The Gears Problem

Lesson Information
By Jon Schweig
Subject:
Algebra
Topic:
Number Sense Functions
Technology:
None
Level:
Easy
Activity Structure:
Self-Guided Problem Solving
Duration of Activity:
Part of a Class

Overview:

Students examine a set of cogs and make guesses as to which direction they will turn in (and how many times they will rotate). Students use a specific case to make a general statement about any number of rotations.

Learning Objectives:

- To see patterns
- To use patterns to make hypotheses
- To use patterns to construct algebraic formulas.

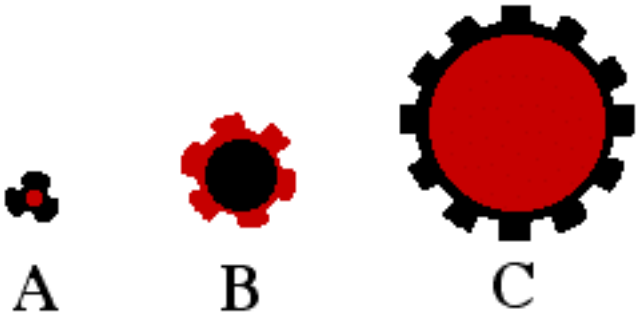
Materials:

- Paper
- Pencil
- Worksheet

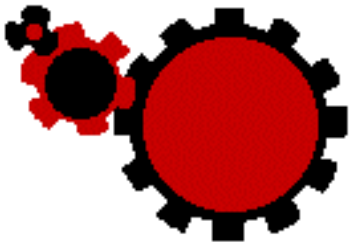
The Gears Problem

Benjamin Banneker, an 18th century mathematician, was the first person ever to build a wooden clock in the United States. By taking apart a pocket watch, Banneker figured out that the ratio of the gears was the key to making it all work. Banneker's clock struck every hour for more than forty years, keeping perfect time.

Activity
Suppose you have these three gears:



Think of them meshing like this:



If Gear C moves clockwise one revolution, will Gear B move clockwise or counter-clockwise? How many revolutions will it make? Will Gear A move clockwise or counter-clockwise? How many revolutions will it make? If Gear C moves clockwise two revolutions, think how many revolutions Gears B and A will make. Explain the relationship between the three gears if Gear C moves clockwise **n** revolutions.