MECHANICAL ADVANTAGE

MECHANICAL ADVANTAGE is the AMOUNT BY WHICH A MACHINE CAN MULTIPLY A FORCE (AKA FORCE RATIO)

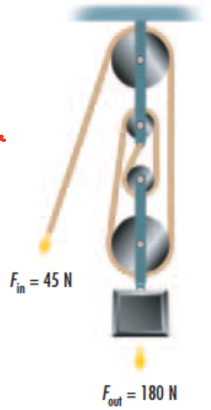
→ FORCE APPLIED to the MACHINE = INPUT FORCE
→ FORCE the MACHINE APPLIES to the OBJECT = OUTPUT FORCE OR RESISTANCE

$$\text{MECHANICAL ADVANTAGE (MA)} = \frac{\text{OUTPUT FORCE (N)}}{\text{INPUT FORCE (N)}}$$

* is a RATIO of FORCES in a MECHANICAL DEVICE *

$$= \frac{180\text{N}}{45\text{N}} = 4$$

[NO UNITS in MECH ADV. B/C IT IS A RATIO]



* IN MOST CASES MA IS GREATER THAN 1
→ MACHINES MULTIPLY INPUT FORCE to CREATE LARGER OUTPUT FORCE

* IF MA IS LESS THAN 1
→ MACHINE CAN STILL BE USEFUL for JOBS THAT NEED LESS OUTPUT FORCE → USUALLY USED to MAGNIFY DISTANCE

EX: FISHING ROD
→ NEEDS MORE FORCE/EFFORT to CATCH FISH THAN FISH WEIGHS