

Introduction to Simple Machines



- » Don't fret if you don't think you know any simple machines, you live work and use simple machines every day
- » Teaching the fundamentals to your team can be very easy and support them in their learning process
- » Try making your own simple machines out of the Lego kits ahead of your team meetings and talk about them while the team is building and discovering
- » There are a great deal of resources available online – here are some good ones
 - > <http://www.engquest.org.au/students-background-lp.cfm>
 - > <http://www.edheads.org/activities/simple-machines/>
- » Do your own web search for simple machines or checkout the SM Gearbots website for some additional examples
 - > www.SMGearbots.org/coach-resources/

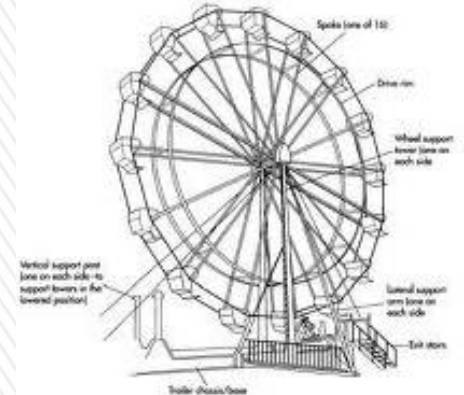
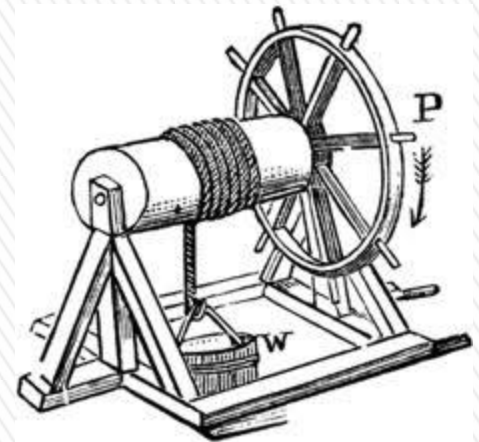
Wheel and Axle

Explanations

- » A smaller cylinder attached to the center of a larger cylinder
- » These simple devices involve large wheel and a small circular shaft where energy is transmitted
- » Examples
 - > Steering column on your car
 - > Car axle
 - > Wheel barrow
 - > Bicycle wheel

Curriculum Examples

- » Attach Lego wheels together through an axle and show how they can move together
- » Take a removable bicycle wheel and axle and spin them to let the children feel how the wheel spins freely around the axle



Levers

Explanations

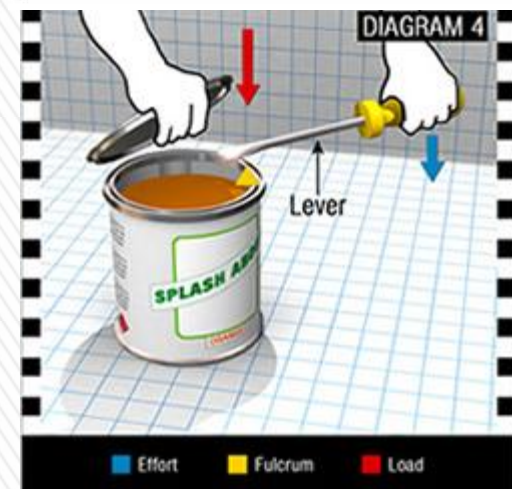
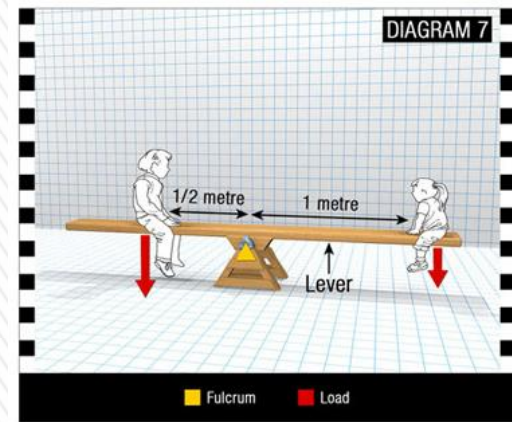
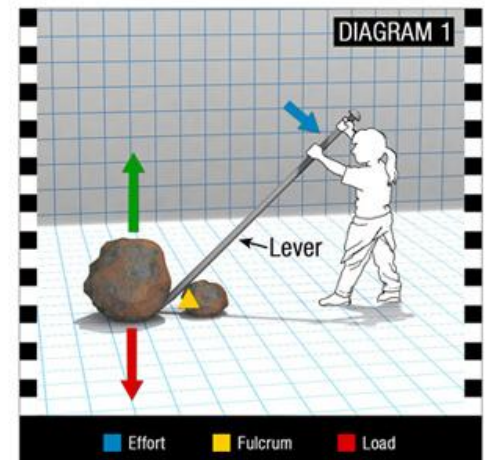
» This simple machine transmits energy in one direction to an object in the opposite direction across a fulcrum or pivot point

» Examples:

- > Teeter totter
- > Hammer

Curriculum Examples

- » Have child try and open empty paint can lid with hands then with an opener
- » Build a simple wooden ruler and use a marker as a fulcrum to lift or pry up a pile of books
- » Pound a nail a little bit into a board and have the child try to pull it out with their hands and then a hammer



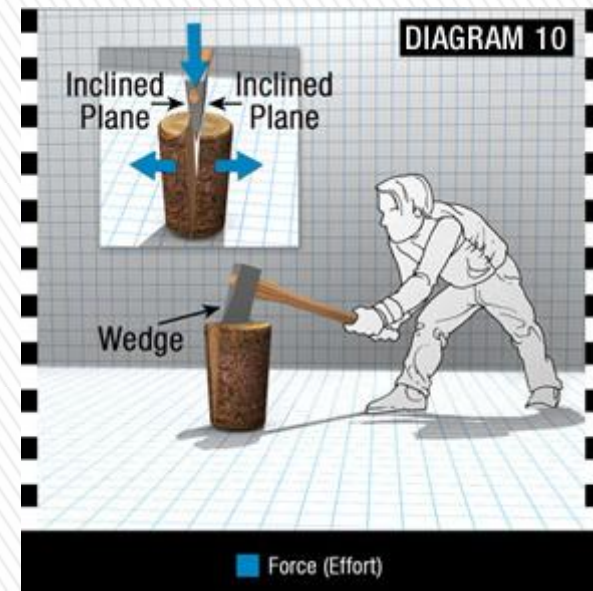
Wedges

Explanations

- » Converts a vertical force into a horizontal splitting force
- » Examples
 - > Splitting Axe
 - > Zipper
 - > Garden plow
 - > Doorstop under a door

Curriculum Examples

- » If you have an old zipper, show how there is a wedge that splits the zipper to open the zipper
- » Put two piles of books together end to end and use the end of a sharpened pencil to show how pushing the pencil between them causes them to separate



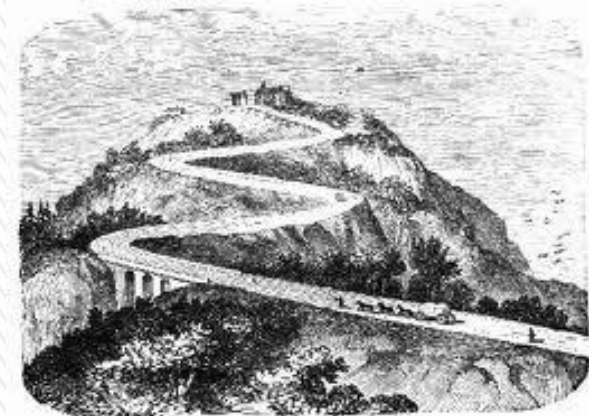
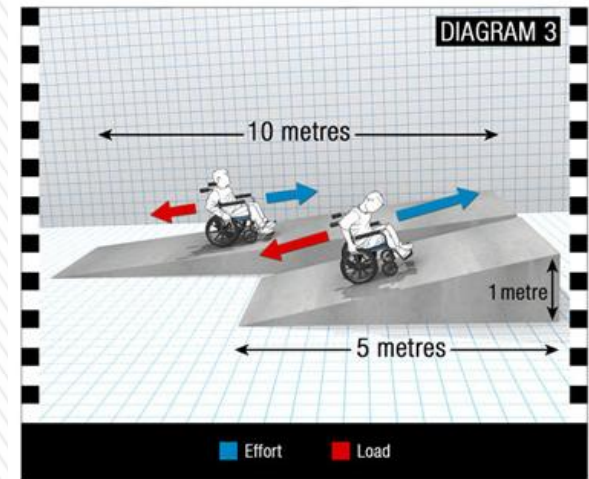
Inclined Planes

Explanations

- » Enables reduced energy and changes it to a vertical lifting force aiding in lifting or lowering a load
- » Examples:
 - > Handicap ramp
 - > Road up a mountain
 - > Truck ramp
 - > Car carrier ramps

Curriculum Examples

- » Simple poster board and build small car – start the car at the top of a pile of books and drive down the ramp then off the top of the pile
- » Tie a small string to the back of a large toy car and pull it up a small ramp mad of books or cardboard with and without an inclined plane - is there a difference in the amount of energy needed?



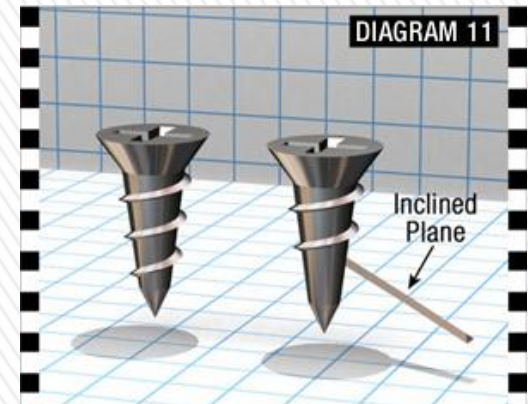
Screw

Explanations

- » A simple inclined plane rotated around a circular shaft
- » A screw transfers the energy of rotation to straight line energy through the inclined plane
- » Examples
 - > Jar Lids
 - > Screws to hold boards together
 - > Garage door opener (screw drive)
 - > Candy vending machine dispenser

Curriculum Examples

- » Using a long screw, show how screwing it into a board causes the screw to appear shorter or longer
- » Find a jar with a screw down lid (bottle of tomato sauce). Explore how the lid screws up and down and holds the cap tightly on



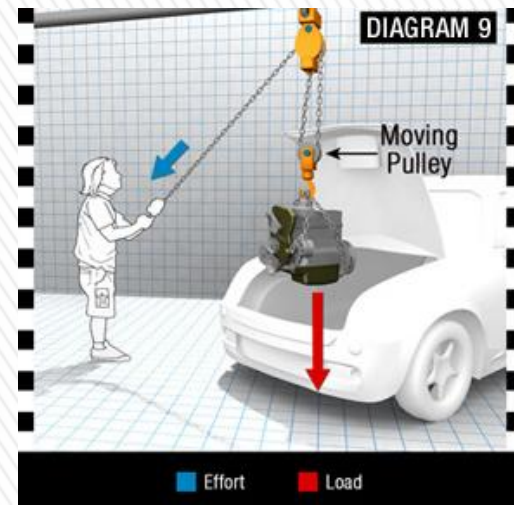
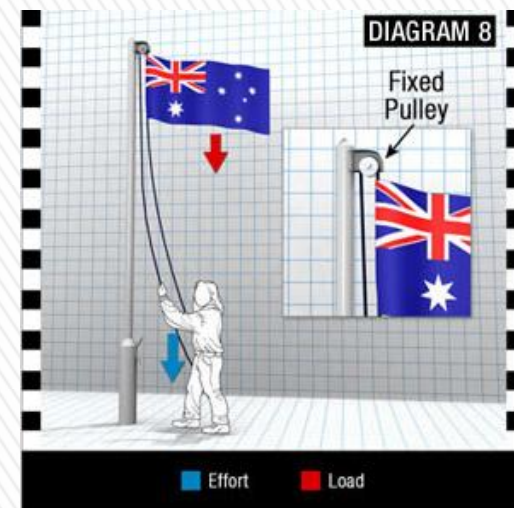
Pulley

Explanations

- » A device that changes the direction of and reduces the amount of force needed to move an object – one pulley reduces the amount of energy needed to lift by about half
- » When used in combination, they can dramatically reduce the energy needed to lift an object
- » Examples
 - > Large and small construction cranes
 - > Flag pole
 - > Engine hoists

Curriculum Examples

- » Wheel chair
- » Well and Bucket
- » Steering Wheel



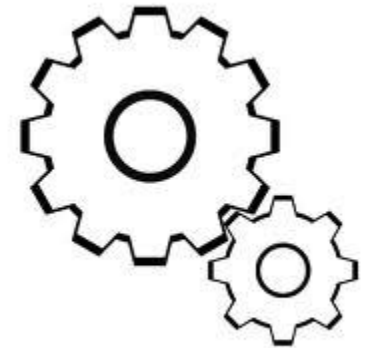
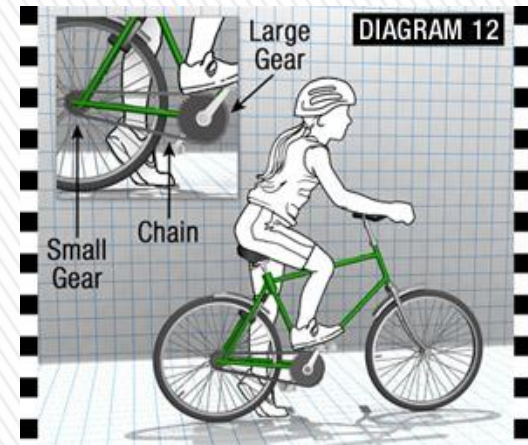
Gears

Explanations

- » A wheel and axle where the wheels have teeth which transfer energy from one wheel to the next either directly or through a chain or belt
- » Examples:
 - > Bicycle gears transfer energy to the back wheels using a chain from the pedals
 - > Mechanical clocks
 - > A car transmission

Curriculum Examples

- » Build a simple device using Lego gears. Mix and match large and small gears to see the effect it has on the speed of the spinning or the force they can generate
- » Have the kids look at their bicycles and explore what happens when they pedal how the energy gets to the back wheels



Worm Gear

