Mechanisms Gear Ratio Exercise #4: Compound Gear Reductions (Grades 6-8)

Student Name(s): _____

Teacher/Class: _____ Date: _____

Review of Key Points:

In a Compound Gear system, there are multiple gear pairs. Each pair has its own Gear Ratio, and a shared axle connects the pairs to each other. The resulting Compound Gear system still has a Driving Gear and a Driven Gear, and still has a Gear Reduction. However, it is now called a Compound Gear Reduction that is calculated by multiplying the gear reductions of each of the individual gear pairs.

For the example shown with 12-tooth and 60-tooth gears, the overall Gear Reduction is calculated this way:

Compound Gear Reduction
Linked by Shared Axle

Driven Gear

Driving Gear

12-Tooth

60-Tooth
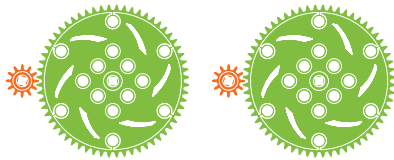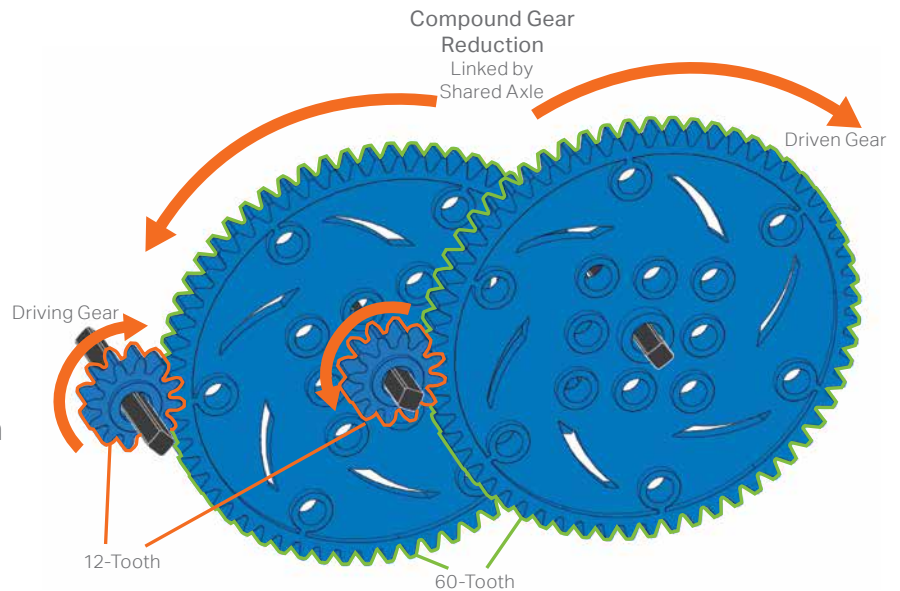
$$(60 / 12) \quad \times \quad (60 / 12)$$
$$(5 / 1) \quad \times \quad (5 / 1) \quad = 25 / 1$$

Say "25 to 1 Compound Gear Reduction"

Instructions:

Using the information above from Compound Gears and Compound Gear Reductions (G.3), demonstrate what you have learned by calculating the correct Compound Gear Reductions. You may also build and use the VEX IQ Gear Ratio Simulator along with 12-tooth, 36-tooth, and 60-tooth kit gears to help find answers.

Gear Pair 1		Gear Pair 2		Simplified Reduction 1	Simplified Reduction 2	Compound Gear Reduction
Driving Gear 1	Driven Gear 1	Driving Gear 2	Driven Gear 2			
12-tooth	60-tooth	12-tooth	36-tooth	____ / ____	____ / ____	____ / ____
12-tooth	36-tooth	12-tooth	36-tooth	____ / ____	____ / ____	____ / ____
12-tooth	36-tooth	12-tooth	60-tooth	____ / ____	____ / ____	____ / ____