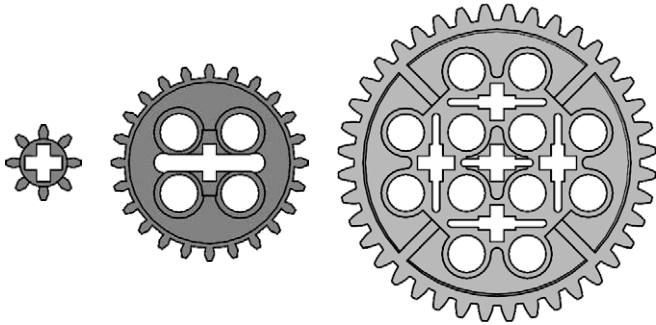
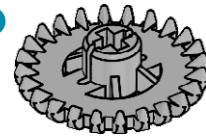
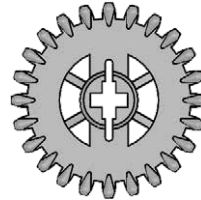


Overview: Gears

Spur Gears



A Crown Gear



Did you know?

A gear, or toothed wheel, when in operation, may actually be considered to be a lever, with the additional feature that it can be rotated continuously instead of rocking back and forth through a short distance.

A gear is most commonly defined as a toothed wheel; the teeth of a gear prevent slipping. When one gear is engaged with another gear they are said to mesh. When a set of gears work together they transmit movement and force. A crown gear has special curved teeth that enable it to mesh at right angles with a spur gear. Gears are sometimes categorized as compound machines, but in this material we have included them as simple machines.

Gears can be used to create the following effects:

- To change the direction of rotation
- To change the orientation of a rotating movement
- To increase or decrease the speed of rotation
- To increase turning force, also called torque

Gears are found in many machines where there is a need to control the speed of rotary movement and turning force. Examples include cars, bicycles, old-fashioned egg beaters, can openers, and grandfather clocks.

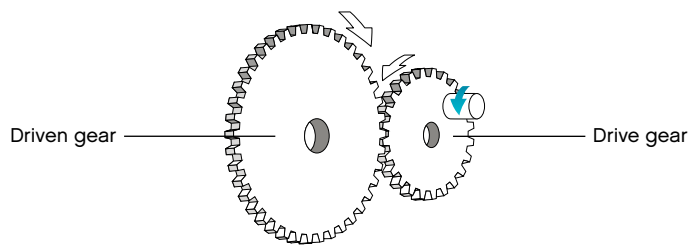


Establishing the Concept

We recommend establishing the concept of the simple machine to be worked on. This could be done, for example, by showing students a number of exhibits from the LEGO® set to stimulate their interest. Build a principle model, or show some of the images from Images for Classroom Use, asking questions such as “What do you know about this simple machine?” or “Where do we use this simple machine?” See if students can name any of the objects you show them, and allow time for students to handle them.

Providing the Vocabulary

Students will acquire the necessary vocabulary for the simple machine as they progress through the activities, but it may be useful to introduce certain terms at this stage. Important new vocabulary items are *drive gear* and *driven gear*.

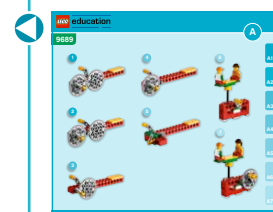
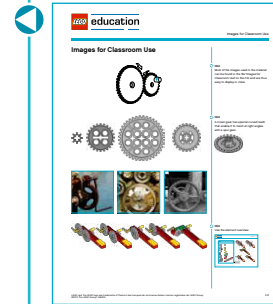
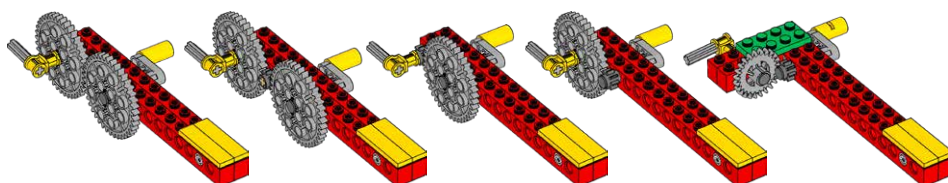


The gear that is closer to the source of power is called the drive gear and the gear that receives power from the drive gear is called the driven gear (or follower gear).

Understanding the Principles

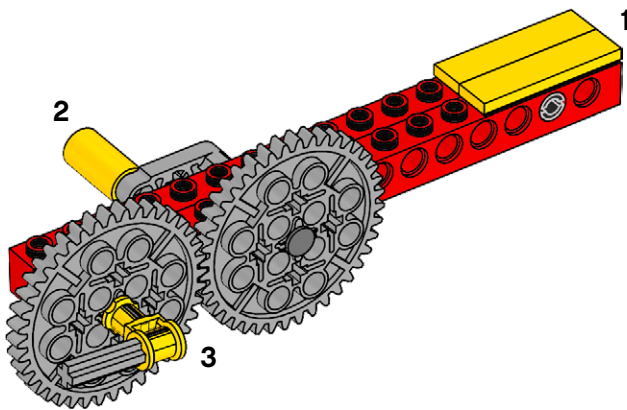
The principle models are designed to help students understand the principles of the simple machine in focus through hands-on experience before they move on to construct the main models.

The principle models are presented in a logical sequence that will build on students' understanding. The principle models can only be built one at a time from the parts in the set.



Using the Principle Models

1. The yellow elements indicate where to hold, push, lift, or apply force/effort in handling the principle models. The principle models need to be held correctly for them to work properly.
2. When measuring one turn of the handle, carefully observe the starting place of the handle, and be careful to stop at the same position after a full turn.
3. When measuring a full turn of the position marker, carefully observe the starting place of the position marker, and be careful to stop at the same position after a full turn. This is especially important when observing the connection between cranking the handle and the number of turns the position marker makes.



Hint

The principle models can be built as mirror-images for left-handed students.

Hint

It is recommended that students work in pairs; one student can observe the position marker while the other cranks the handle a full turn.