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Taller 3
Física I - Universidad de los Andes

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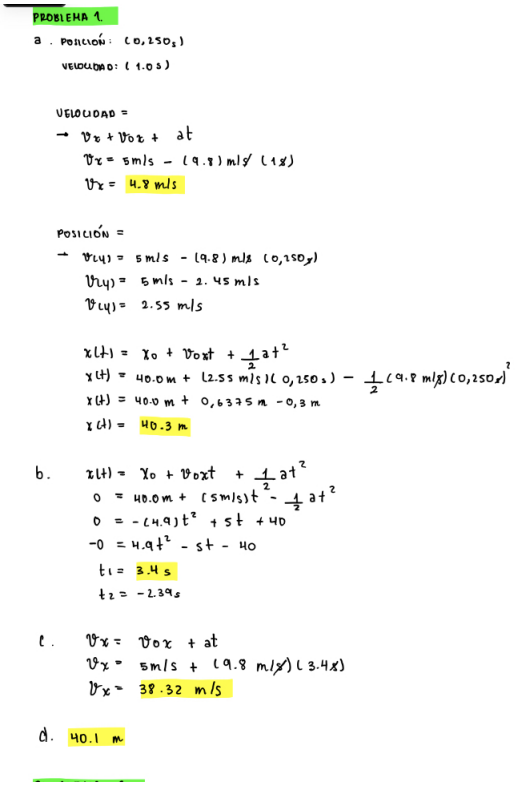
1 Problema 1



PROBLEMA 1.

a. POSICIÓN: (0,250 s)
VELOCIDAD: (1.0 s)

VELOCIDAD =
$\rightarrow v_x = v_{0x} + at$
$v_x = 5\,m/s - (9.8)\,m/s\,(1\,s)$
$v_x = 4.8\,m/s$

POSICIÓN =
$\rightarrow v_{(y)} = 5\,m/s - (9.8)\,m/s\,(0{,}250\,s)$
$v_{(y)} = 5\,m/s - 2.45\,m/s$
$v_{(y)} = 2.55\,m/s$

$x(t) = x_0 + v_{0x}t + \frac{1}{2}at^2$
$x(t) = 40.0\,m + (2.55\,m/s)(0{,}250\,s) - \frac{1}{2}(9.8\,m/s)(0{,}250\,s)^2$
$x(t) = 40.0\,m + 0{,}6375\,m - 0{,}3\,m$
$x(t) = 40.3\,m$

b. $x(t) = x_0 + v_{0x}t + \frac{1}{2}at^2$
$0 = 40.0\,m + (5\,m/s)t - \frac{1}{2}at^2$
$0 = -(4.9)t^2 + 5t + 40$
$-0 = 4.9t^2 - 5t - 40$
$t_1 = 3.4\,s$
$t_2 = -2.39\,s$

c. $v_x = v_{0x} + at$
$v_x = 5\,m/s + (9.8\,m/s)(3.4\,s)$
$v_x = 38.32\,m/s$

d. 40.1 m

2 Problema 2

[redacted] HA 1.

a. $x(t) = v_0 \cos 50° t$

$y(t) = h + v_0 \operatorname{sen} 50° t - \frac{1}{2} g t^2$

$v_y(t) = v_{0y} - gt \longrightarrow$ $v_y(t) = v_{0y} - gt$

$0 = v_{0y} - gt$

$v_{0y} = gt$

$\frac{v_{0y}}{g} = t$

$\frac{v_0 \operatorname{sen} 50°}{g} = t$

$x(t) = v_0 \cos 50° t$

$x = v_0 \cos 50° t$

$\frac{x}{v_0 \cos 50°} = t$

$y(t) = h + v_0 \operatorname{sen} 50° t - \frac{1}{2} a t^2$

$0 = h + v_0 \operatorname{sen} 50° \left(\frac{x}{v_0 \cos 50}\right) - \frac{1}{2} g \left(\frac{x^2}{v_0^2 \cos^2 50°}\right)$

$h + v_0 \operatorname{sen} 50° \left(\frac{x}{v_0 \cos 50°}\right) = \frac{1}{2} g \left(\frac{x^2}{v_0^2 \cos^2 50°}\right)$

$h + x \tan 50° = \frac{1}{2} g \left(\frac{x^2}{v_0^2 \cos^2 50°}\right)$

$h = \frac{1}{2} g \left(\frac{x^2}{v_0^2 \cos^2 50°}\right) - x \tan 50°$

$y(t) = y_0 + v_{0y} t - \frac{1}{2} g t^2$

$h + h_{max} = h + v_0 \operatorname{sen} 50° \left(\frac{v_0 \operatorname{sen} 50°}{g}\right) - \frac{1}{2} g \left(\frac{v_0^2 \operatorname{sen}^2 50°}{g^2}\right)$

$h_{max} = \frac{v_0^2 \operatorname{sen}^2 50°}{g} - \frac{1}{2} \left(\frac{v_0^2 \operatorname{sen} 50°}{g}\right)$

$h_{max} = \frac{1}{2} \frac{v_0^2 \operatorname{sen}^2 50°}{g}$

$g h_{max} = \frac{v_0^2 \operatorname{sen}^2 50°}{2}$

$2 g h_{max} = v_0^2 \operatorname{sen}^2 50°$

$v_0^2 = \frac{2 g h_{max}}{\operatorname{sen}^2 50°}$

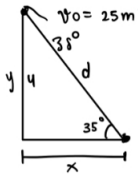
$v_0 = \sqrt{\frac{2 g h_{max}}{\operatorname{sen}^2 50°}}$

$v_0 = \sqrt{\frac{(2)(9.8 m/s^2)(0,674) m}{0,586}}$

$v_0 = 1.50 m/s_0$

3 Problema 3

PROBLEMA 3.



$\tan 35° = \frac{y}{x}$ $\quad x = \frac{y}{\tan 35°}$

$y = \tan 35° \, x$

$y = y - \frac{1}{2} g t_v^2 \rightarrow t_v = \frac{\sqrt{2y}}{g} \uparrow$

$x = v_0 t_v \rightarrow t_v = \frac{x}{v_0} \uparrow$

$d = \sqrt{x^2 + y^2}$

$d = \sqrt{\left(v_0^2 \frac{2}{g}\right)^2 + \left(v_0^2 \frac{2}{g} \tan 35°\right)^2}$

$x = v_0 \sqrt{\frac{2y}{g}}$

$\left(\frac{y}{\tan 35°}\right)^2 = v_0^2 \left(\sqrt{\frac{2y}{g}}\right)^2$

$\frac{y^2}{\tan^2 35°} = v_0^2 \frac{2y}{g}$

$y = v_0^2 \frac{2}{g} \tan 35°$

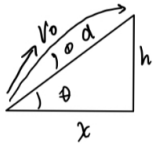
$t_v = v_0 \frac{2}{g}$

$v_y^2 = v_0^2 \operatorname{sen}^2 35° - 2g\left(v_0^2 \frac{2}{g} \tan 35°\right)$

$v_y^2 = v_0^2 \operatorname{sen}^2 35° - 2(v_0^2 2 (\tan 35°)$

4 Problema 4

PROBLEMA 4.



a. $h = y_0 + v_{0x} \operatorname{sen}\phi + \theta t - \frac{1}{2} g t^2 \rightarrow$

$x = v_0 \cos\phi + \theta t$

$\frac{x}{v_0 \cos\theta + \theta} = t$

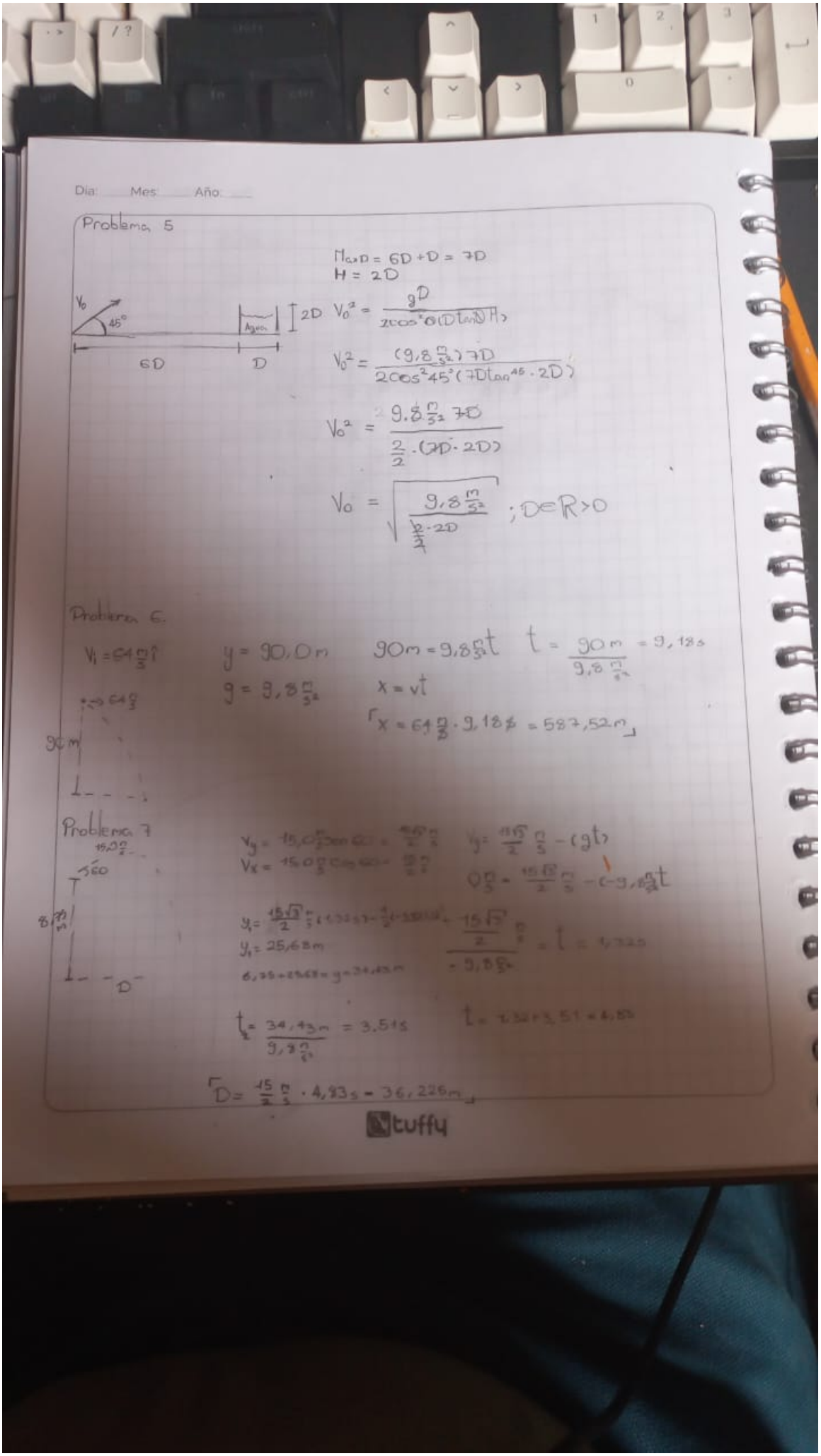
$h = v_0 \operatorname{sen}\phi + \theta \left(\frac{x}{v_0 \cos\theta + \phi}\right) - \frac{1}{2} g \left(\frac{x^2}{v_0 \cos\theta + \phi}\right)$

b). $45° + \theta = \phi$

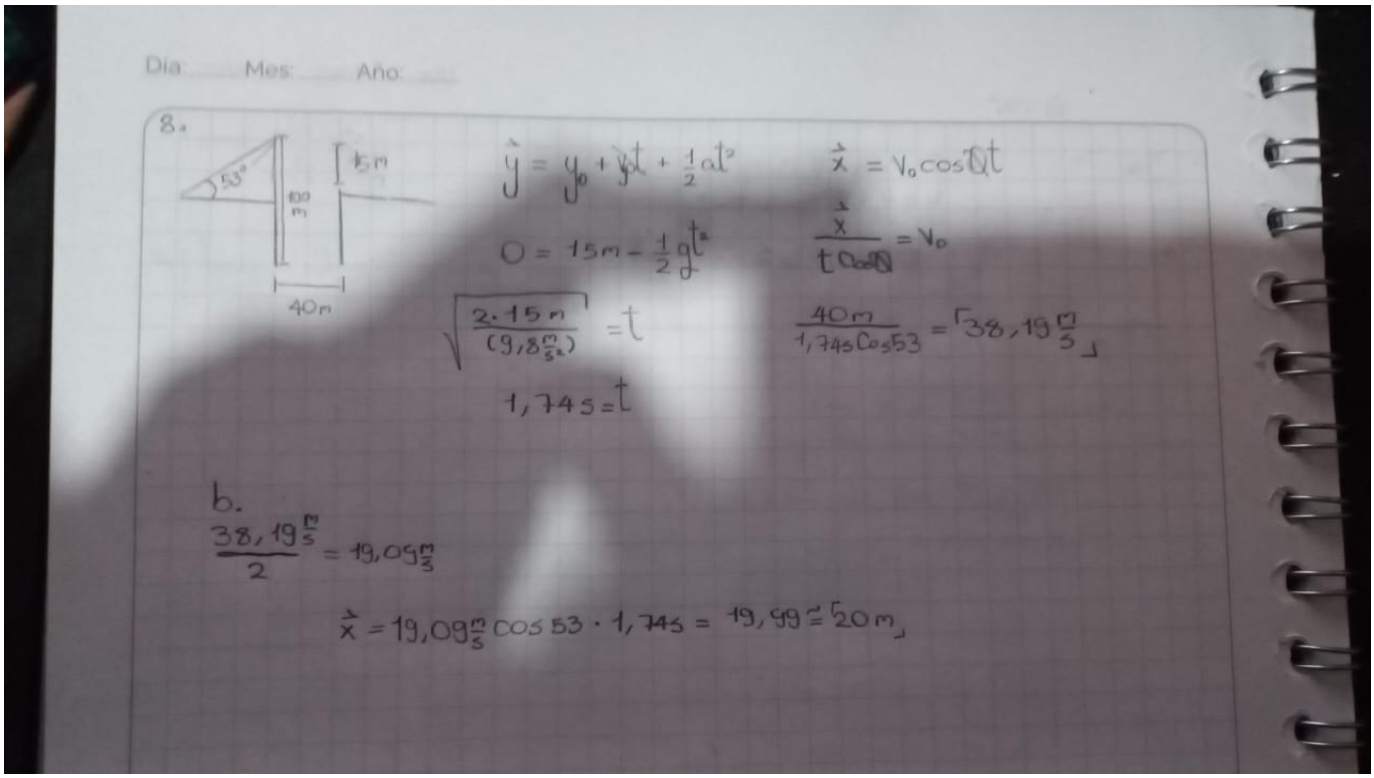
$h = x \tan\phi + \theta - \frac{g x^2}{2 v_0^2 \cos^2\theta + \phi}$

$d = \sqrt{\left(x \tan\phi + \theta - \frac{g x^2}{2 v_0 \cos^2\theta + \phi}\right)^2 + v_0 \cos\phi + \theta \, t}$

5 Problema 5,6 y 7



6 Problema 8



7 Problema 9

PROBLEMA 9.

Pelota 1

$y(t) = y_0 + v_{0y}t - \frac{1}{2}gt^2$

$y(t) = 40m + 20\,m/s\,t\,\text{sen}\,53° - \frac{1}{2}\,9.8\,m/s\,t^2 =$

$40m + 20m/s\,\text{sen}53°\,t - \frac{1}{2}9.8\,m/s\,t^2 = 30\,m/s\,\text{sen}\,37°\,t - \frac{1}{2}gt^2$

$15.97\,t - 4.9\,t^2 - 18{,}05\,t - 4.9\,t^2 = -40m$

2.08_2

$\frac{40m}{2\,m/s} = t$

$20\,s = t$

$y(t) = 40m + 20\,m/s\,t\,\text{sen}\,53° - \frac{1}{2}\,9.8\,m/s\,t^2 =$

$y(t) = 40m + 15.97\,m/s\,(20s) - 4.9\,m/s\,(20s)^2$

Pelota 2.

$y(t) = y_0 + v_{0y}t - \frac{1}{2}gt^2$

$y(t) = 0 + 30\,m/s\,\text{sen}\,37° - \frac{1}{2}gt^2$