

Teachers' Guide

Lesson's objectives

- What is the mixer and the time needed to develop the device
- Transmission of motion
- How the speed is affected from the gear linkage
- Development of fine mobility skills
- Students cooperate with each other
- Students develop their creativity and critical thinking skills to solve a problem they are given

Introduction to the activity

The activity is about the mixer, a device that (almost) all students have at their houses. So, we refer to simple machines we can find at home, and more specifically in our kitchen. You can discuss about the invention of the mixer, the use of electric energy to support its operation (greater speed, less human effort). It is interesting to refer to the improvements from one engineer to another during the years (nothing is perfect from the beginning), the use of the appropriate accessory depending on what we want to mix, patents and certificates. Depending on the level of your students and your own knowledge, you can extend to one or more of the above topics.

Simple machine

The simple machine you mainly use in this activity is the gear. You will refer to the meshing of gears, the motion transmission, the speed of motion. You will also use the crown gear, through the use of which the axles of the meshing gears are vertical and not parallel to each other.

Building

Follow the building instructions (there is nothing difficult in the building). We remind that during the building stage you need to talk to your students, call each piece with its right name, refer to the symmetry emerging, the role of each piece to the stability of the whole building, etc.

Answers to worksheet

- To transmit the motion, starting from the crank, we follow the gears. One picture remains empty (it is for the second gear).



- Change the ring with the crank. We can see that it moves faster with the second gear.

This happens because:

In the first gear, the gears that mesh are the 40-teeth gear with the crown gear, that has 24 teeth. Their ratio is $40/24 = 5/3$. So, for 5 rotations of the 40-teeth gear, the crown gear rotates 3 times.

In the second gear, the gears that mesh are the 24-teeth gear with the crown gear, that also has 24 teeth. Their ratio is 1:1, so they have the same speed.





The picture shows the accessory of the mixer when we want to beat eggs. Students need to build something with similar edges.