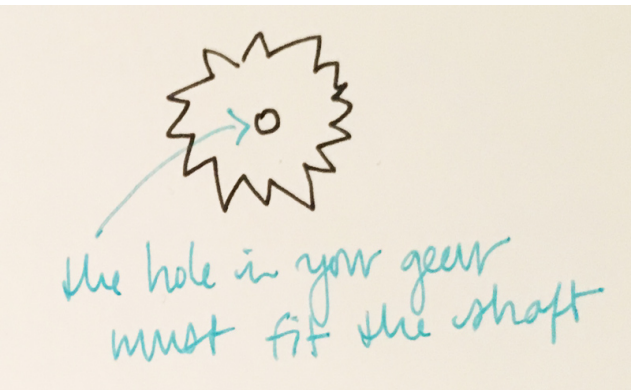


3 axes of rotation



Let's talk about gears!



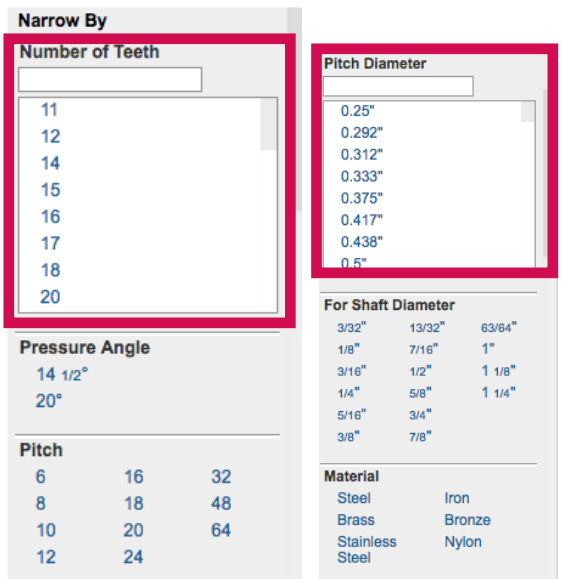


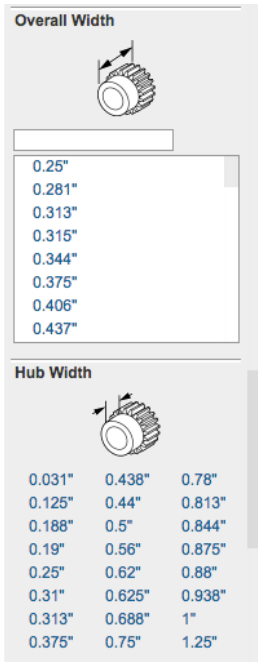
Make sure your gears have the same pitch. Make sure your shafts fit.

OTHERWISE YOUR GEARS WILL NOT MESH, THINGS WILL NOT FIT & YOU WILL BE SAD

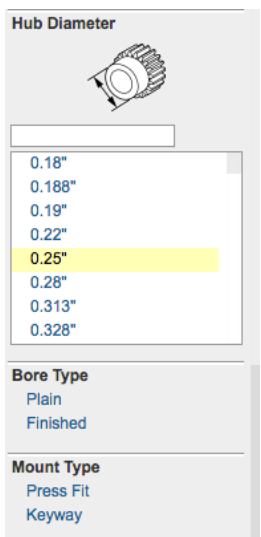
Let's talk about gears!

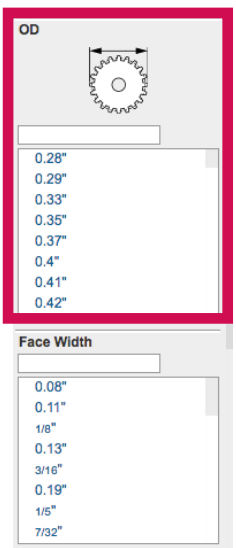
These can vary based on your design





This can vary based on your design





link to animations

bevel gear

worm gear

lead screw
(not a gear, but
useful & easy)

helical gear

Tell us about your component (:

cam and follower
(not a gear, but
super cool)

spur gear

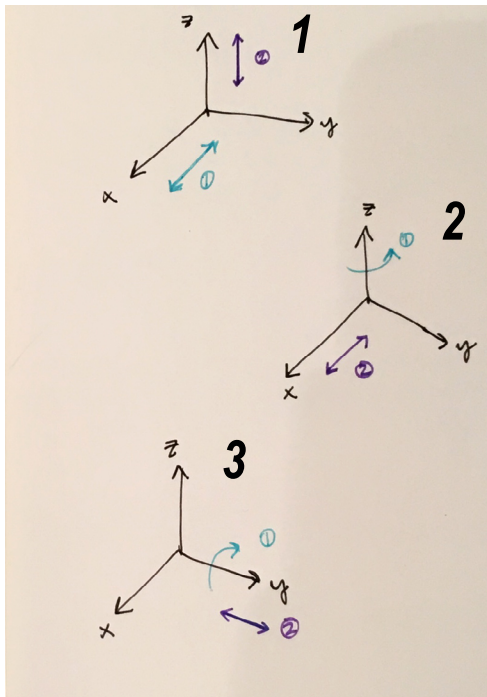
rack and
pinion

Make a mechanism!

GROUP 1:
convert x translation to z translation

GROUP 2:
convert z rotation to x translation

GROUP 3:
convert y rotation to y translation



Questions?

THANK YOU!!!

Share your feedback on this workshop:

https://bit.ly/2K5lIUX

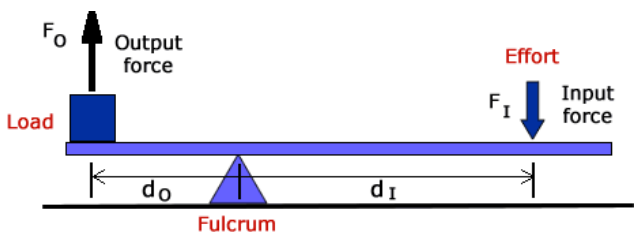
Mechanical Advantage

How do we make it easier to do tasks that require a lot of force??

Instead of inputting a large force at one point,

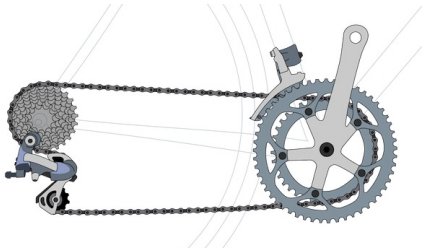
you input a smaller amount of force over a distance.

In both scenarios, you are still have the same total input power and acheive the same task.



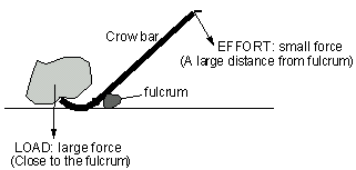
MA = (force output) / (force input)

Examples!



Shifting the gears on your bike when you go uphill

crowbars

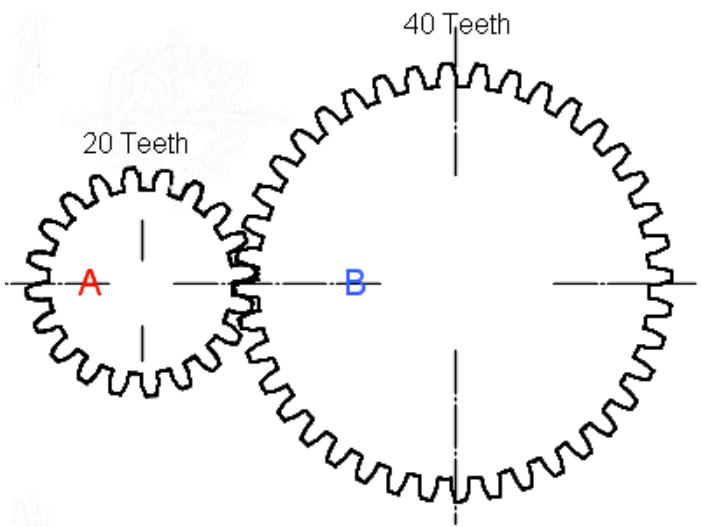


things with levers

pushing a door close to the hinge vs pushing it at the handle

Equations !!!

This example has two spur gears with the same pitch.



Mech. Advantage

=

$$\frac{\text{(\# of teeth on output gear)}}{\text{(\# of teeth on input gear)}}$$

=

$$\frac{\text{(diameter of output gear)}}{\text{(diameter of input gear)}}$$