

# FUNTASTIC GEARS

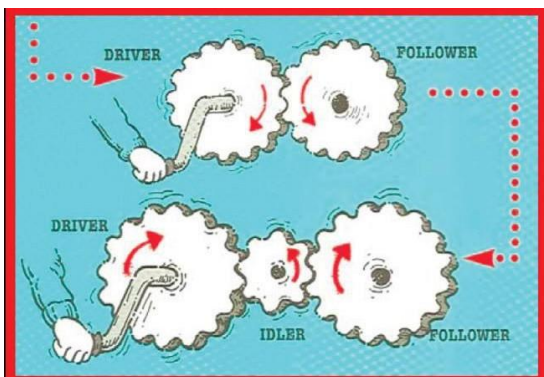
A LEGOLAND® Malaysia Educational Resource Guide

## Educational Objectives

- Learn what gears are and that gears cause circular movement
- See how gears can change speed and direction of movement
- Build a model that uses gears to speed up (gear up) and slow down (gear down)
- Relate concepts learned during the Hands-on activities to other LEGOLAND attractions

## Background Information

### Gears make work easier!

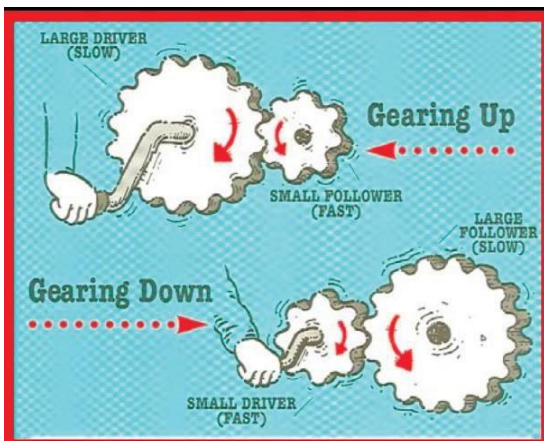


### Gears are wheels with teeth.

- Gears always work together. When the teeth of two gears **mesh**, the first gear's teeth push the next gear's teeth to make it move.
- The **driver** is the gear that starts the movement. The **follower** gear is turned by the driver.

### Gears can change the direction of movement.

- When the teeth of two gears mesh, they turn in opposite directions. You can see this work on a hand-held can opener.
- An **idler** gear makes the neighbouring gears turn in the same direction.
- A **gear train** is formed when many gears mesh, as in a lawn mower or big machine.



### Gears can change the speed of a machine.

- When two gears of the same size mesh, each gear turns at the same speed.
- **Gearing up** is when a large gear turns a small gear. A machine goes faster with less power.
- When you gear up on your bicycle, your pedal cranks a large gear that drives a small gear, and your pedals turn faster, easier.
- **Gearing down** is when a small gear turns a large gear. The machine goes slower with more power.

When the Kids Power Tower ride at LEGOLAND gears down, the ride comes down smoothly and slowly, instead of dropping suddenly.

## Additional Resources

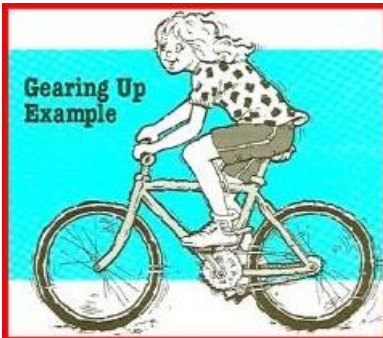
Fun Time Gears Set and Fun Time Gears II Pitsco/LEGO Education Primary Simple Machines Set/Activity Pack Pitsco/LEGO Education

# Before and After the Visit: Minds-On Activities

## Gearing Up

Gearing up means a large gear drives a small gear. The machine moves fast. In this picture, the two gears don't mesh, but they are connected with a chain so they still work together.

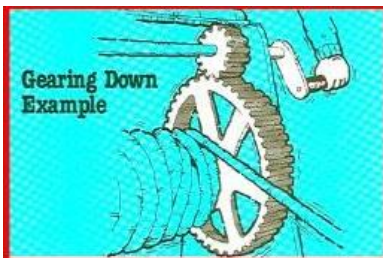
1. FIND the DRIVER gear in the picture. Color it RED. Hint: Driver gears have a crank.
2. FIND the FOLLOWER gear in the picture. Color it YELLOW.
3. DRAW a large gear (a circle with teeth). Draw a crank on it. It is the driver. Color it RED.
4. DRAW a small gear touching the large gear. This is the follower. Color it YELLOW.



## Gearing Down

Gearing down means a small gear drives a large gear. A machine moves slowly with more power.

1. FIND the DRIVER gear in the picture. Color it RED. Hint: Driver gears have a crank.
2. FIND the FOLLOWER gear in the picture. Color it YELLOW.
3. DRAW a small gear with a crank. This is the driver. Color it RED.
4. DRAW a large gear meshing with the small gear. This is the follower. Color it YELLOW.



# Discovery Worksheet

How do we use gears on rides at LEGOLAND®?

**Gearing down causes slower movement with more power.**

Write the names of these LEGOLAND rides. Circle the ride that gears down.



**Gears make circular movement.**

Write the names of these LEGOLAND® rides. Circle the rides that use gears to make the ride go in a circle.



# Hands-On Activities

## Gears

1. Think of things that move in a circle. Here are some ideas: Can opener, merry-go-round, bicycle tires, music box dancer, egg beater, fan, electric shavers. Gears cause the movement to go in a circle. Can you see the gears or are they hidden?
2. Discuss and show examples of these gear types:
  - a. Gear
  - b. Two gears mesh – in what direction does each gear move?
  - c. Gear train – in what direction will the last gear move? Hint: With an odd number of gears, the last gear turns in the same direction as the first gear.
  - d. Drive gear
  - e. Follower gear
  - f. Gearing up – name a LEGOLAND® ride that uses gearing up, going faster.
  - g. Gearing down – name a LEGOLAND ride that uses gearing down, going slower.



### Build a LEGO® Model with Gears!

In pairs, get a LEGO® kit and follow the instructions to build a LEGO Model. Show your model to the class. Talk about how you and your partner built your model. What kind of gears does it use?