Chapter 5.

- Simple Machine.

  Multiplies (x) an applied $\vec{F}$.

WORK IS CONSERVED!!

- WORK = FORCE x DISTANCE

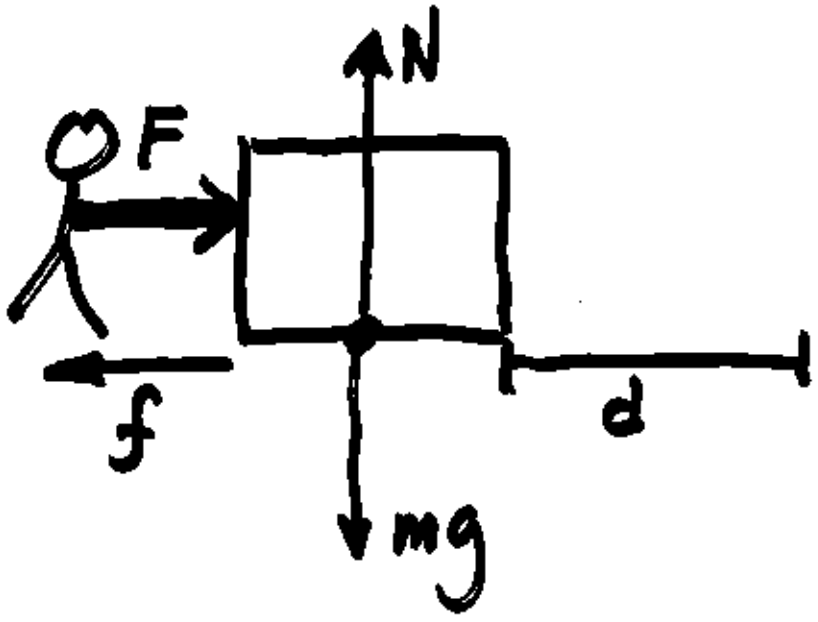
  $W = F \times d$

- Always true.

  WORK INput = WORKoutput

Newtons x meters = Joules

2)



A MAN Pushes A Box. IT MOVES A DISTANCE d. Which FORCES ARE USED to Calculate the WORK Done (by the MAN)?

A.) $mg + N + f \cdot F$.

B) $f + F$

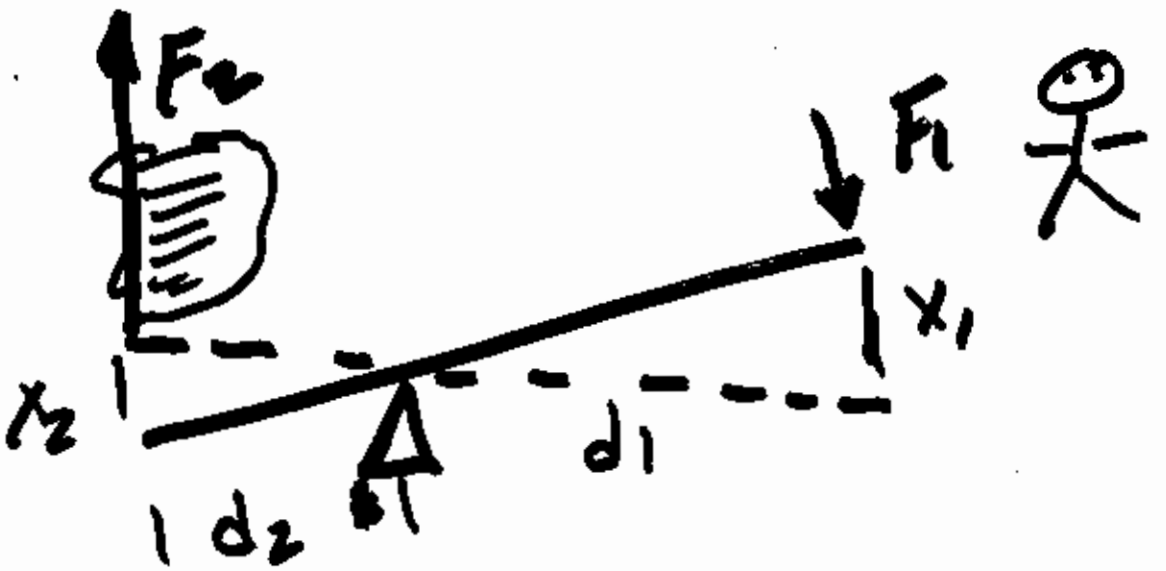
c) N

D) mg

e) F

Mechanical Advantage.

$$\frac{F_{out}}{F_{IN}} = \text{Mech. Adv.}$$



Energy into the Box

$$(F - f)\,d = \frac{1}{2}mv^2$$

1/ How much Work is done by  to move the Rock a distance x_2.?

A.) $F_1 \cdot d_1$

B.) $F_1 \cdot x_1$

C) $F_1 \cdot x_2$

D.) $F_1 \cdot d_2$

E.) $F_1 \cdot (d_1 + d_2)$

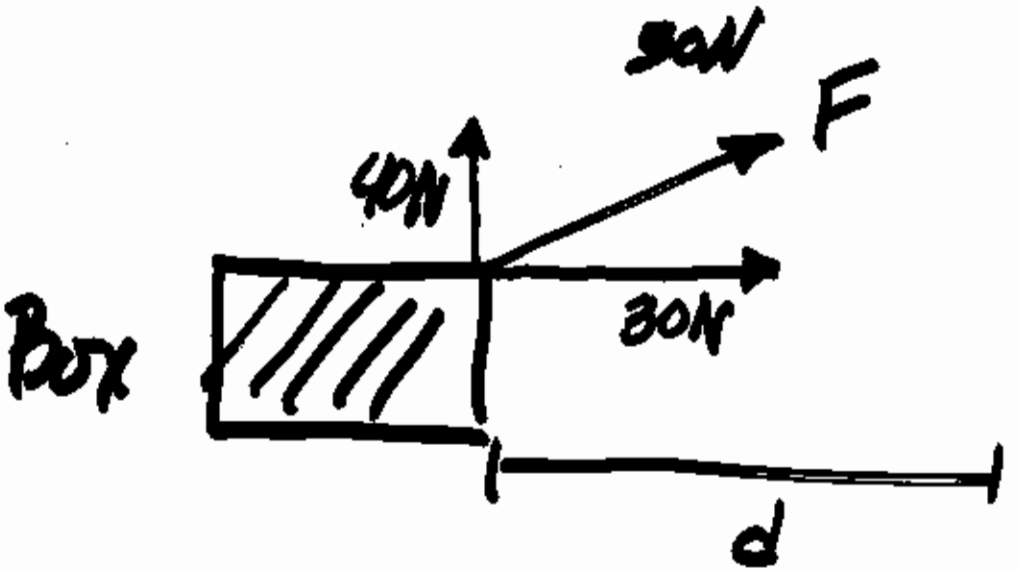
Mechanical Advantage.

$\frac{x_1}{d_1} = \frac{x_2}{d_2}$ similar triangles

$\frac{x_1}{x_2} = \frac{d_1}{d_2}$

$Work = F_1 x_1 = F_2 x_2$

$M.A. = \frac{F_2}{F_1} = \frac{x_1}{x_2} = \frac{d_1}{d_2}$



Only the Force Applied in the Direction of the Motion does Work!

$$\text{Power} = \frac{\text{Work}}{\text{Time}}$$

$$= \text{Joules/sec}$$

$$= \text{Watt.}$$

Kilowatt-hrs
electric Bill

Power • time = Work.

[horse power = 746 watts]

Cup tea = handgranade

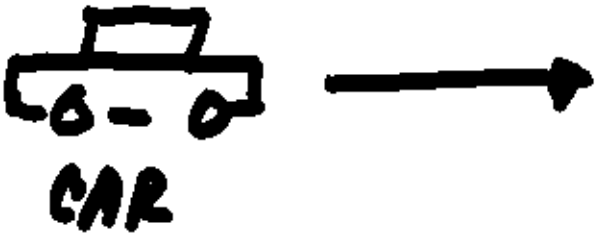
Work

Forms of Energy.

- Kinetic Energy.

[Energy due to movement]

Work done = $\frac{1}{2} m v^2$ = K.E.



3 How much more Energy does it take to Keep a CAR moving at 40 miles/hr than 10 miles/hr ?

a.) 2 times
b.) 4 times
c) 8 times
D.) 10 times
E.) 16 times

Potential Energy

$mgh. = P.E.$

Joules

Spring

$P.E. = \frac{1}{2} K x^2$