Name: _____ Date: _____

Exploring Gears

This experiment is designed to let you get an opportunity to create gears and see them in action.

Equipment:

- Gear Cut-Outs
- Cardboard
- Nails

Procedure:

1. Cut out each of the four gears.
2. Glue the cut-out gears onto a piece of cardboard.
3. Cut out the gears on the cardboard.
4. Colour one tooth on each gear so that it stands out.
5. Place one small gear on a flat piece of cardboard.
6. Push a nail through the centre of the gear and into the cardboard underneath so that it is held in place.
7. Place the second small gear next to the first so that they are meshed together.
8. Attach this gear with a nail the same way you did the first.
9. Turn the first small gear:
    a. What direction does the second gear turn?
    b. If you turn the first gear six full turns, how many times does the second gear turn?
10. Repeat steps 7, 8 and 9 for both the medium and the large gears, keeping the first small gear in place and using it to turn each time.

Observations:

First Gear	Direction it Turns	Number of Turns	Second Gear	Direction it Turns	Number of Turns
Small	Clockwise	6	Small	Counter Clockwise	6
Small	Clockwise	6	Medium	Counter Clockwise	4
Small	Clockwise	6	Large	Counter Clockwise	3

Discussion:

1. What do you notice about the direction of movement of each pair of gears?

   The direction of the second gear is always opposite to the direction of the first gear.

2. Count the number of teeth on each gear. How does the number of teeth on each gear affect the number of turns you get with different pairs of gears?

   Number of teeth on the small gear: 8

   Number of teeth on the medium gear: 12

   Number of teeth on the large gear: 16

   When the gears are the same, they turn the same number of times.

   When there are more teeth on the second gear, it turns less.

   The more teeth that there are on the second gear, the less it turns.

3. Suppose the first gear in a system has ten teeth. How many teeth should the second gear have if you want to get one turn from it for every three turns of the first gear? Explain. You may want to use the table at the bottom to help you.

   You would need 30 teeth.

   We want the second gear to turn less, so there has to be more teeth on it.

   If we turn the first gear 3 times, then 10 teeth rotate through 3 times each = 30 teeth

   To make the second gear only rotate once, we need it to have 30 teeth to match.

   This is because each tooth touches one other tooth when they mesh.

Gear	Number of Teeth	Number of Turns
Gear 1	10	3
Gear 2	30	1