



# TeachEngineering

STEM Curriculum for K-12

**ENGINEERING: SIMPLE MACHINES**



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# Introduction to Simple Machines

# What are they?

Simple machines are machines with few or no moving parts that are used to make work easier

# Types of Simple Machines

Wedge

Wheel and Axle

Lever

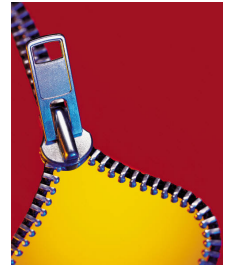
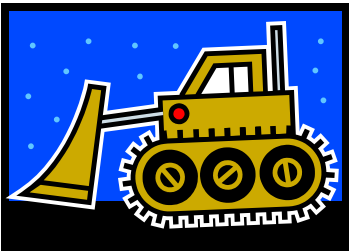
Inclined Plane

Screw

Pulley

# Wedge

- Pushes materials apart, cuts things
- Examples: axe, doorstop, chisel, nail, saw, jackhammer, bulldozer, snow plow, horse plow, zipper, scissors, airplane wing, knife, fork, bow of a boat or ship



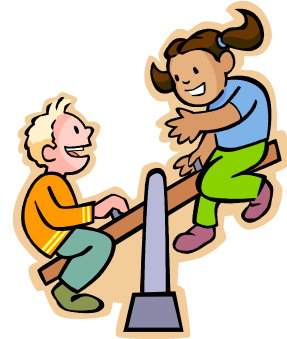
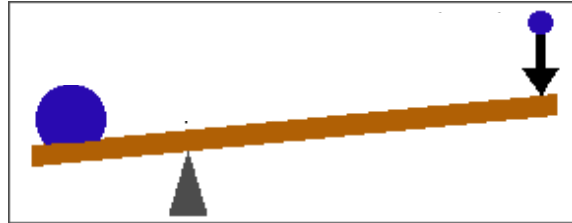
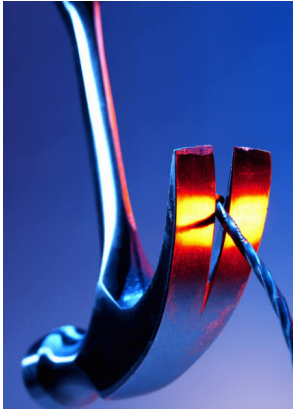
# Wheel and Axle

- Makes it easy to move things by rolling them, and reducing friction
- Examples: car, bicycle, office chair, wheel barrow, shopping cart, hand truck, roller skates



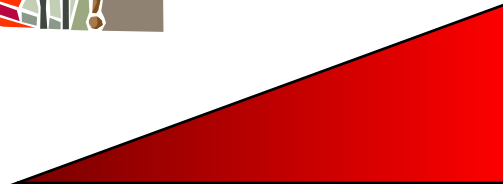
# Lever

- Makes lifting weight easier by using a fulcrum to redirect force over a longer distance
- Examples: see-saw, dump truck, broom, crane arm, hammer claw, crow bar, fishing pole, screwdriver, bottle opener



# Inclined Plane

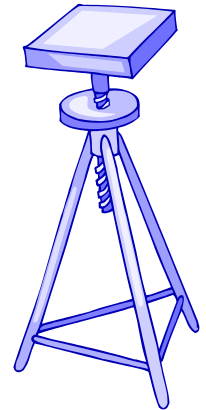
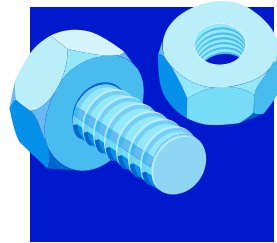
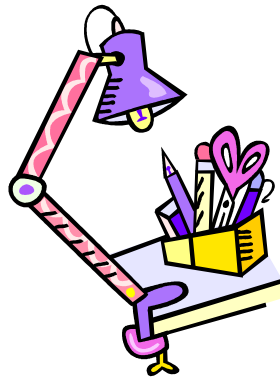
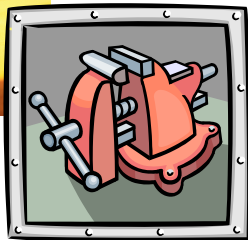
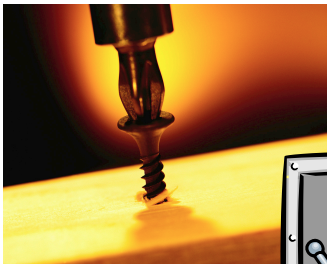
- Makes it easier to move objects upward, but you have to go further horizontally
- Examples: highway or sidewalk ramp, stairs, inclined conveyor belts, switchback roads or trails



# Screw

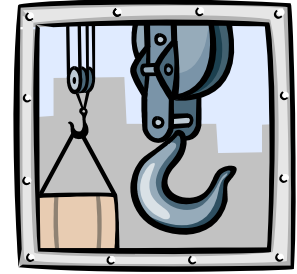


- Turns rotation into lengthwise movement
- Takes many twists to go a short distance
- Holds things together
- Examples: screws, bolts, clamps, jar lids, car jack, spinning stools, spiral staircases



# Pulley

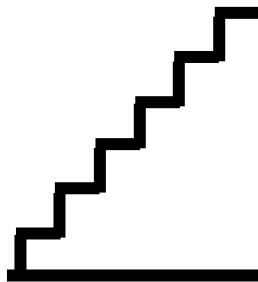
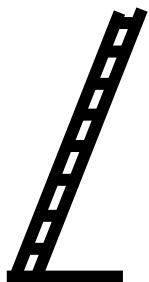
- Makes lifting things with a rope easier by redirecting force and the addition of additional pulleys
- Examples: flag pole, elevator, sails, fishing nets, clothes lines, cranes, window shades and blinds, rock climbing gear



# Why Use Simple Machines?

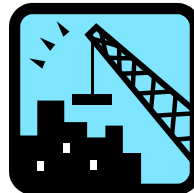
For the mechanical advantage...

- Making something easier to do, but it takes a little longer to do it
- For example, going up a longer flight of stairs instead of going straight up a ladder



# Complex Machines

- Combining two or more simple machines to work together
- Examples:
  - Car jack **combines** wedge and screw
  - Crane or tow truck **combines** lever and pulley
  - Wheelbarrow **combines** wheel and axle with a lever



## Summary

Wedge	Pushes material apart, cuts
Wheel and Axle	Makes it easy to move things by rolling them, and reducing friction
Lever	Helps lift heavy weights using longer distances
Inclined Plane	Makes it easier to move objects upward; a longer path, but easier lifting
Screw	Turns rotation into lengthwise movement
Pulley	Makes lifting heavy weights easier by redirecting force

## References

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