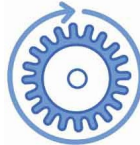




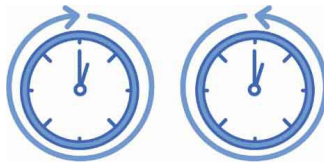
Gear Ratio Worksheet

Definitions that describe gears and gear motion:

Revolution – A revolution is one complete rotation of the gear



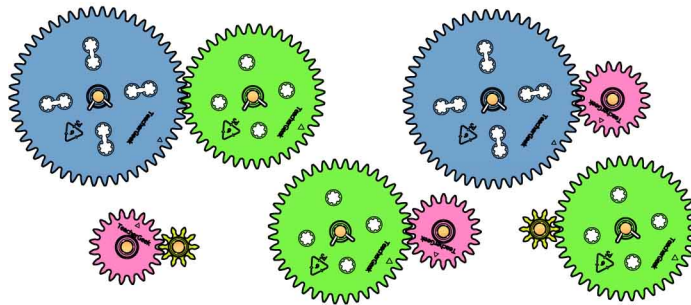
Rotation direction – Can be clockwise (CW) or counterclockwise (CCW)



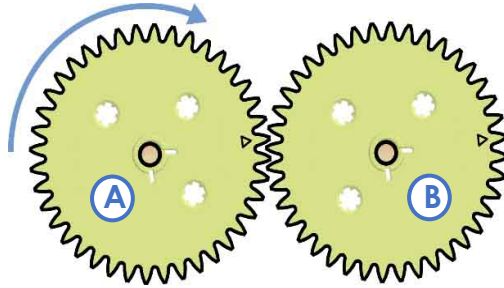
Clockwise (CW)

Counterclockwise (CCW)

Gear ratio – A ratio is a comparison of two values. A gear ratio compares the number of teeth of the gears which are meshed together. This ratio is a mathematical way to describe your gear set up to others. Gear ratios can be set up either for torque (turning force) or for speed.



- Using your gear set-up, place two 40-tooth gears meshed together on the base plate. Using the dowel, spin Gear A clockwise for one revolution. Complete the table below with your observations.

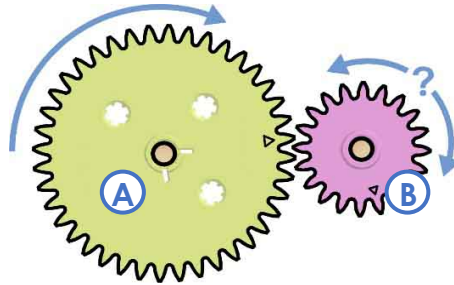


Gear	# Gear teeth	Rotation direction (CW or CCW)	# Revolutions
A (driver)			
B (driven)			

Gear Ratio = Driven Gear Teeth/Driver Gear Teeth

Gear Ratio = _____

- Swap Gear B out and replace with a 20-tooth gear. Spin Gear A clockwise for one revolution. What happens differently?



Gear	# Gear teeth	Rotation direction (CW or CCW)	# Revolutions
A (driver)			
B (driven)			

Gear Ratio = Driven Gear Teeth/Driver Gear Teeth

Gear Ratio = _____

How did changing the size of Gear B affect the gear ratio? _____

3. Keep the same gear set up but spin Gear A counter clockwise for one revolution. What changed?

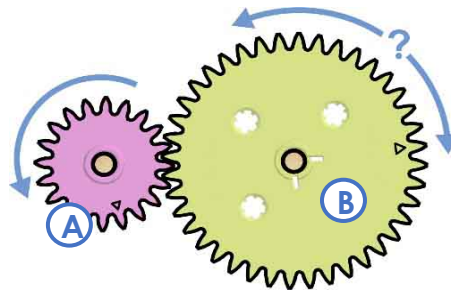
Gear	# Gear teeth	Rotation direction (CW or CCW)	# Revolutions
A (driver)			
B (driven)			

Gear Ratio = Driven Gear Teeth/Driver Gear Teeth

Gear Ratio = _____

Did the change in direction of rotation change the gear ratio? _____

4. Switch your gear set-up so that Gear A is a 20-tooth gear and Gear B is a 40-tooth gear. Spin Gear A clockwise for one revolution. Record your observations.



Gear	# Gear teeth	Rotation direction (CW or CCW)	# Revolutions
A (driver)			
B (driven)			

Gear Ratio = Driven Gear Teeth/Driver Gear Teeth

Gear Ratio = _____

How did switching the driver and driven gears' sizes affect the gear ratio? _____

5. Try some other gear set-ups, spin for one revolution in the direction of your choice and record below:

- a. Gear A has 10-teeth and Gear B has 50-teeth

Gear	# Gear teeth	Rotation direction (CW or CCW)	# Revolutions
A (driver)			
B (driven)			

Gear Ratio = Driven Gear Teeth/Driver Gear Teeth

Gear Ratio = _____

- b. Gear A has 50-teeth and Gear B has 20-teeth

Gear	# Gear teeth	Rotation direction (CW or CCW)	# Revolutions
A (driver)			
B (driven)			

Gear Ratio = Driven Gear Teeth/Driver Gear Teeth

Gear Ratio = _____

- c. Gear A has 10-teeth and Gear B has 40-teeth

Gear	# Gear teeth	Rotation direction (CW or CCW)	# Revolutions
A (driver)			
B (driven)			

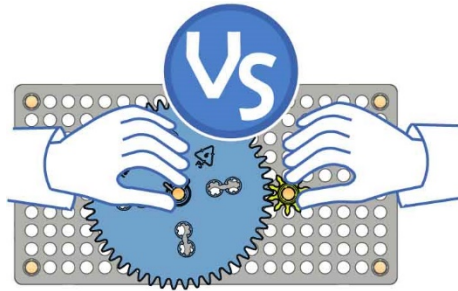
Gear Ratio = Driven Gear Teeth/Driver Gear Teeth

Gear Ratio = _____

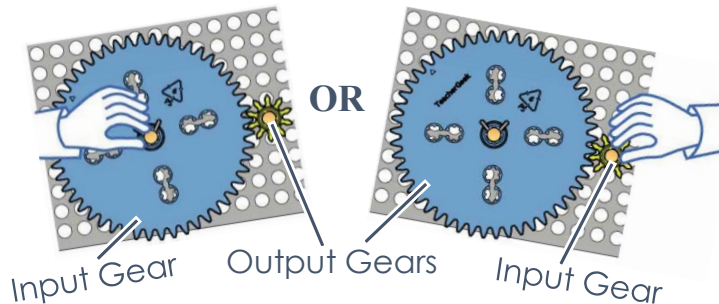
Mechanical Advantage

Now that you have tried different gear set-ups with different gear ratios, it is time to apply what you have learned. How are different gear set-ups useful?

Gears can be set-up in order to increase torque (turning force) or speed, but not both at the same time. This is called mechanical advantage. Try placing a 50-tooth gear meshed with a 10-tooth gear on your base plate. Have a twisting contest with a partner.



Which gear increases force on the other gear? When the _____ tooth gear is turned, the force on the second (driven) gear is greater.



Spin each gear and observe which way increases speed. When the _____ tooth gear is turned, the speed of the second (driven) gear is greater.