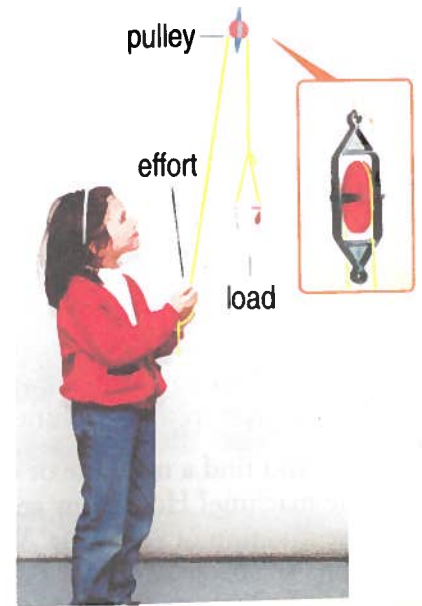


It would be hard to imagine living in a world that did not have pulleys and gears. Humans have used them for a long, long time. Pulleys and gears were invented more than 2000 years ago, simultaneously and yet independently, by the ancient Greeks, Chinese and Romans. In fact, all six of the simple machines: the lever, wheel and axle, pulley, wedge, inclined plane, and screw were invented around that time.

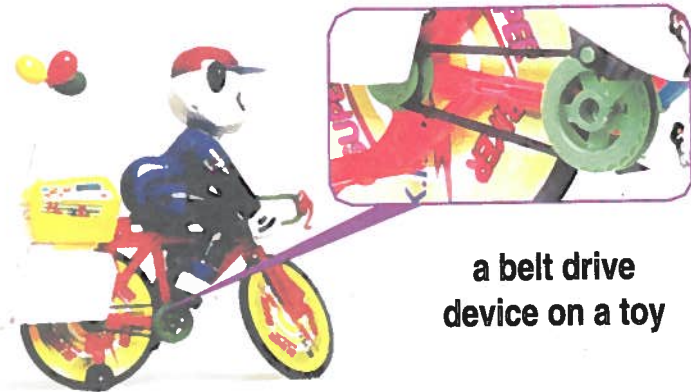
We still use pulleys and gears in the same ways as when they were first invented. Now, however, they are made of many different materials and used in far more devices.

A pulley is a wheel with a groove, usually connected to a frame or structure. The groove holds a rope or belt. The purpose of a pulley is to change the direction of force. A downward pull on one side of a pulley rope causes the opposite side to go up.



**a simple pulley system**

There are two kinds of pulley systems: (1) pulleys that lift and (2) pulleys that transmit power. The pulleys in a crane, an elevator, a window blind, and a flagpole are pulleys that lift. The pulleys in a kitchen blender, a VCR, a vacuum cleaner, or a washing machine are pulleys that transmit power. Pulleys that transmit power are called "belt drives." A bicycle chain is also a belt drive. It transmits power from the pedals to the back wheel.



**a belt drive device on a toy**

Gears are wheels with teeth. The teeth fit together, and one gear transmits force to another when it is turned. A gear system is similar to a belt drive system. If a gear system has many gears, it is called a "gear train."



**a gear device on a toy**