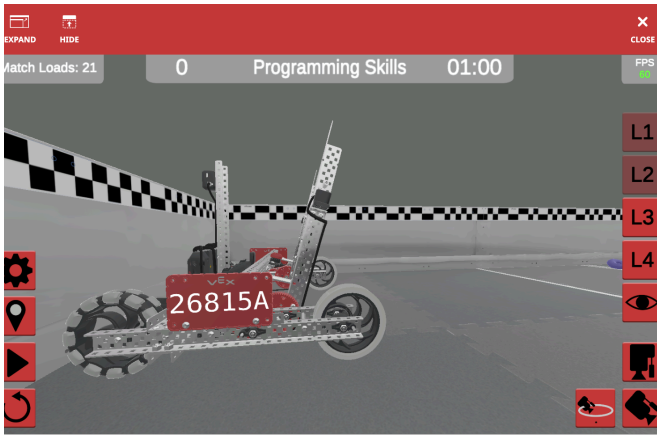
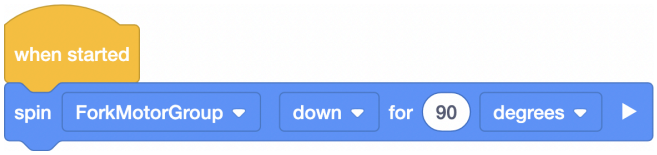
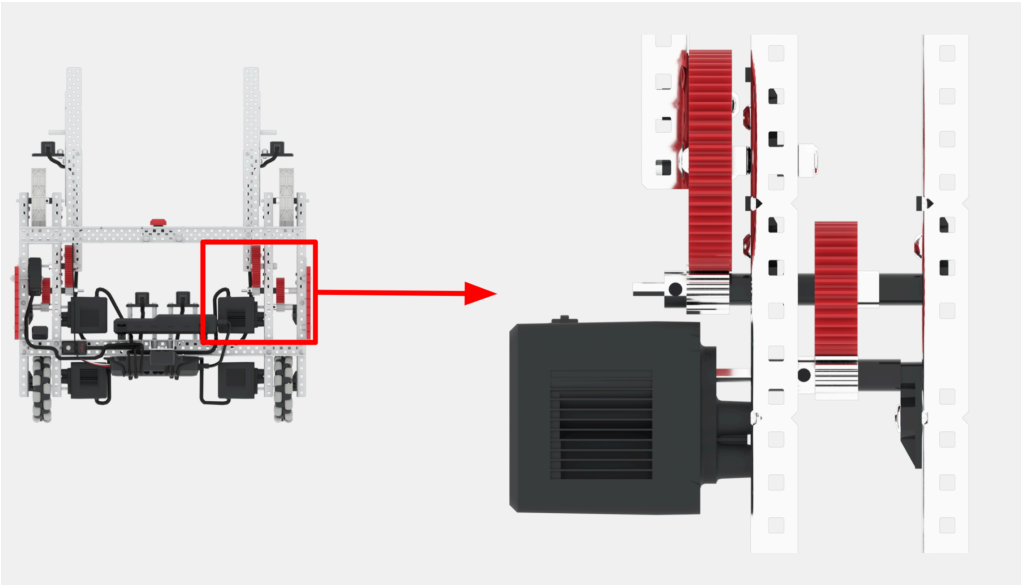
Math Extension Activity - VRC Virtual Skills - Lesson 2

If you use the [Spin for] block with Moby's Fork Motors and have the motors spin down for 90 degrees, they appear to barely move. This is because the Fork Motors use a gear train to connect the Smart Motors to the motion of the Forks.

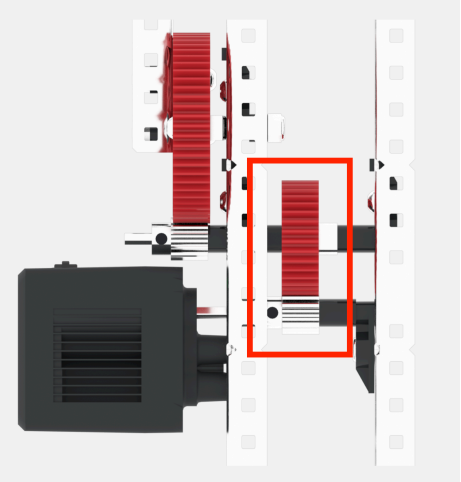




Use what you know about ratios of fractions to calculate the gear ratio of Moby's right Fork Motor. The gear train is the same for both Forks, so only one set of calculations will need to be completed. Below is a close up view of the gear train.



Begin by calculating the first gear ratio for Moby's Fork Motor.

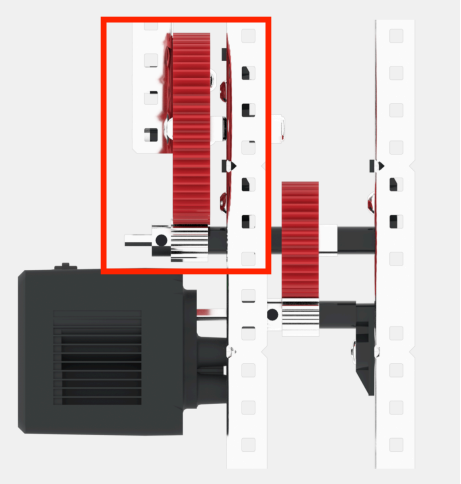


$$FirstGearRatio = \frac{\#\ Teeth\ in\ Driven\ Gear}{\#\ Teeth\ in\ Driving\ Gear} = \frac{36}{12} = \frac{?}{?}$$

Gear Ratio 1:

- Driving Gear: 12 Teeth
- Driven Gear: 36 Teeth

Then calculate the second gear ratio for Moby's Fork Motor.



$$SecondGearRatio = \frac{\#\ Teeth\ in\ Driven\ Gear}{\#\ Teeth\ in\ Driving\ Gear} = \frac{60}{12} = \frac{?}{?}$$

Gear Ratio 2:

- Driving Gear: 12 Teeth
- Driven Gear: 60 Teeth

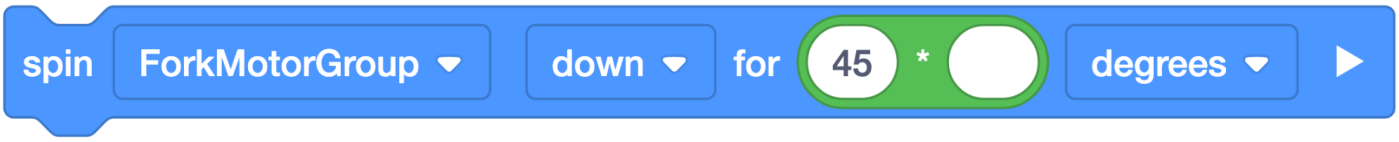
Use these two ratios and multiply them to calculate the compound gear ratio for Moby's Fork Motor.

$$CompoundGearRatio = \frac{?}{?} \times \frac{?}{?} = \frac{?}{?}$$

How many times will the first gear need to turn for the last gear to complete a full rotation? How does this affect the number of degrees you need to spin the Fork Motor in your VEXcode V5 project?

After completing this calculation you will be able to use this information to see how to change the parameters in the [Spin for] block to move the Forks to your desired location.

Add these blocks to your project. Input your desired angle location in the first position of the Operator block (45 degrees for this example). Use the denominator of your Compound Gear Ratio calculation in the second position of the Operator block.



When this block is executed, Moby's Fork will move and be angled at approximately 45 degrees. You can use this method in other [Spin for] blocks in your VEXcode V5 project to move the Fork as you intend.

Standard: CCSS.MATH.CONTENT.7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.