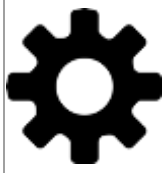
STIC resources on Mechanisms 

The following resources are hands-on science activities for students developed by STIC. Included with each simple machine are the following:

1. Introduction to the simple machine with examples
2. Video and pictures of the simple machine
3. Templates and instructions on how-to build them
4. Additional resources

			
Bell Crank	**Cam and Yoke**	**Pulley**	**Rack and Pinion**
Rod and Crank	**Snaildrop Cam**	**Gears**	**Quick Return**
Slide and Crank	**Cam and Scotch Yoke**	**Oscillation**	**Wedges**

Additional External Simple Machine Resources:

All sorts of mechanism; What they do and how they work. http://www.robives.com/mechs This website contains numerous information sheets and exercises to enhance the study, understanding and teaching of DESIGN and TECHNOLOGY. http://www.technologystudent.com/index.htm

Simple Machines for Kids. http://www.neok12.com/Simple-Machines.htm

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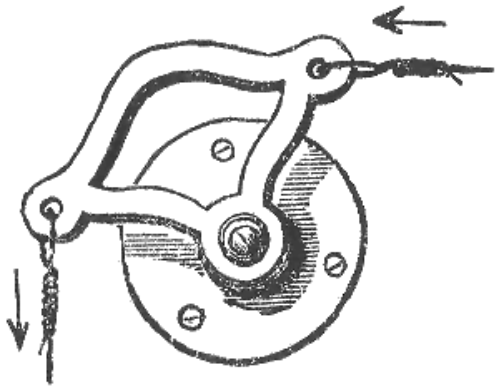
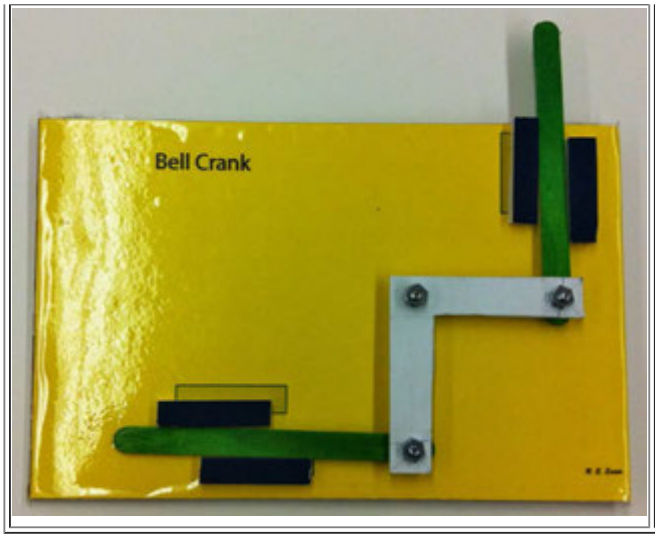
Bell Crank

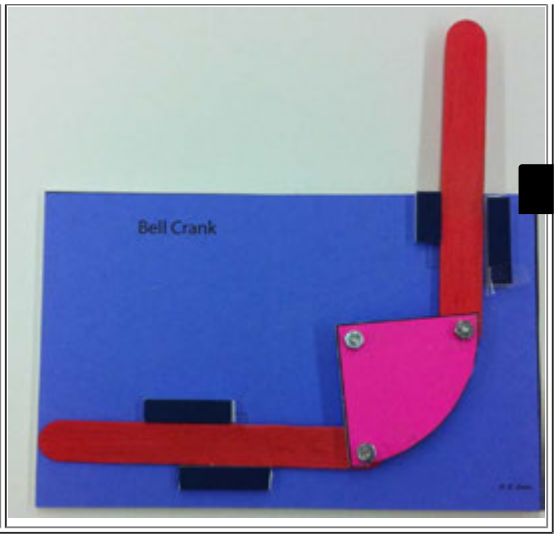


Bell-crank.

A bell crank is a type of crank that changes motion through an angle. The angle can be any angle from 0 to 360 degrees, but 90 degrees and 180 degrees are most common. The name comes from its first use, changing the vertical pull on a rope to a horizontal pull on the striker of a bell, used for calling staff in large houses or commercial establishments.

Report a Problem





Building Template (PDF)

Cam & Yoke

A CAM changes the input motion, which is usually rotary motion (a rotating motion), to a reciprocating motion of the follower. They are found in many machines and toys. A CAM has two parts, the FOLLOWER and the CAM PROFILE.

The cam seen above is a 'pear shaped cam'. As the handle is turned the cam profile rotates. The model moves forwards and backwards as a result. The movement is gentle although the faster the handle is turned the faster the movement of the model becomes.

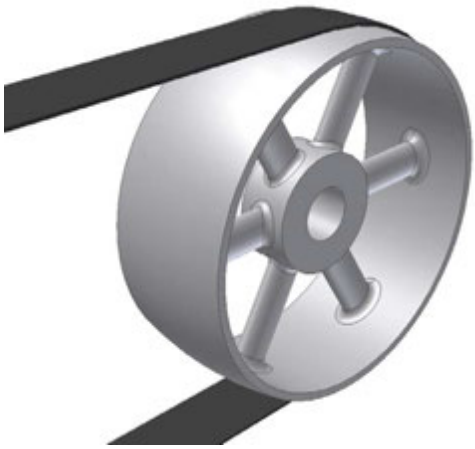

Cam and Yoke Type Follower

Building Template #1 | Building Template #2 (PDF)

Cam & Yoke Instructions (.doc)

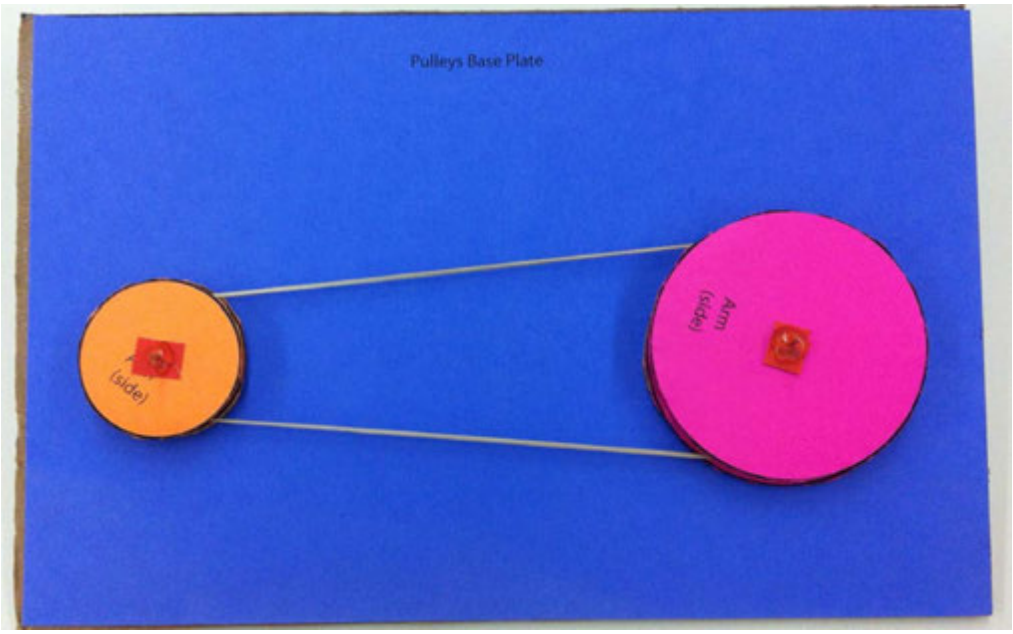
Pulley

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a cable or belt along its circumference. Pulleys are used in a variety of ways to lift loads, apply forces, and to transmit power. In nautical contexts, the assembly of wheel, axle, and supporting shell is referred to as a "block."



The Pulley

Explore science games on simple machines for kids at NeoK12



Building Template (PDF)

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			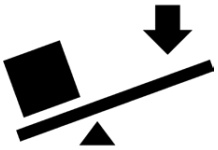
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Professional Development; Contact sticcontact@gmail.com

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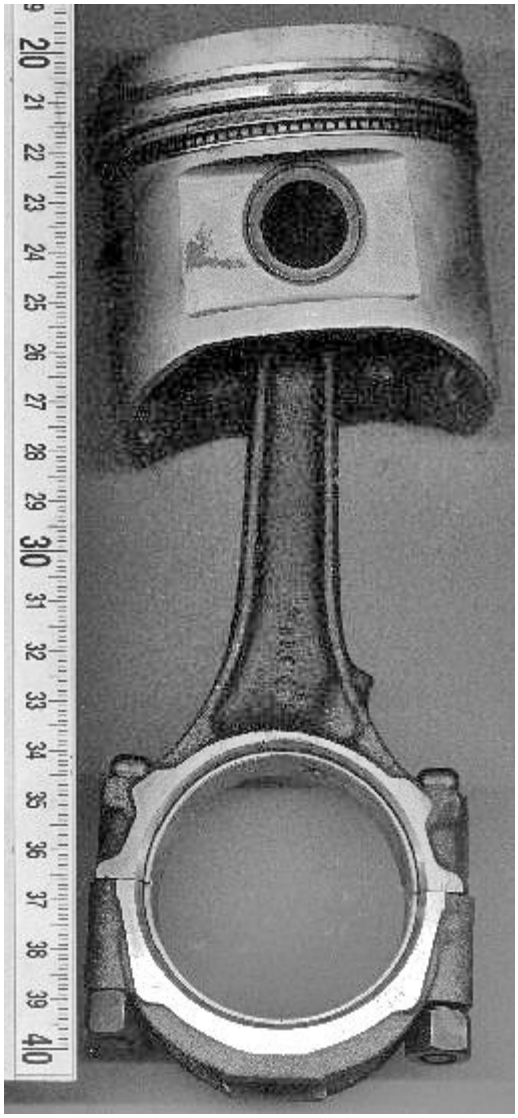
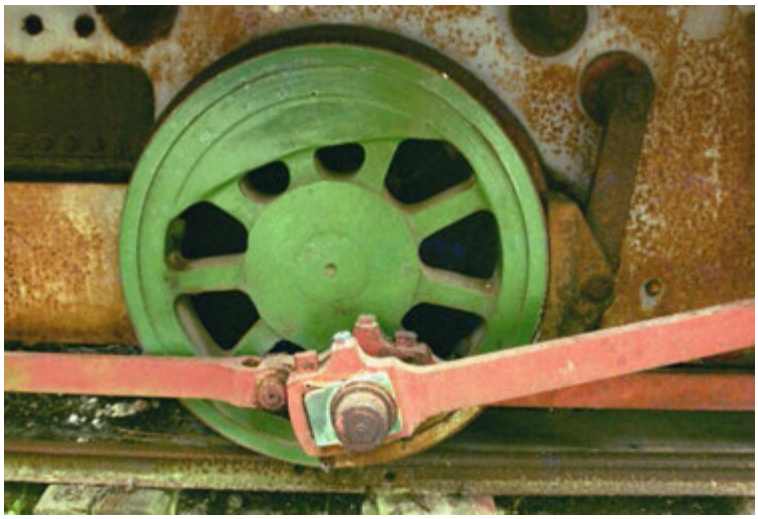
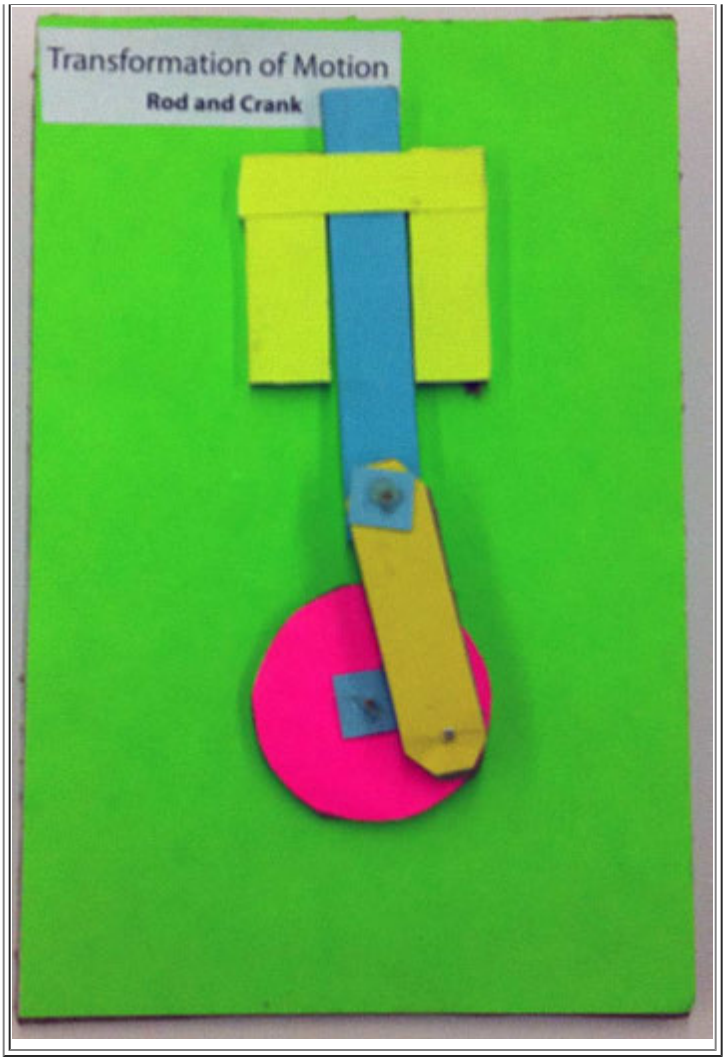
Report a Problem

Rod and Crank

In a reciprocating piston engine, the connecting rod or conrod connects the piston to the crank or crankshaft. Together with the crank, they form a simple mechanism that converts reciprocating motion into rotating motion.



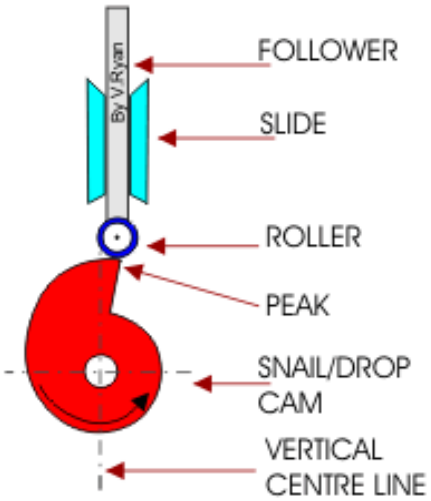




Building Template EN / Building Template FR (PDF)

Snail Drop Cam

This type of cam was used for example in mechanical time keeping clocking-in clocks to drive the day advance mechanism at precisely midnight and consisted of a follower being raised over 24 hours by the cam in a spiral path which terminated at a sharp cut off at which the follower would drop down and activate the day advance. Where timing accuracy is required as in clocking-in clocks these were typically ingeniously arranged to have a roller cam follower to raise the drop weight for most of its journey to near its full height, and only for the last portion of its travel for the weight to be taken over and supported by a solid follower with a sharp edge. This ensured that the weight dropped at a precise moment and which delivered theaccurate timing. This was achieved by the use of two snail cams mounted coaxially with the roller initially resting on one cam and the final solid follower on the other but not in contact with its cam profile. Thus the roller cam was initially carried the weight, until at the final portion of the run the profile of the non-roller cam rose more than the other causing the solid follower to take the weight.



Student Worksheet (PDF)

Building Instructions #1 | Building Instructions #2 (PDF)

Gears

A gear or cogwheel is a rotating machine part having cut teeth, or cogs, which mesh with another toothed part to transmit torque, in most cases with teeth on the one gear being of identical shape, and often also with that shape on the other gear. Two or more gears working in a sequence (train) are called a gear train or, in many cases, a transmission; such gear arrangements can produce a mechanical advantage through a gear ratio and thus may be considered a simple machine.

Gears_animation

Simple Gear worksheet (PDF)

Building Templates #1 | #2 (PDF)

Gears

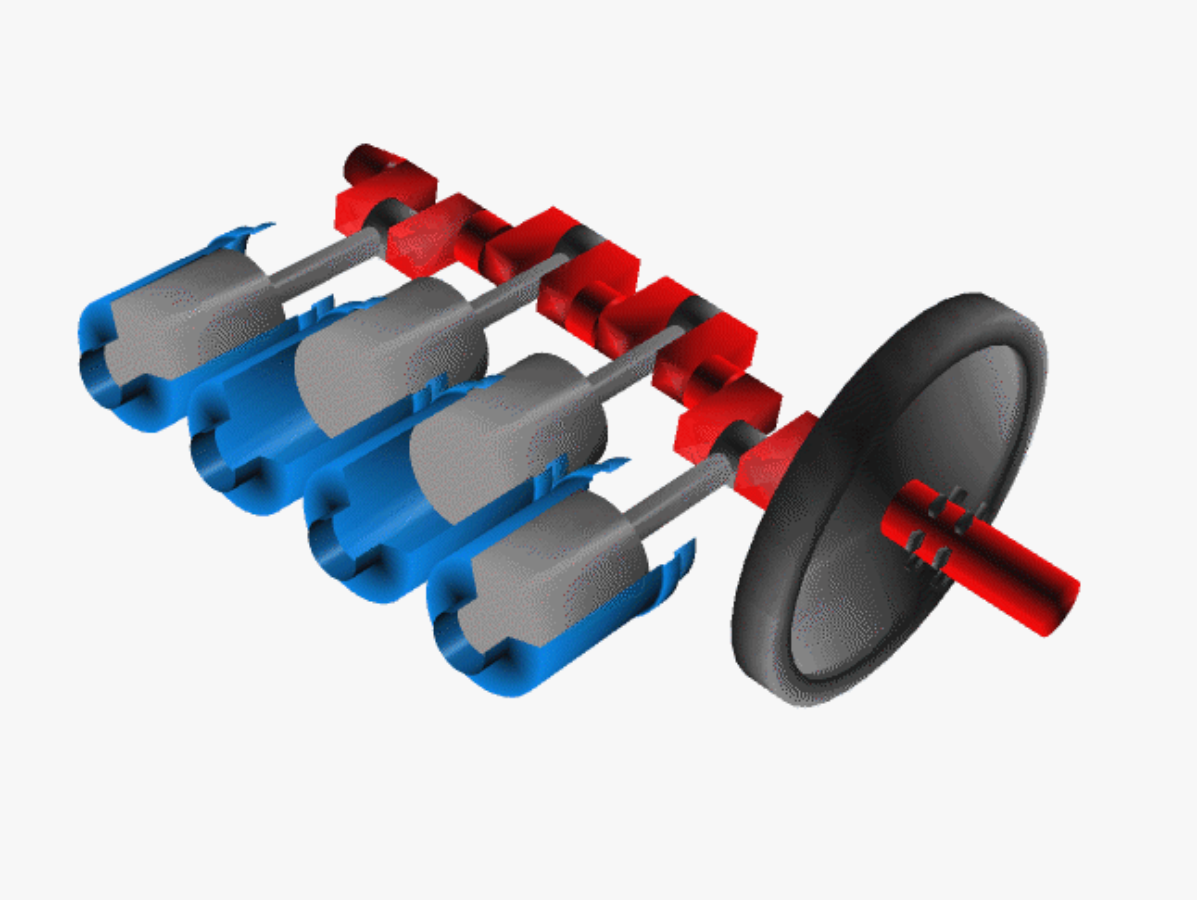
Report a Problem

Quick Return

The quick return mechanism converts rotary motion into reciprocating motion, but unlike the crank and slider, the forward reciprocating motion is at a different rate than the backward stroke. At the bottom of the drive arm, the peg only has to move through a few degrees to sweep the arm from left to right, but it takes the remainder of the revolution to bring the arm back. This mechanism is most commonly seen as the drive for a shaping machine. robotpark

Crank and Slide

A crank is an arm attached at right angles to a rotating shaft by which reciprocating motion is imparted to or received from the shaft. It is used to convert circular motion into reciprocating motion, or vice versa. The arm may be a bent portion of the shaft, or a separate arm or disk attached to it. Attached to the end of the crank by a pivot is a rod, usually called a connecting rod. The end of the rod attached to the crank moves in a circular motion, while the other end is usually constrained to move in a linear sliding motion.



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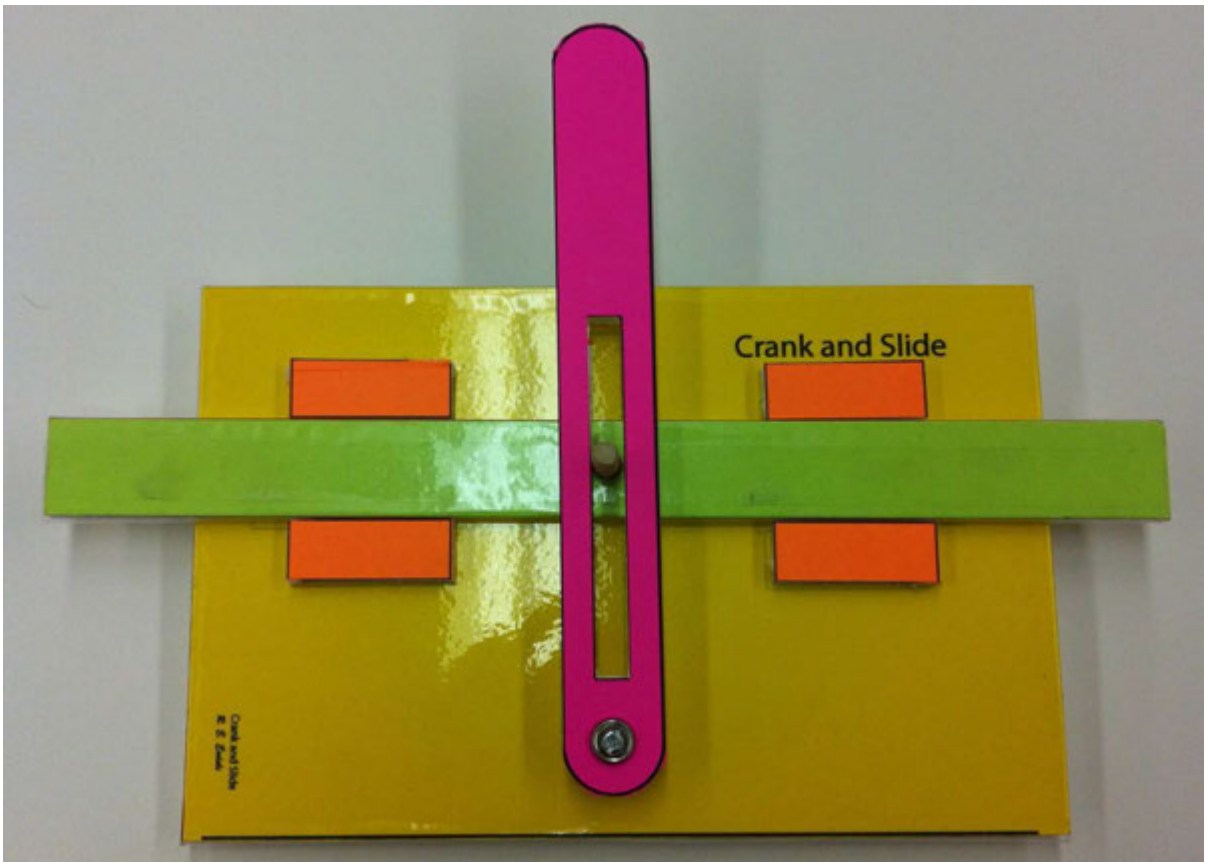
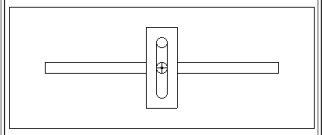


Building Template (PDF)

Resource & Worksheet: CRANK AND SLIDER MECHANISM V. Ryan © 2002 - 2009

Cam and Scotch Yoke



The Scotch yoke is a mechanism for converting the rotation motion of a crank into reciprocation motion. The piston or other reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part. In this video the shape of the slot is such that it enables dwell at the both ends of the reciprocation motion.

Report a Problem

Building Template Part 1 | **Part 2**

Piston water pump, with a scotch yoke connection to its flywheel

Oscillation

***Oscillation**, in general, is a periodic fluctuation between two things; in the broadest sense, oscillation can occur in anything from a person's decision-making process to tides and the pendulum of a clock. Oscillation in a device called an oscillator is usually a back and forth motion over a central neutral point, created by changes in energy. In a pendulum-driven clock, for example, the oscillation is the back and forth movement of the pendulum. Oscillators may be mechanical or electronic, but all work on the same principles.*Whatis

Animated-mass-spring	MoSchaukel

A swing or a pendulum on a clock are good example of oscillation, as seen in the above image.

Oscillation

Building Template (PDF)

Wedges and Incline Planes

A **wedge** is a triangular shaped tool, and is a portable inclined plane, and one of the six classical simple machines. It can be used to separate two objects or portions of an object, lift up an object, or hold an object in place. It functions by converting a force applied to its blunt end into forces perpendicular (normal) to its inclined surfaces. The mechanical advantage of a wedge is given by the ratio of the length of its slope to its width. Although a short wedge with a wide angle may do a job faster, it requires more force than a long wedge with a narrow angle.

Wedge-diagram.svg

wedge_inclineplane

Building Templates ONE | TWO

[redacted]