

Vex Robotics Summer Program Day-1



Welcome to Vex Robotics

Summer Course
6-8 Grade

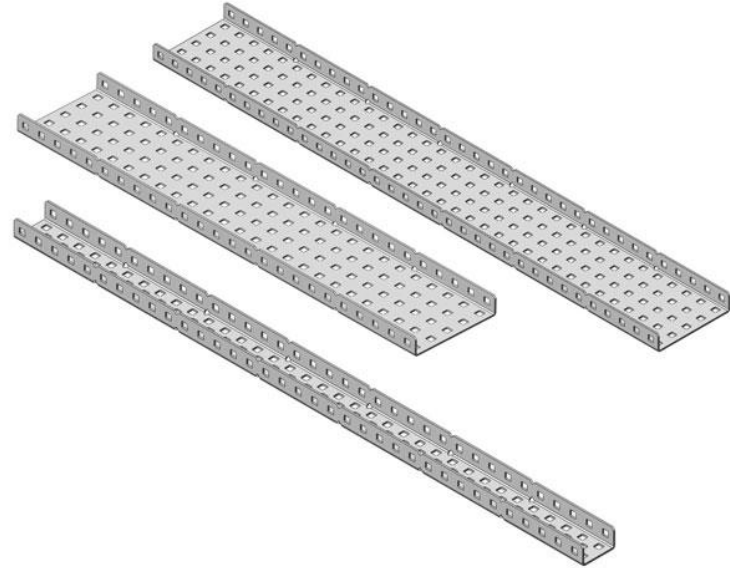
What is Vex

- The **VEX Robotics** Design System offers students an exciting platform for learning about areas rich with career opportunities spanning science, technology, engineering, and



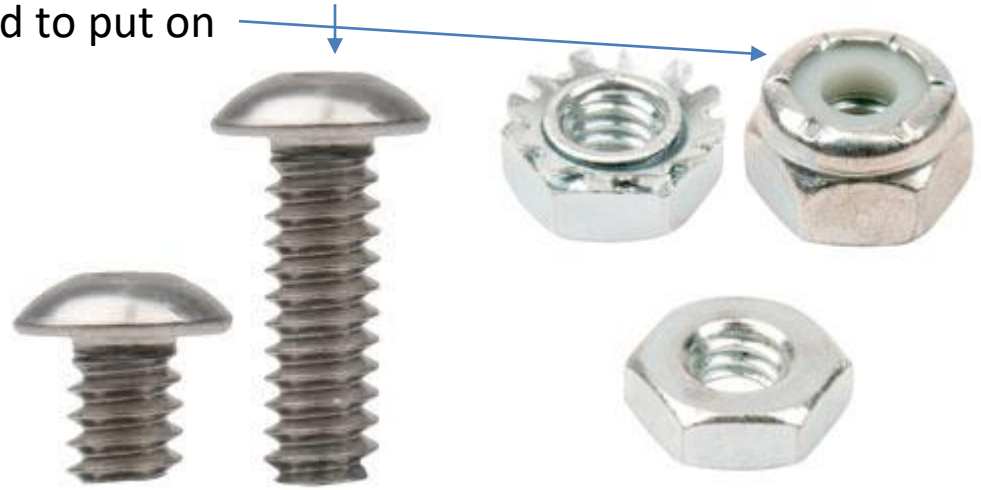
Parts - C Channel

- Used for Structure
- Can put screws and axles through



Parts - Screws and Nuts

- Screws - for holding metal and other vex parts together
- Bolts
 - Regular bolts - Can come off easily but easy to put on
 - Locking bolts - Sturdy but hard to put on



Parts - Axles and Spacers

Axles - Metal rod used to put in motor for circular motion

Spacers - Used to but on axles for spacing



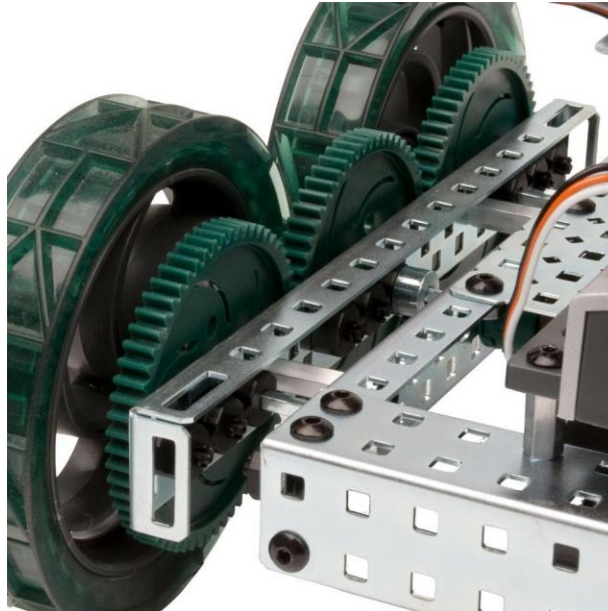
Parts - Bearings

- Used to put on either end of axle for sturdiness
- Attach motor on metal with bearing in between



Parts - Wheels and gears

- Wheels - Attached to axles, move robot forward
- Gears - Used to increase/decrease speed and torque



Parts - Motor

- Primary motion in Vex Robot
- Have to be programmed to move
- Can only connect to axles



Cortex and Battery

Cortex - Brain of the robot, where you upload your program too and tells motors what to do

Battery - Gives cortex and motors power to operate



Building a base



CLICK TO PLAY VIDEO

Step One

- Making basic structure of base
- Using eight screws and bolts, attach the structure shown below



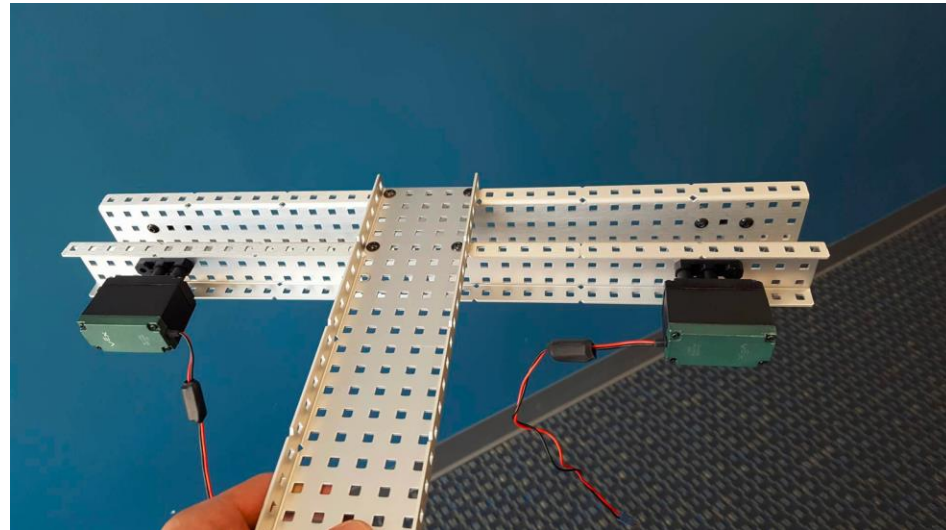
Step Two

- Attach bearings on the outer ends of the structure using the spacing shown below
- Use two screws and nuts to bolt down each bearing



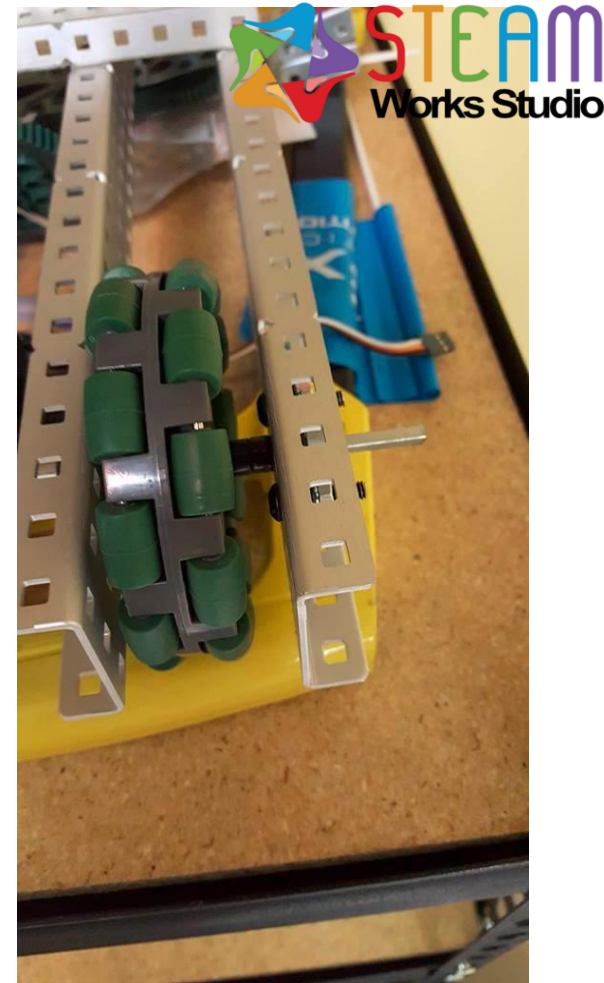
Step Three

- Attach bearings and a motor using thin screws and thin allen key on the inner side of the structure as shown below
- The motor wires should be facing inwards and the open hole in both bearings should align



Step Four

- Slide an axle through the bearing hole
- Through the axle, put one small and one large spacer, an omni wheel, and another large spacer
- Push the axle all the way into the motor

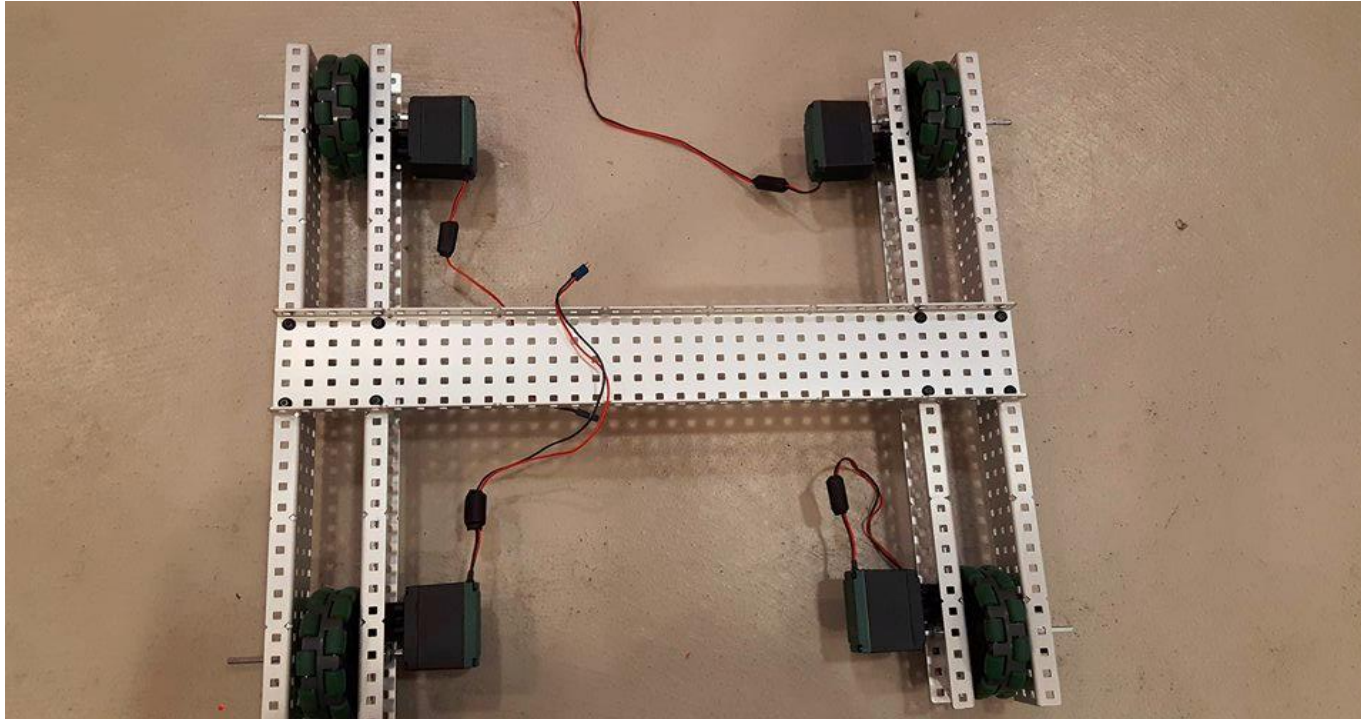


Step Five

- Place one collar on the outer end of the axle
- Place another collar between the inner plate and motor

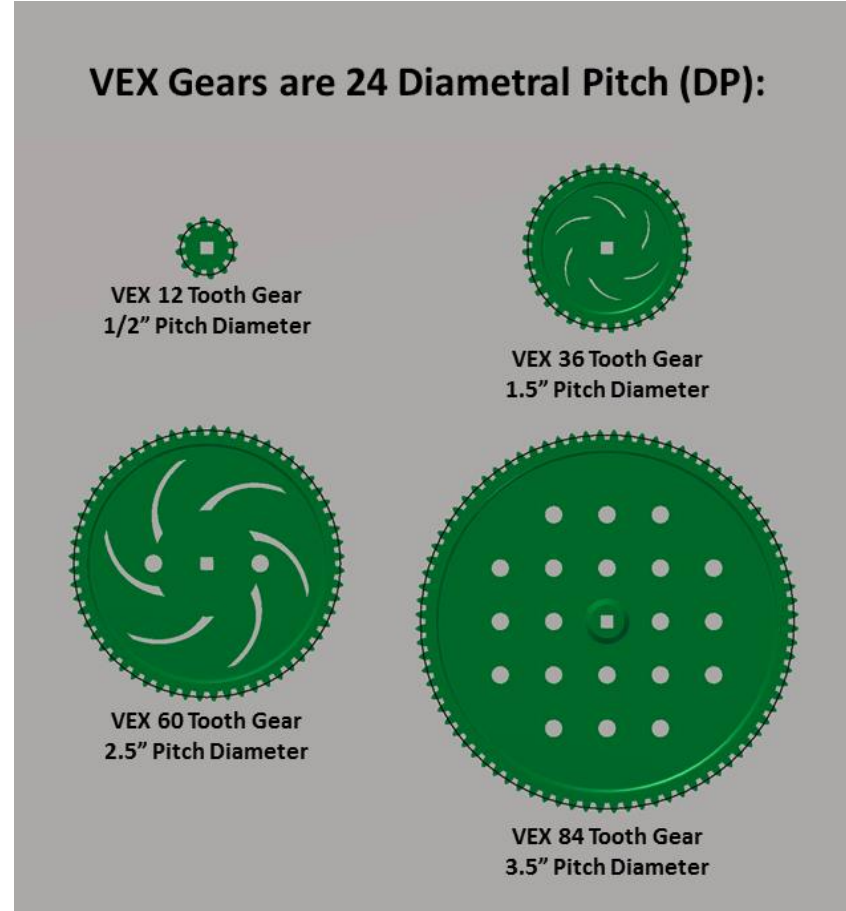


Base should look like this



Gearing

- Have four types of gears
 - 12 tooth
 - 36 tooth
 - 60 tooth
 - 84 tooth

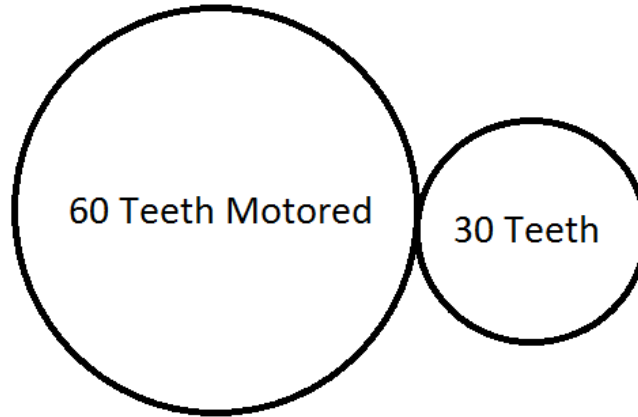


Gear ratios

- **Torque** = force in rotational motion
- The Higher the gear ratio, the faster the speed the smaller the torque
- The Lower the gear ratio, the slower the speed and higher the torque
- Formula : Gear ratio = (teeth on connected gear)/(teeth on motored gear)

Gear ratio practice

What's the gear ratio of the following configuration?

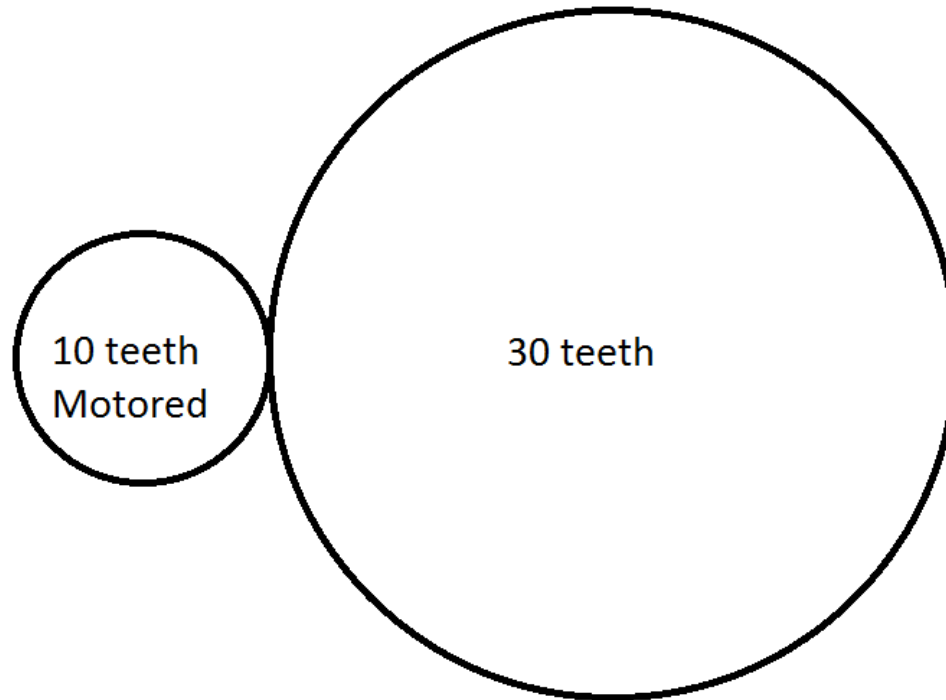


Answer

1:2 or $\frac{1}{2}$

Typically people say 1 to 2

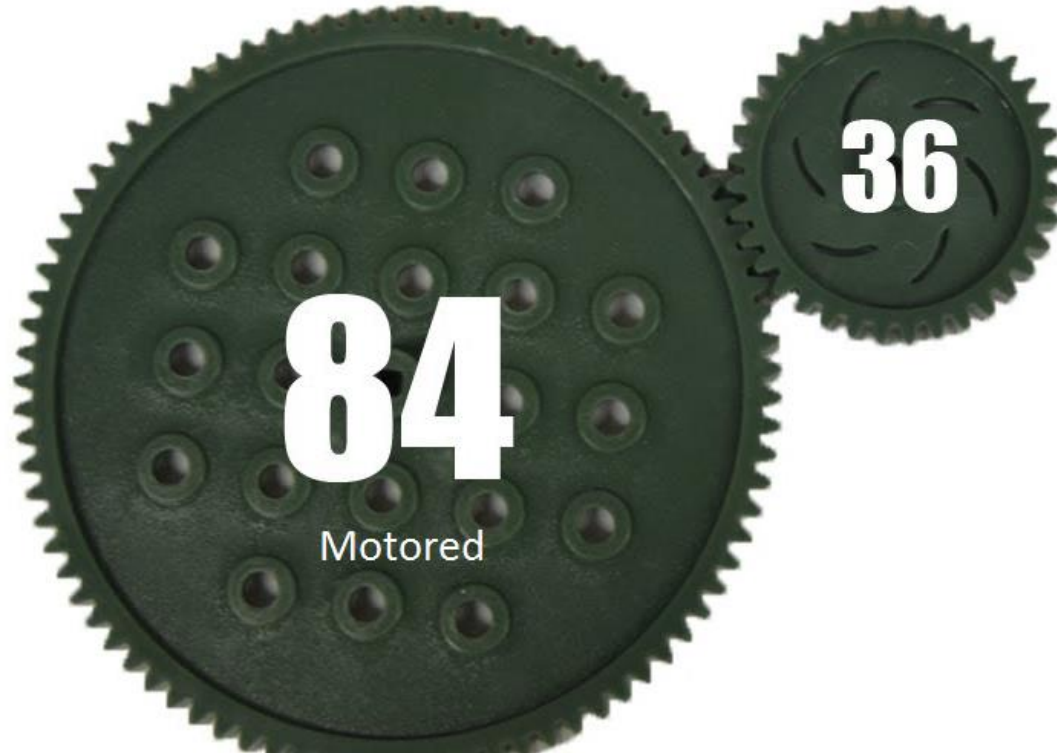
Lets try again



Answer

3:1 or 3 to 1

How about this



Answer
3:7 or 3 to 7

Challenge

Find and write down a gear ratio that will make base faster with reasonable amount of torque. Then gear your robot to a faster speed. When you are done, ask instructor to upload his/her driver control program onto robot and test your base. The fastest robot wins!!