

# Ames Public Library @HOME Activities

## Wheel and Axle!

The wheel and axle is a type of simple machine. Here, a wheel is locked to a central axle and they rotate each other when a force is applied on either one of them. To see a related video go to the Library's YouTube Channel at <http://bit.ly/APLvideos>.

### Books and Media

<b>Title</b>	<b>Author / Performer</b>	<b>Call Number:</b>
<i>Cub Scout Grand Prix, Pinewood Derby Guidebook</i>	Boy Scouts of America	J 369.2 BOY
<i>Pinewood Derby Speed Secrets</i>	Meade, David	J 369.2 MEA
<i>Pinewood Derby Designs &amp; Patterns</i>	Thorne, Troy	J 369.2 THO
<i>Simple Machines</i>	Adler, David	J 621.8 ADL
<i>Basic Machines</i>	Holzweiss, K	J 621.8 HOL
<i>The Usborne Big Book of Big Machines</i>	Lacey, Minna	J 621.8 LAC
<i>How Machines Work</i>	Macaulay, David	J 621.8 MAC
<i>My World of Science: Simple Machines</i>	Marsico, K	J 621.8 MAR
<i>On Wheels</i>	Scarry, Huck	J 621.8 SCA
<i>Holding a Door Open: Wedge vs. Wheels and Axles</i>	Schuh, Robin	J 621.8 SCH
<i>Wheels and Axles</i>	Walker, Sally and Feldmann, Rosann	J 621.8 WAL
<i>Simple Machines</i>	Ward, D. J.	J 621.8 WAR

## Vocabulary

*Simple Machines* – There are six simple machines, they are: the pulley, the inclined plane, the wedge, the lever, the screw, and the wheel and axle. A simple machine is a basic mechanical device that allows you to use leverage to multiply force.

*Leverage* – Leverage is the gain in output force over input force. Leverage is the assisted advantage; to leverage means to gain an advantage through the use of a tool.

*Wheel* – A wheel is a circular object or frame that revolves or turns on an axle. A wheel enables objects to move easily over the ground.

*Axle* – A wheel spins on an axis. This axis is called an axle, and is the bar that goes into the middle of a wheel. A wheel and axle helps us move things with much less force. The wheel and axle can be found in cars, bicycles, skateboards, the doorknob and many more objects.

*Friction* – The force resisting the motion of the object on the ground. When there is less friction, it takes less force to move something.

*Gravitational force* – The force that pulls objects to the ground.

*Load* – The amount of work that a machine is expected to perform. It also is the quantity that can be carried at one time by a particular or specified means.

# Pinewood Derby Car Take-Home Kit

**This kits contains sharp objects; please ask a grown-up to help!**

*The kit contains:*

- Pinewood wedge
- 4 wheels
- 4 nails for the axles

Open your kit and take out the pinewood wedge. Be sure to put the wheels and the nails in a safe place.

On the pinewood wedge you will notice four grooves on the flat-side, this is where the nails, that are going to act as axles for the wheels, will go in. You can decorate your pinewood car in a variety of different ways. For ideas and tips check out some of the pinewood derby car books at Ames Public Library.

Once you are finished with decorating the wedge, it's time to insert the wheels. This is a two-step process: first insert the axle (the nail) into the wheel and then insert the nail into the groove. Please ask a grownup for help as the nails are sharp. You may need to drill holes for the wheels if you are not able to use the grooves. Once your car is ready, you are ready to race!

You can race on a flat surface like the floor, or build a ramp using materials that you find around the home such as cardboard boxes, tape, empty containers etc.

When your ramp is ready, test your car to see how fast and far it can go. Can you modify it in any way to make it go faster? How can you use science to speed up your car?