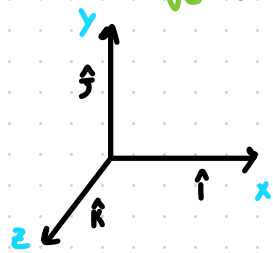
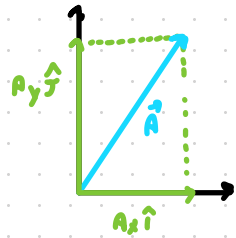
LAW OF MOTION

$$\frac{v_f^2 - v_i^2}{2a} = \Delta x$$

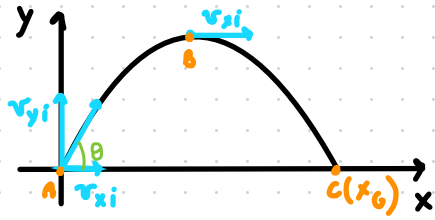
↖ a CONSTANT

VECTORS





MOTION IN TWO DIMENSION



IN B $v_y = 0$ m/s

THE x COMPONENT OF V_i REMAINS CONSTANT

$v_{xi} = v_i \cos\theta$ $\qquad v^2 = v_x^2 + v_y^2$

$v_{yi} = v_i \sin\theta$

CONSTANT IN TIME

$$\begin{cases} x(t) = x_0 + v_{xi}t = x_0 + v_i \cos\theta \cdot t \\ y(t) = y_0 + v_{yi}t + \frac{1}{2}at^2 = y_0 + v_i \sin\theta\, t - \frac{1}{2}gt^2 \end{cases}$$

$$\begin{cases} v_{0x} = v_0 \cdot \cos\theta \\ v_y(t) = v_{0y} - gt \end{cases}$$

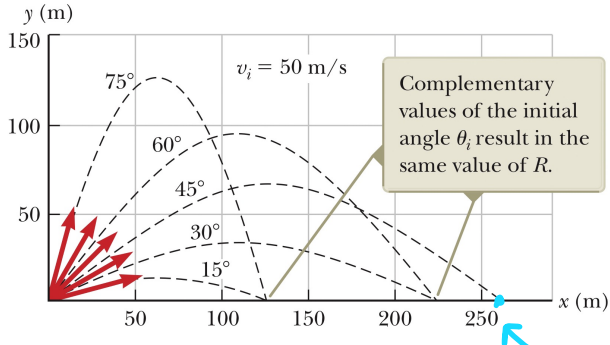
FIND X_G (GITTATA)

$$\begin{cases} y(t) = y_0 + v_i \sin\theta\, t - \frac{1}{2}gt^2 \\ x_G = x_0 + v_i \cos\theta\, t_{FLIGTH} \end{cases}$$

$y(t) = 0$; FIND t_{FLIGTH} (ONE OF t IS 0 S, TAKE THE OTHER ONE)

X_G: $G = \dfrac{2v_{0x}v_{0y}}{g}$

H_{MAX}: $H_{MAX} = \dfrac{(v_0 \sin\theta)^2}{2g}$



MAX X_G: $\theta = 45°$

ENERGY of A SYSTEM

WORK: $W = F \Delta r \cos\theta$ [J]

$E = U + K$

KINETIC ENERGY: $K = \frac{1}{2} m v^2$ [J]

POTENTIAL ENERGY: $U = mgh$ [J]

ELASTIC POTENTIAL ENERGY: $U_s = \frac{1}{2} k x^2$

CONSERVATION OF ENERGY $E_f = E_i$

LINEAR MOMENTUM AND COLLISION

LINEAR MOMENTUM: $\vec{p} = m\vec{v}$

ISOLATED SYSTEM: $\Delta \vec{p}_{tot} = 0$

IMPULSE: $I = F \Delta t$

IMPULSE-MOMENTUM THEOREM: $\Delta \vec{p} = I$

COLLISION

- INELASTIC: $K_{i\,tot} \neq K_{s\,tot}$ (NOT CONSERVED)
  - PERFECTLY INELASTIC:

    BOTH OBJECTS STICK TOGHETHER
  - INELASTIC:

    NOT STICK TOGHETER BUT SOME K IS TRANSFORMED OR TRASFERRED
- ELASTIC: K IN THE SYSTEM IS CONSERVED

WITH COLLISION IN TWO DIMENSION WORK SEPARATELY ON X AND Y