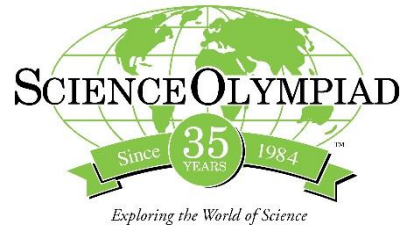


Practice Tips: Simple Machines



USEFUL WORDS TO KNOW: Here are some representative words you should know.

Energy	Lever	Pulley	Inclined Plane	Compound Machine
Work	Fulcrum	Pivot	Wheel and Axle	Mechanical Advantage
Force	Distance	Axle	Wedge	Resistance
Load	Effort	Sheave	Screw	

USEFUL WEBSITES TO SEE: We verified these in January 2020.

http://phet.colorado.edu/en/simulation/balancing-act	A nice lever simulation
http://www.compassproject.net/html5sims/pulleysim/pulley_en.html	A nice pulley simulation

Simple descriptions of Simple Machines and worksheets from TeachEngineering.org:

https://www.teachengineering.org/lessons/view/cub_simple_lesson01

- [Descriptions of the Simple Machines](#)
- [Simple Machines Matching Worksheet](#)

Background information for TEACHING about simple machines (for parents):

http://www.phy.ilstu.edu/pte/489.01content/simple_machines/simple_machines.html

USEFUL THINGS TO TRY: Practice with your teacher or at home with a parent.

1. A ramp is an inclined plane that can be used instead of stairs to move an object. Find a building with a handicap ramp. Compare lifting up something heavy - like a 1-gallon jug of water – by lifting it straight up from the ground to the upper height of the ramp versus pulling it up the ramp on a wagon. Which takes more effort? Which takes a greater distance? Are you strong enough to repeat this with 2 or 3 gallons of water in a bucket?
2. Look at common objects around your house and see if you can find any simple machines. For example, the bottom of a light bulb contains a screw. What about a doorknob, a light switch, or a broom? How many different simple machines can you identify?



3. An important equation to keep in mind is that work equals force multiplied by distance. How does this relate to each simple machine?
4. Try making a pulley with objects around your house such as wire, a spool, and string. Bend the wire into a triangle and place the ends into the empty spool. Attach the wire to a stationary object and make sure the spool can move freely. Attach a paperclip to one end of the string and tie an object such as a pencil to the other end of the string. Hang the string over the spool and pull gently on the side with the paper clip to raise the pencil. Compare this to lifting a pencil without the pulley. Which takes less effort? Try making some compound pulleys with several spools.

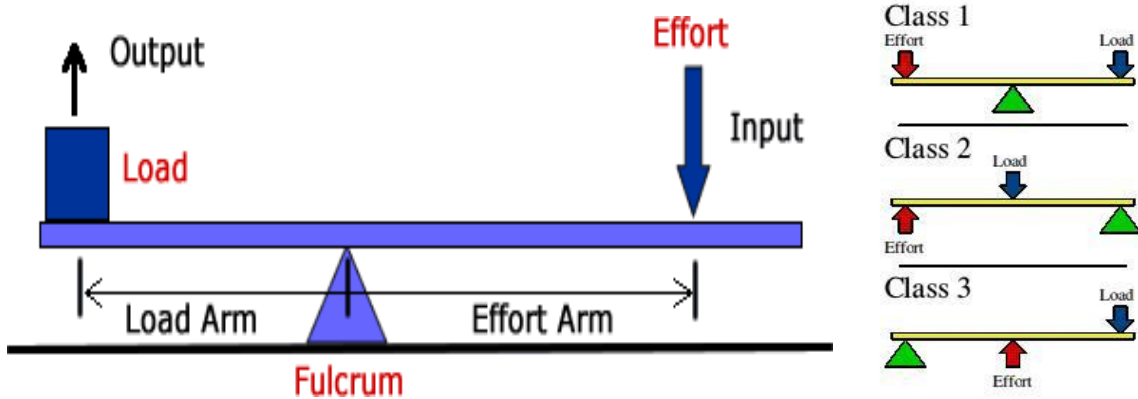
RULE CLARIFICATIONS:

These apply to DeKalb's Olympiad.

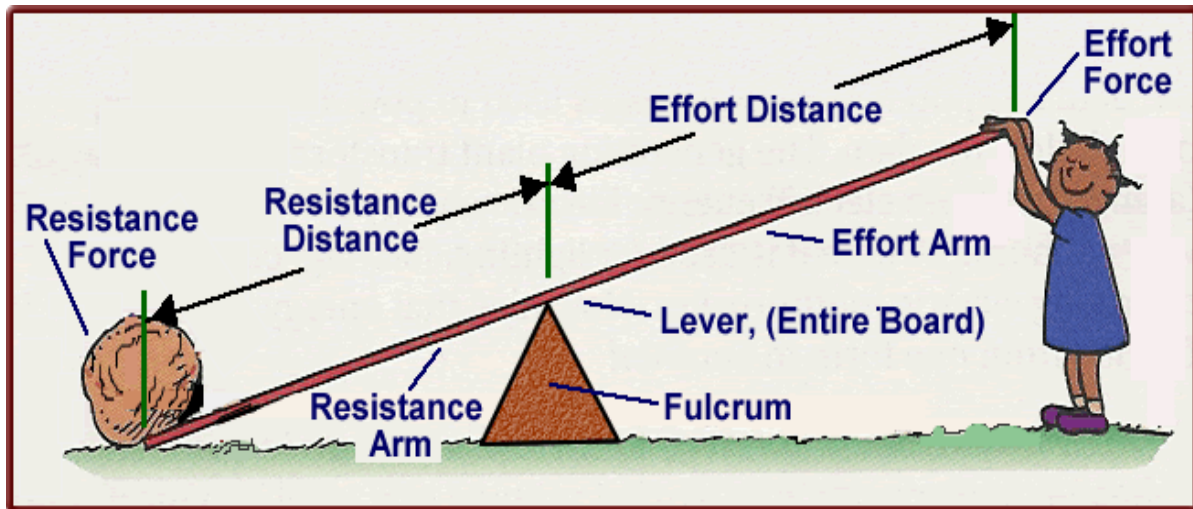
1. For our Elementary tournament, we focus on the following simple machines: lever, inclined plane, pulley, screw, wheel and axle, and wedge.
2. Some questions may ask you to identify a simple machine while others may ask you to use the simple machines to make measurements values like "effort distance" or "load force" or "load weight." Make sure to practice with a spring scale!

Simple Machines and Their Components

Levers



http://www.school-for-champions.com/machines/images/levers_parts.gif

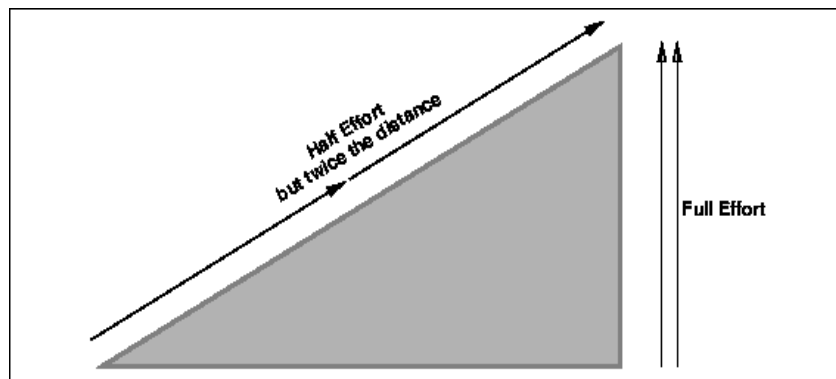


A lever either uses less force over a greater distance or more force over a shorter distance.

<http://www.mlms.loganschools.org/~mlowe/LoweHome/SciberText/SciberStandard4ForceAndMotion.html>

<http://ipc1.clpccd.cc.ca.us/ipc/DivisionIII/images/DSNT/Levers.jpg>

Inclined Planes

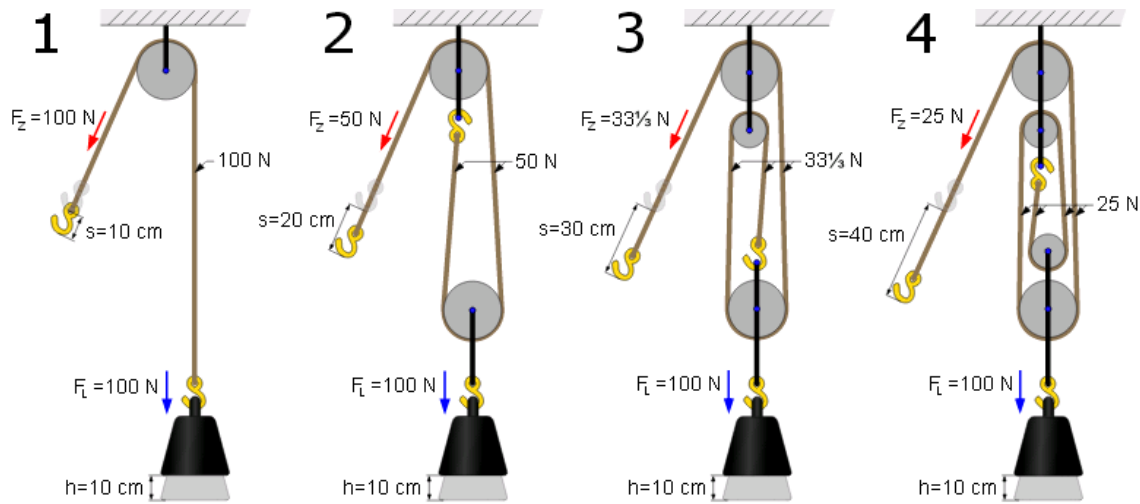


An inclined plane allows for less force over a greater distance.

<https://www.clear.rice.edu/elec201/Book/images/img70.gif>

Pulleys

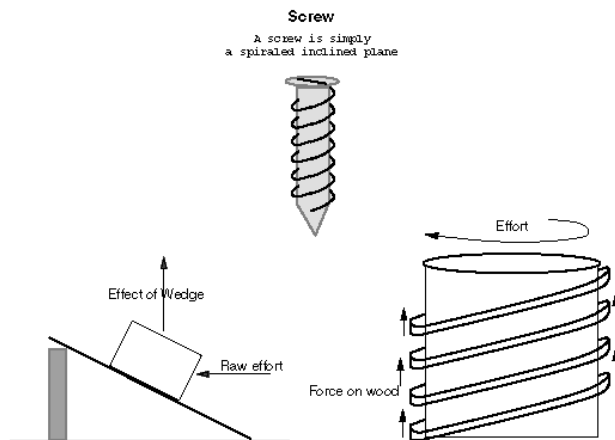
A fixed pulley changes the direction of the force, not the speed, distance, or force. As a pulley system becomes more complex, less effort is needed to raise an object.



http://upload.wikimedia.org/wikipedia/commons/e/e9/Four_pulleys.svg

Screws

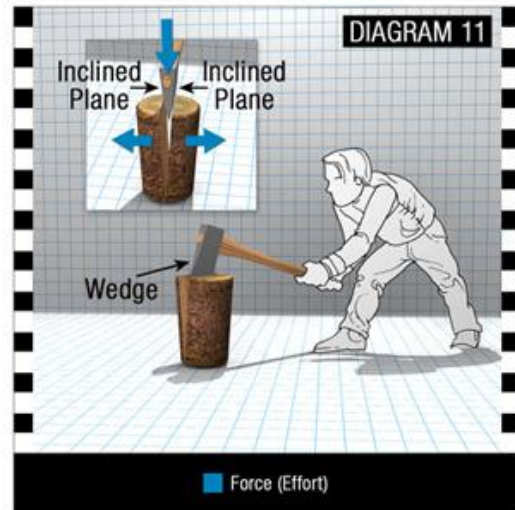
A screw is an inclined plane wrapped around a cylinder. It allows for less force and changes the direction of the force.



<https://www.clear.rice.edu/elec201/Book/images/screw.gif>

Wedges

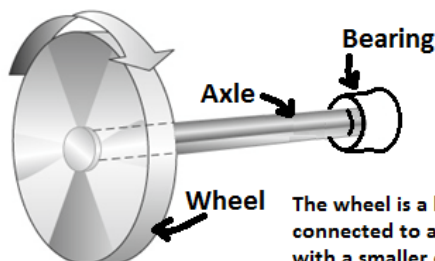
A wedge is an inclined plane that changes the direction of the force.



http://www.engquest.org.au/Images/Machines/SM_diagram11.jpg

Wheel and Axle

This wheel and axle turn inside a **bearing** with very low friction. This allows motion that is **much** easier than dragging something directly along the ground.



The place where one part turns against something fixed in place is called the bearing.

The wheel is a larger disk connected to a rigid stick with a smaller diameter.

This allows smaller twisting forces on the wheel to exert much larger forces on the axle.

Image adapted from http://01.edu-cdn.com/files/89501_89600/89547/file_89