We've Got It Simple!

cause we've got machines…

All you ever wanted to know about:

Simple Machines

Work!!

- work = force x distance
- W = Fd
- Nm = N x m
- Nm = Joule (J)---- unit for energy

Input force

- The force you exert on a machine
- Sometimes called the Effort force

Output force

- The force a machine exerts on an object
- Sometimes called the Resistance.

Work input and output

- Work input
  - Fd that you do…
- Work output
  - Fd that the machine does

Machines(simple ones)

- why use em??
- so we can use less input force (effort)
- machines are used to change the size or direction of input force (effort)
- work must stay the same (work is work) soooo… if you decrease force, you must…………????

Mechanical Advantage

- The number of times a machine multiplies your input force (effort)

$$MA = \frac{Output\ force}{Input\ force}$$

- a machine w/ a MA of 1 does not change the amount of force BUT it may change the DIRECTION of the force!!!

MA of 2

- means that you need to use 1/2 the force but you need to double (2x) the distance to compensate
- MA of 3: you need to use 1/3 the force but you need to triple (3x) the distance to compensate.....
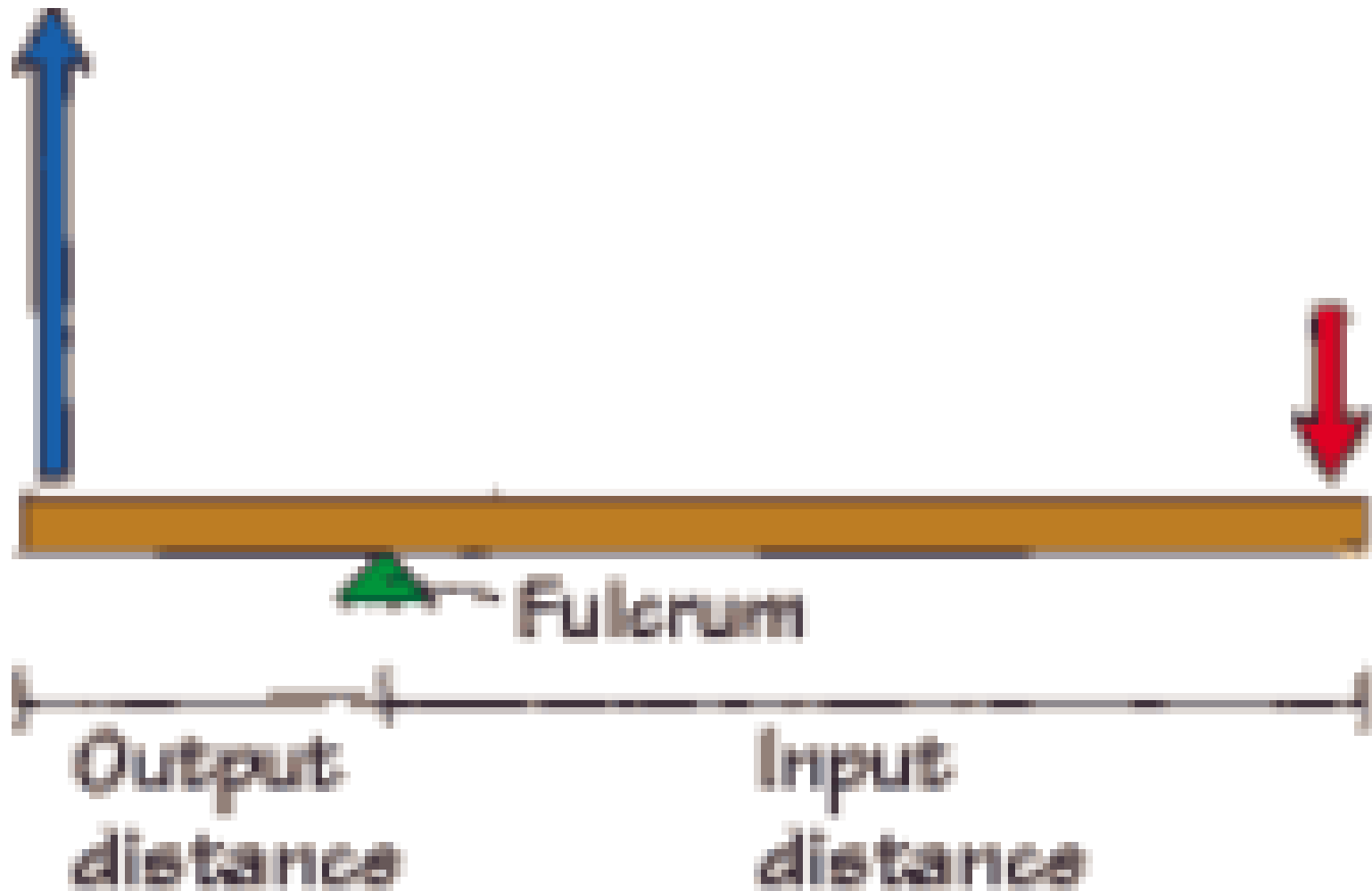
6 Simple Machines

- lever
- inclined plane
- wheel and axle
- pulley
- wedge
- screw

Lever

- bar on a pivot
- fulcrum = pivot (turning point)
- input force (effort) needs direction
- output force (resistance) = opposes effort (need direction)
- Input distance= distance from input to fulcrum
- Output distance= distance from output to fulcrum

Lever…

3 classes

- 1st class: fulcrum in the middle
  - see-saw
- 2nd class: force output in the middle
  - wheelbarrow
- 3rd class: force input in the middle
  - rake

Inclined Plane

- a ramp
- Does not move

Wheel 'n' Axle

- kinda like a lever (a bent lever)
- wheel must be connected to the axle to be considered a real w&a
- ex: steering wheel, faucet, door knob

Pulley

- grooved wheel that moves around a pin or rod; a cord must fit in the groove

Wedge

- sloping solid that comes to a point
- it must move for real work to be done
- ex: axe, knife...

Screw

- inclined plane wrapped around a rod
- again, must be moving to do work
- ex: car jack, Archimedes Screw

IMA for the big 6

- Inclined Plane: length of plane / height
- Levers: input dist / output dist
- W&A: radius of wheel / radius of axle
- Pulley: number of cords supporting the resistance

  - don't count cord you are pulling DOWN on!!!

IMA for the big 6

- Wedge and Screw: same as inclined plane

GOT IT??

GOOD!