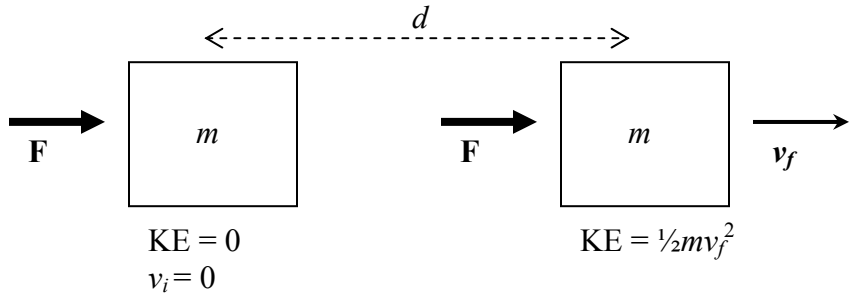
An example in Kinetic Energy

Ex.

A 100 *kg* box is moved from rest to a distance of 4 *m* under a 50 N force.



a) What is v_f?
b) What is the initial Kinetic Energy of the box?
c) What is the final Kinetic Energy of the box?
d) What is the change in Kinetic Energy of the box?
e) How much work was done in moving the box?

a)

Given	Needed
v_i, a, d	v_f

➔ *Use Equation # 2:* $v_f^2 = v_i^2 + 2ad$

Need *a*: From F = *ma*

$$a = \frac{F}{m} = \frac{50N}{100kg} = .5\frac{m}{s^2}$$

➔ $$v_f = \sqrt{v_i^2 + 2ad}$$

$$v_f = \sqrt{2\left(.5\frac{m}{s^2}\right)(4m)}$$

$v_f = 2\ m/s$

b) $KE_i = ½\ (100\ kg)\ (0)^2$

$= 0$ J

c) $KE_f = \frac{1}{2}(100\ kg)(2\ m/s)^2$

$= 200\ J$

d) $\Delta KE = KE_f - KE_i$

$= 200\ J - 0\ J$

$= 200\ J$

e) $W = Fd$

$= (50\ N)(4\ m)$

$= 200\ J$

or

Using the Work-Energy relation: $W = KE_f - KE_i = \Delta KE$

$W = KE_f - KE_i$

$= 200\ J - 0\ J$

$= 200\ J$