

Angles and Gears Lab

Name _____ Date _____ Group _____ Period _____

Whenever two gears intermesh, as you turn the top input gear, the bottom output gear also turns.

Objective: You need to be able to predict the number of turns the output gear will make for each turn of the input gear when the top and bottom gears are different sizes.

Variables: By the time you finish this experiment, you will need to identify the different types of variables present in this investigation. Consult your notes for definitions of the types of variables.

Independent Variables: (two variables)

Dependent Variables: The number of turns of the output gear

Controlled Variables: Same size gears for each group

Procedures:

Distances can be measured in feet, meters, and centimeters. For example, you can move 1 meter from where you are now. What about things that rotate? How do we measure the movement of objects which go around and around but stay in one place?

Rotation is measured with **angles**. Angles are measured in **degrees**. There are 360 degrees in a circle. A circle is one full **rotation**.

In this experiment we will explore how gears work and how to use degrees to measure rotation.

Question 1.

How many degrees of rotation are there for when a gear rotates 5 and 1/2 times around? _____

Setting Up

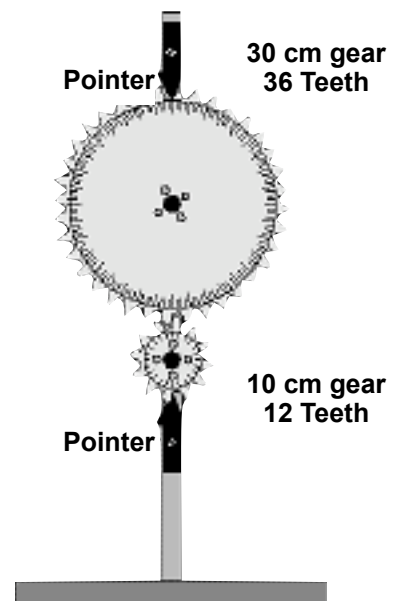
Start by attaching the 30 cm and 10 cm Gears to the Physics Stand. The Gears attach with the thumbscrews and knobs. Use the shorter thumbscrews. Attach the two arrows so that they point to the 0° angle on each gear.

Procedures

1. The three gears you'll use each have different numbers of teeth. Set up the combinations of gears shown on the back of this page. Use the degree marks to align both gears so that the arrow points to zero degrees.

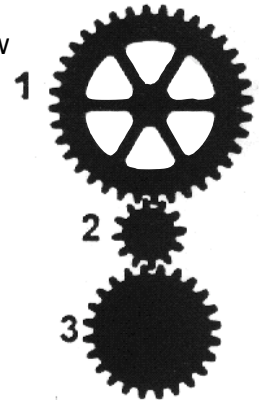
2. **Count** the number of **whole** turns **each gear** makes. Make sure **each gear** turns a **whole number of turns**. You can tell the number of turns by counting how many times the zero degree mark passes the pointer.

3. You must find the mathematical rule which relates the number of times gear 2 (output gear) turns for each turn of gear 1 (input gear)? (HINT: Think about the number of teeth on each gear)



Teeth in Gear 1=	Teeth in Gear 1=	Teeth in Gear 1=	Teeth in Gear 1=
Teeth in Gear 2=	Teeth in Gear 2=	Teeth in Gear 2=	Teeth in Gear 2=
Turns of Gear 1=	Turns of Gear 1=	Turns of Gear 1=	Turns of Gear 1=
Turns of Gear 2=	Turns of Gear 2=	Turns of Gear 2=	Turns of Gear 2=

Question 2. Build the machine in the picture on the right. Turn Gear one 12 times. How many times does Gear 3 turn when you do this?



Question 2.

Write down a mathematical rule that shows how the number of teeth of gear 1 and the number of turns of gear 1 (input gear) equates to the number of teeth of gear 2 and the number of turns of gear 2 (output gear). Write your rule in the form of a math equation. (The correct rule can fit in the space below which means it's not very long.) **Do NOT give an example!**

Sources of Error :Identify **two** things that people may have done incorrectly that would have caused them to get totally different answers from the rest of the class. These errors must be unique, in other words they have not been applicable in previous labs. They must be **new** sources of error. Be **specific** about what might have been done.
