Name: _____ Date: _____ Class: _____

Angular Velocity Experiment Worksheet

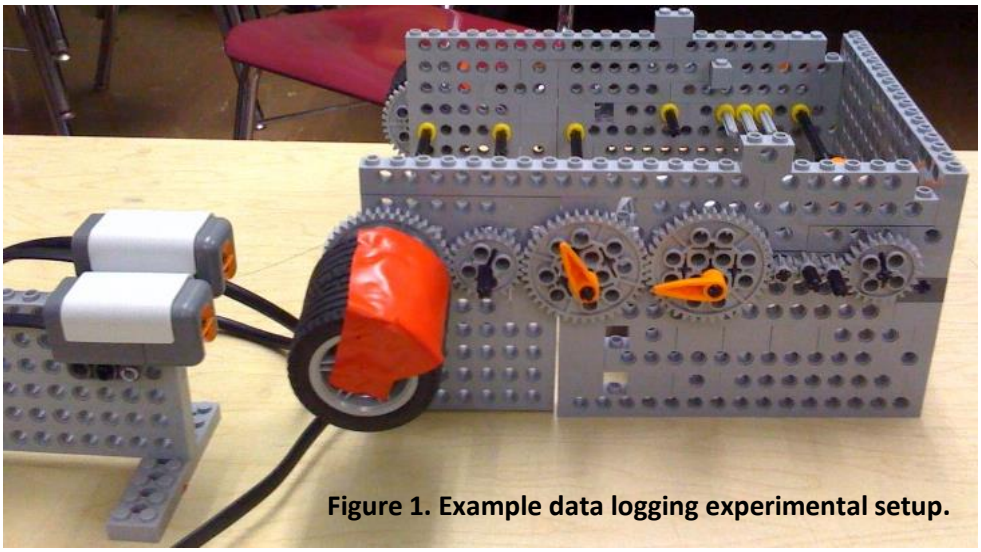

Figure 1. Example data logging experimental setup.

Vocabulary/Definitions

Word	Definition
data logging	Using a computer to collect and record data over an extended period of time through the use of a sensor.
length	The measure of how long something is from one end to another.
period	The length of time to complete one cycle.
gear	A rotating machine with cut teeth.
gear train	A set of gears that is able to transfer rotational motion.
circumference	The distance around a circle.
degree	The unit of measure for a given angle.
radian	The unit of measure for a given angle equal to 57.296 degrees. The measure of a circle is equal to 2π radians = 360°.
velocity	The distance traveled per unit time.
angular velocity	The change in rotation traveled per unit time.
optimal	Best suited for the situation. The best choice, arrangement, result or decision obtainable that meets specific requirements.

Name: _____ Date: _____ Class: _____

Hypothesis

Materials

- LEGO MINDSTORMS Education NXT base set
- 2 LEGO MINDSTORMS NXT intelligent bricks
- calculator
- ruler
- 2 pieces electrical tape (not black)

To share with the entire class:

- computer with LEGO MINDSTORMS Education NXT Software 2.1 (programming and data logging)

Procedure

Explain and/or sketch your data logging experimental setup.
List the steps you followed to construct the device.

Name: _____ Date: _____ Class: _____

Data

Calculate the angular velocity with the three physics-based equations:

circumference = 2*π *(radius) (Equation 1)

degrees = radians * (180/π) (Equation 2)

angular velocity = degrees/ (time for one period) (Equation 3)

Gear Length	Circumference (radians)	Rotations (degrees)	Period (seconds)	Angular Velocity (degrees/second)
big:big				
medium:medium				
small:small				
big:medium				
big:small				
small:medium				

Name: _____ Date: _____ Class: _____

Now, let's look at length and gear ratio:

Gear Length	Circumference (radians)	Rotations (degrees)	Period (seconds)	Angular Velocity (Degrees/ seconds)
4 big				
4 medium				
4 small				
1 big:3 medium				
3 big:1 medium				
3 big:1 small				
1 big:3 small				
3 small:1 medium				
1 small:3 medium				

Name: _____ Date: _____ Class: _____

Results

What does your data tell you about gears and angular velocity?

Conclusions

Do your experimental results agree with your hypothesis? Why or why not?

Optimal Solution

What gear train is optimal for a high angular velocity?