Mechanisms: Gear
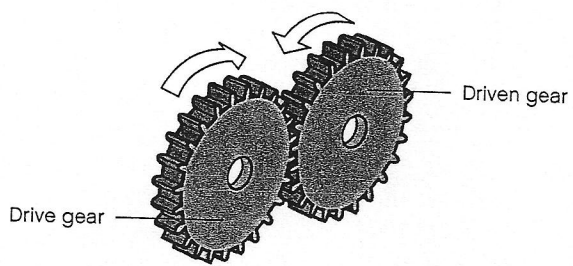
Gears are wheels with teeth that mesh with each other. Because the teeth lock together, they can efficiently transfer force and motion.

Driven gear

Drive gear

The drive gear is the gear that is turned by an outside effort, for instance your hand or an engine. Any gear that is turned by another gear is called a driven gear. The drive gear provides the input force and the driven gear delivers the output force.

Using a gear system can create change in speed, direction and force. But there are always advantages and disadvantages. For example, you can not both have more output force and an increase in speed at the same time.

To predict the ratio of which two meshed gears will move relative to each other, divide the number of teeth on the driven gear by the number of teeth on the drive gear. This is called the gear ratio. If a driven gear with 24 teeth is meshed with a drive gear with 48 teeth, there is a 1:2 gear ratio. Meaning that the driven gear will turn twice as fast as the drive gear.

Gears are found in many machines, where there is the need to control the speed of rotary movement and turning force. Common examples include power tools, cars and egg beaters!

$$\text{Gear Ratio} = \frac{\text{\# teeth on driven gear}}{\text{\# teeth on drive gear}}$$
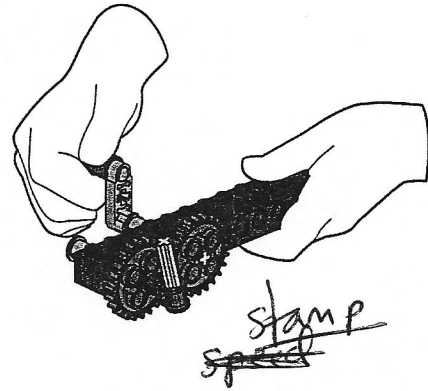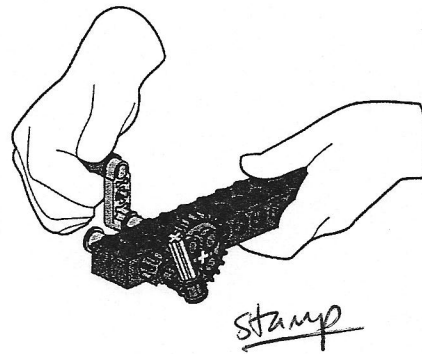
G1

Build G1 book III, page 2

Calculate the gear ratio. Then turn the handle and explain the speeds of the drive and the driven gears. Label the drive and driven gears.

Drive gear speed :

Driven gear speed :

Gear Ratio :

stamp
~~speed~~

G2

Build G2 book III, page 3

Calculate the gear ratio. Then turn the handle and explain the speeds of the drive and the driven gears. Label the drive and driven gears.

Gear Ratio :

Drive gear speed :

Driven gear speed :

stamp

Build G3 book III, page 4
Calculate the gear ratio. Then turn the handle and explain the speeds of the drive and the driven gears. Label the drive and driven gears.

Gear Ratio: _____
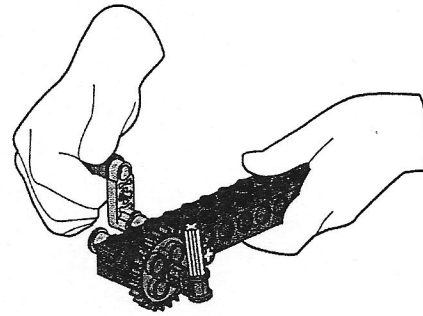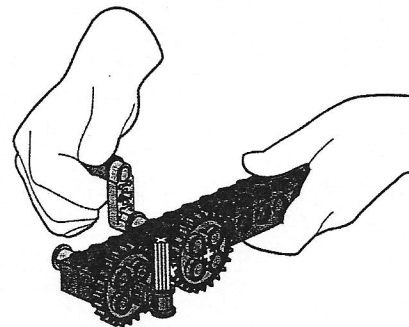
Drive gear speed: _____

Driven gear speed: _____

_____

G4
Build G4 book III, pages 5 to 6
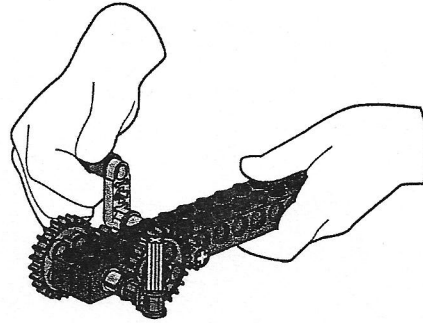Calculate the gear ratio. Then turn the handle and explain the direction of the drive and the driven gears.

Gear Ratio: _____

Drive gear speed: _____

Driven gear speed: _____

Direction of drive gear: _____

Direction of driven gear _____

G5

Build G5 book III, pages 7 to 8

Calculate the gear ratio. Then turn the handle and explain the speeds of the drive and the driven gears.
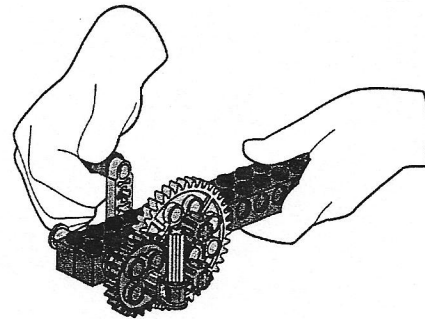
Gear ratio: _____

Drive gear speed: _____

Driven gear speed: _____

_____

G6

Build G6 book III, pages 9 to 10

Turn the handle and explain the movement of the driven gear.

Speed of driven gear: _____
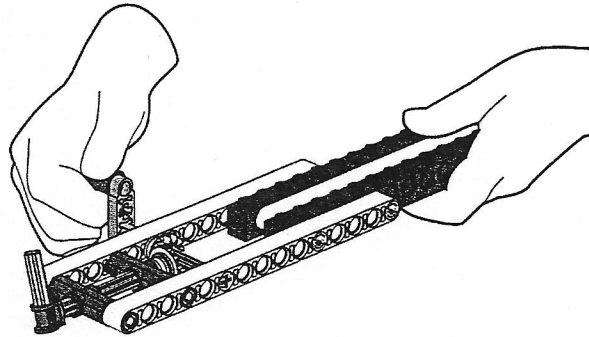
Direction of driven gear _____

_____

_____

G7

Build G7 book III, pages 11 to 14
Calculate the gear ratio. Then turn the handle and explain
what happens and why.

Gear Ratio: _____

Direction of out put: _____

_____

_____

G8

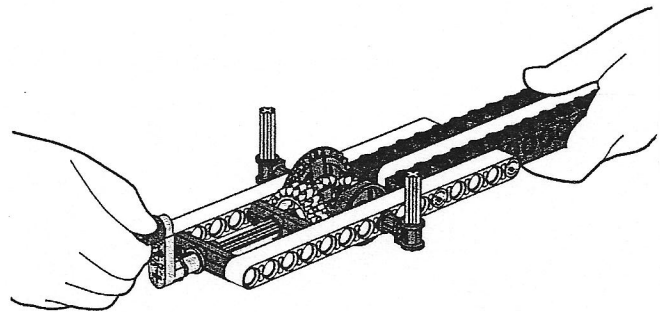**Build G8 book III, pages 15 to 18**
Turn the handle and explain what happens and why.
What happens if you stop one of the output pointers.
What happens if you stop both output pointers?
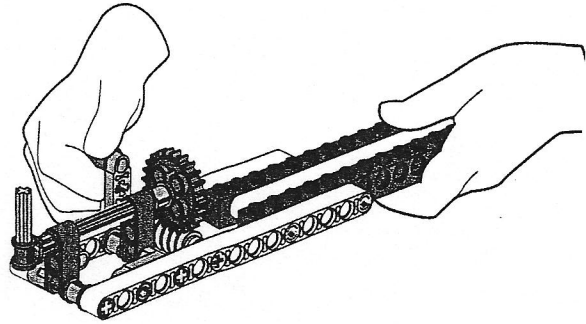
One stopped output pointer: _____

Two stopped out put pointes _____

_____

_____

G9

Build G9 book III, pages 19 to 22
Turn the handle and explain what happens and why.
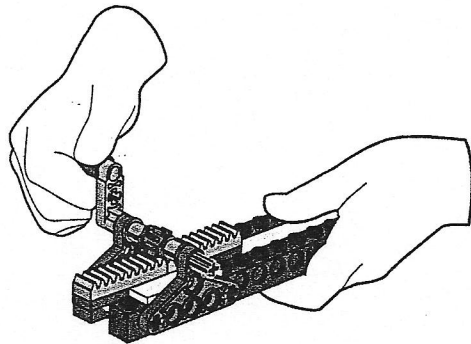What happens if you try turning the output pointer?

Direction: _____

What happens when you turn the output pointer: _____

_____

_____

G10

Build G10 book III, pages 23 to 25
Turn the handle and explain what happens and why.

Direction of movement: _____

_____

_____

_____