

- YERYÜZÜNDE HAREKET -

1- Serbest Düşme

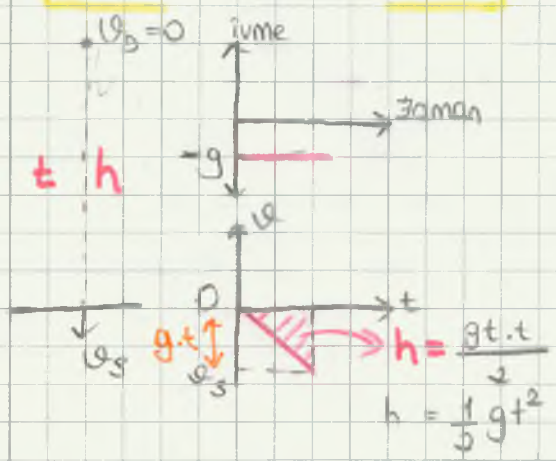


$$v_0 = 0$$

$$h = \frac{1}{2}gt^2 \quad (h = 5t^2)$$

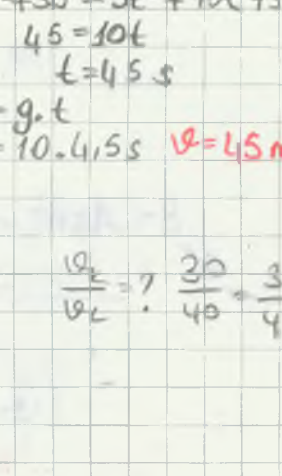
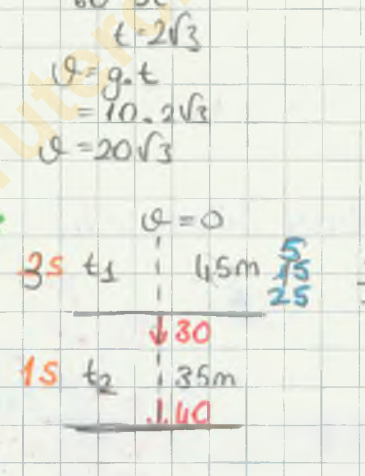
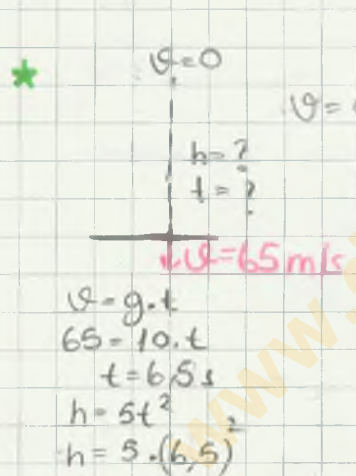
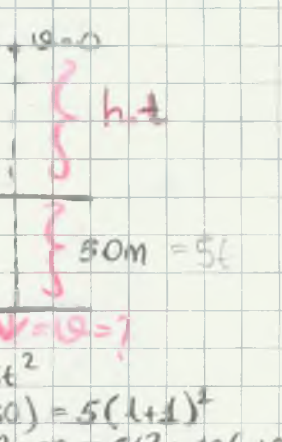
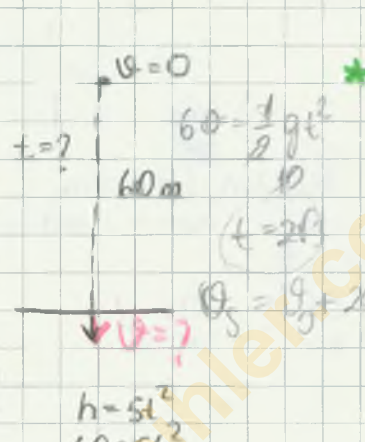
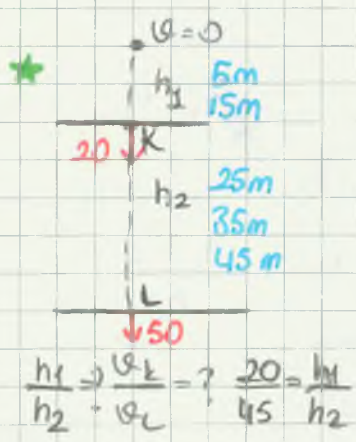
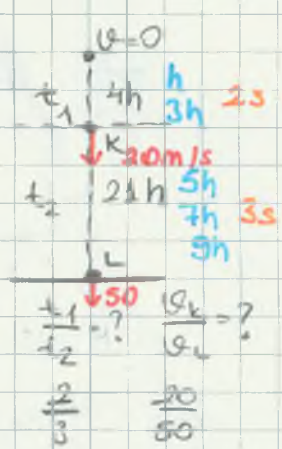
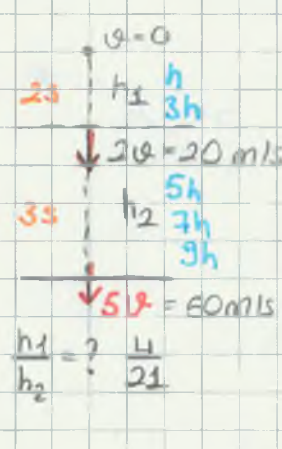
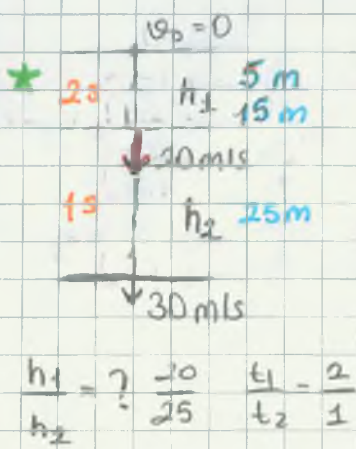
$$v_s = v_0 + gt \quad (v_s = 10 \cdot t)$$

$$v_s^2 = v_0^2 + 2gh$$

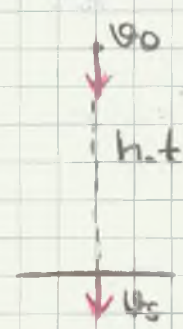


0	5m	h	
1	10m/s	15m	1.sn
2	20m/s	20m	2.sn
3	30m/s	25m	3.sn
4	40m/s	30m	4.sn
5	50m/s	35m	5.sn

$h = 5t^2$
 $h = 5m$
 $h = 20m$
 $h = 45m$
 $h = 80m$



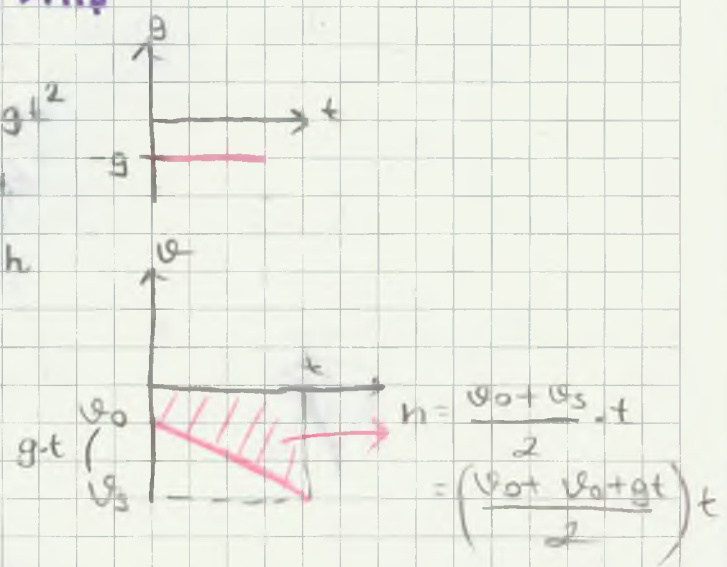
2- Yukarıdan Aşağı Düşey Atış



$$h = v_0 t + \frac{1}{2} g t^2$$

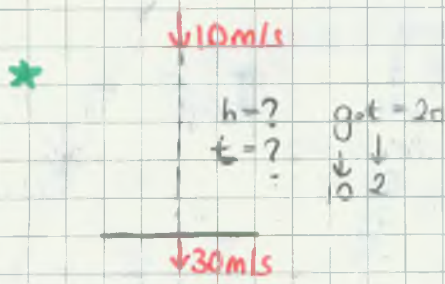
$$v_s = v_0 + g t$$

$$v_s^2 = v_0^2 + 2 g h$$

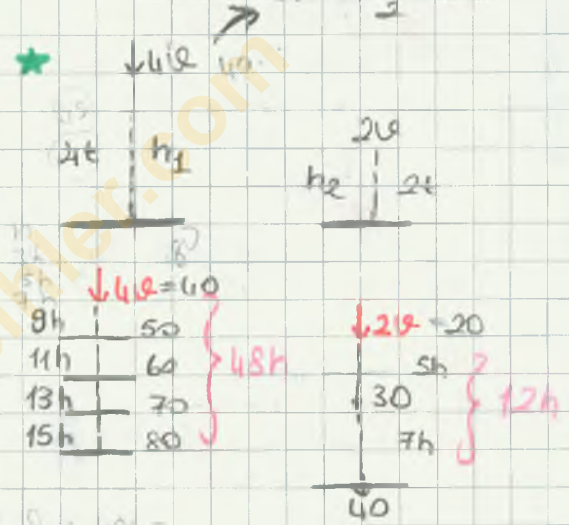
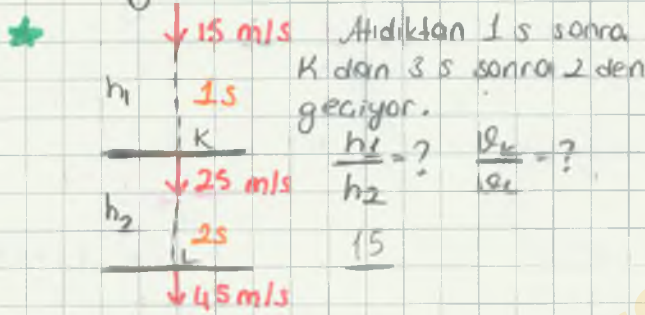
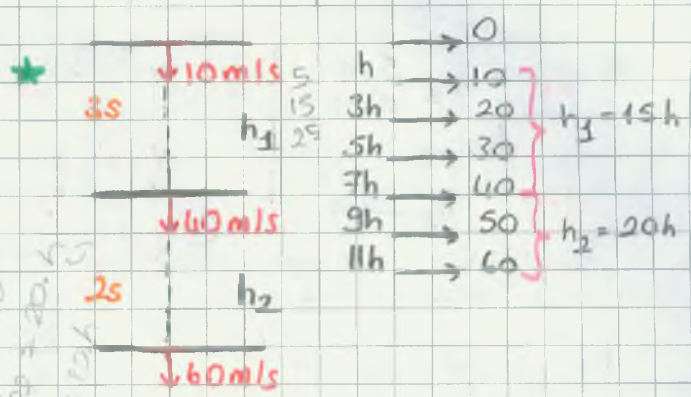
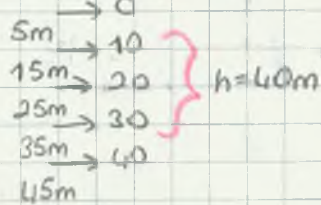


$$h = 10t + \frac{1}{2} 10 \cdot t^2$$

$$20 + 20 = 40$$



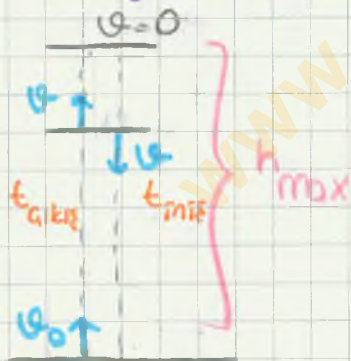
$$h = 10 \cdot 2 + \frac{1}{2} 10 \cdot 4$$



$$(0-K) 25^2 = 15^2 + 2 \cdot 10 \cdot h_1$$

$$(K-L) 45^2 = 25^2 + 2 \cdot 10 \cdot h_2$$

3- Aşağıdan yukarı Düşey Atış

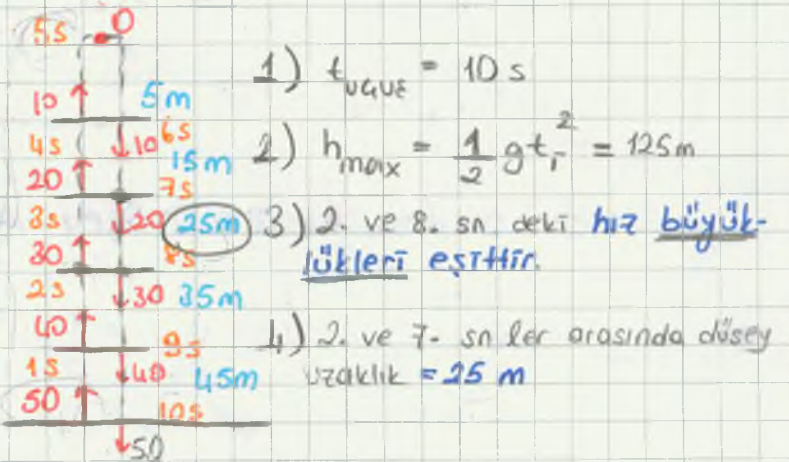


$$t_g = t_i$$

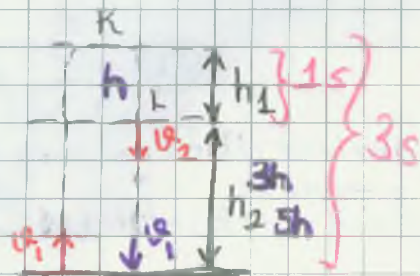
$$t_{uçuş} = 2t_g = 2t_i$$

$$h_{max} = v_0 t - \frac{1}{2} g t^2$$

$$= \frac{1}{2} g t_i^2$$

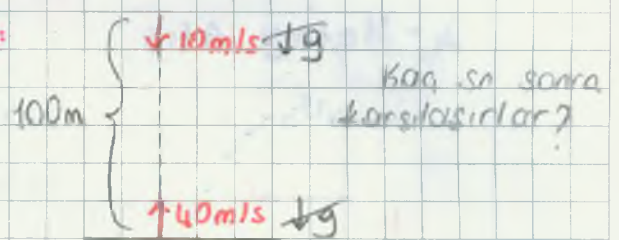


Örnek:



M den K'ya 3 s
K dan M'ye 1 s de
 $\frac{h_1}{h_2} = ?$ $\frac{1}{8}$ a

Örnek:



$$100 = (10 + 40) \cdot t$$

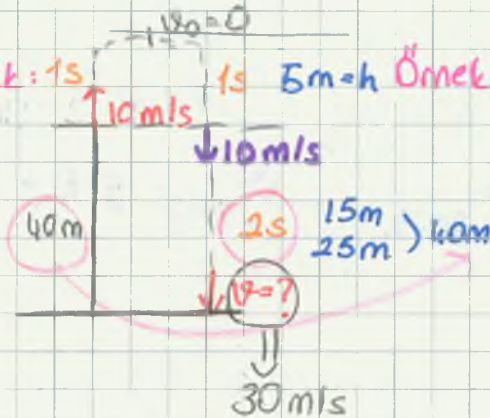
$$t = 2s$$

$$2) \quad h = v_0 t - \frac{1}{2} g t^2$$

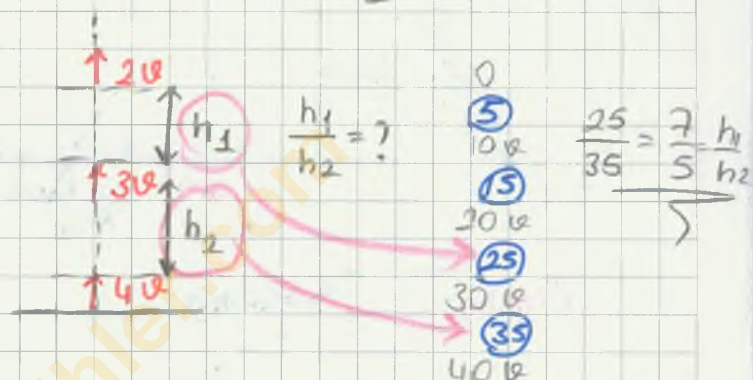
$$= 10 \cdot 2 - \frac{1}{2} \cdot 10 \cdot 4$$

? nerede karşılaşırlar?

Örnek: 1s



Örnek: 1s 5m = h Örnek:



Örnek:



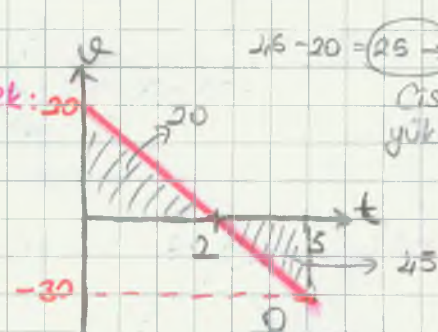
$$1) \quad v_2^2 = v_0^2 + 2 \cdot g \cdot 2h$$

$$2) \quad v_2^2 = v_2^2 + 2g \cdot 7h$$

$$\frac{v_1^2}{v_2^2} = \frac{14}{4}$$

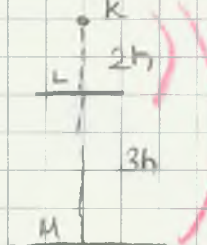
$$\frac{v_1}{v_2} = \frac{\sqrt{14}}{2}$$

Örnek: 20



$2 \cdot 5 - 20 = 25 \rightarrow$ Gecektir.
Cismin okidığı yükseklik?

Örnek:



K-L arasını t_1 ? $\frac{t_1}{t_2} = ?$
L-M arasını t_2

$$\frac{2h}{5h} = \frac{\frac{1}{2} g t_1^2}{\frac{1}{2} g (t_1 + t_2)^2}$$

$$\sqrt{5} t_1 = \sqrt{2} (t_1 + t_2)$$

$$\sqrt{5} t_1 - \sqrt{2} t_1 = \sqrt{2} t_2$$

$$t_1 (\sqrt{5} - \sqrt{2}) = \sqrt{2} t_2$$

$$\frac{t_1}{t_2} = \frac{\sqrt{2}}{\sqrt{5} - \sqrt{2}}$$

4- Yatay Atış



Düseyde : Serbest düşme

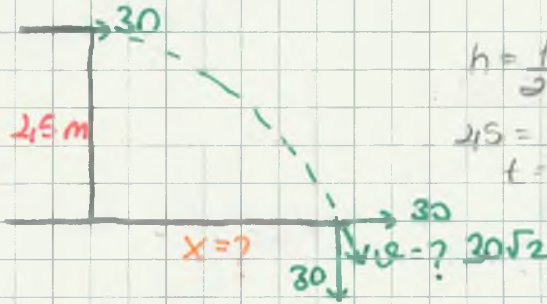
Yatayda : Sabit hızlı hareket

$$h = \frac{1}{2}gt^2$$

$$X = v_0 \cdot t$$

↳ menzil

Örnek:



$$h = \frac{1}{2}gt^2$$

$$X = v_0 \cdot t$$

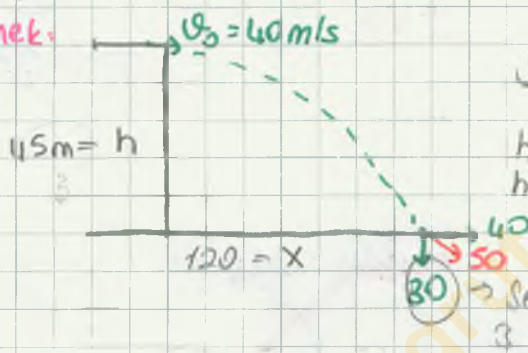
$$2,5 = 5t^2$$

$$t = 0,3 \text{ sn}$$

$$X = 30 \cdot 0,3 = 9 \text{ m}$$

$$v_{\text{düşey}} : g \cdot t = 10 \cdot 0,3 = 3 \text{ m/s}$$

Örnek:



3 sn de yere çarptığına göre :

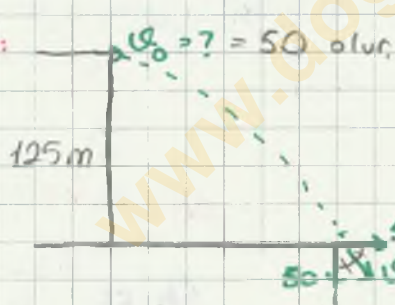
$$h = 5t^2$$

$$X = v_0 \cdot t$$

$$h = 5 \cdot 9 = 45 \text{ m}$$

$$X = 40 \cdot 3 = 120 \text{ m}$$

Örnek:

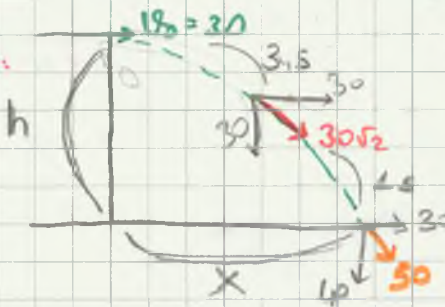


5 sn de yere çarpıyor.

$$h = 5t^2 = 5 \cdot 5^2 = 125 \text{ m}$$

$$X = 50 \cdot 5 = 250 \text{ m}$$

Örnek:



K dan geçtikten 1 s sonra yere çarpıyor.

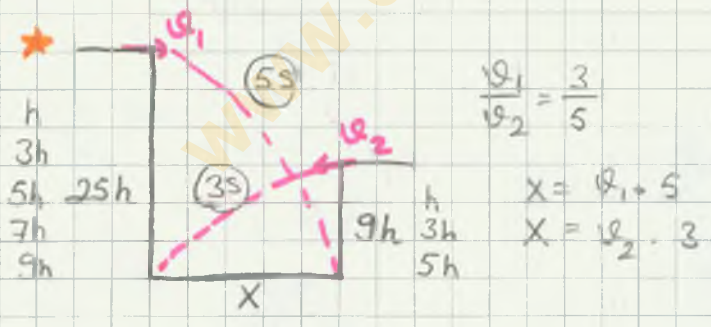
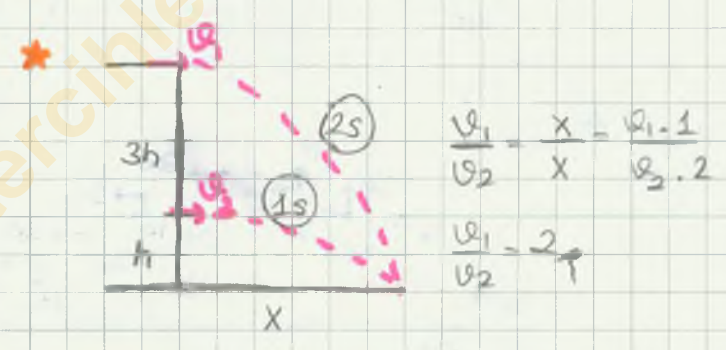
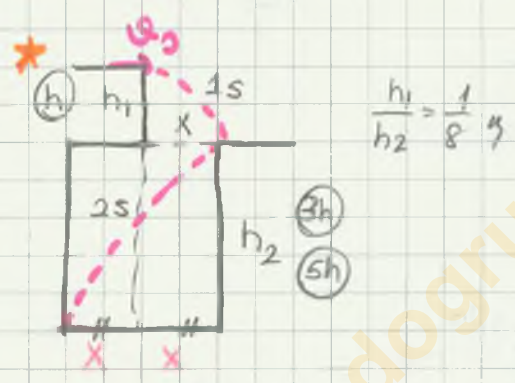
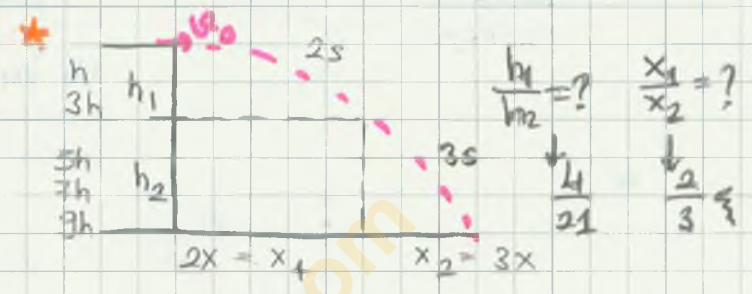
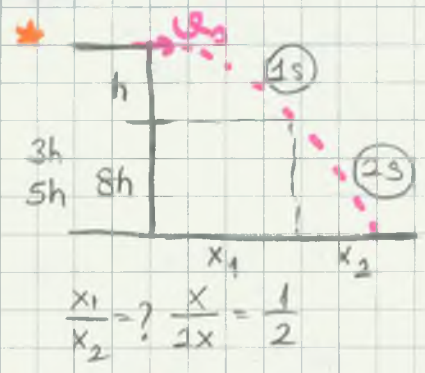
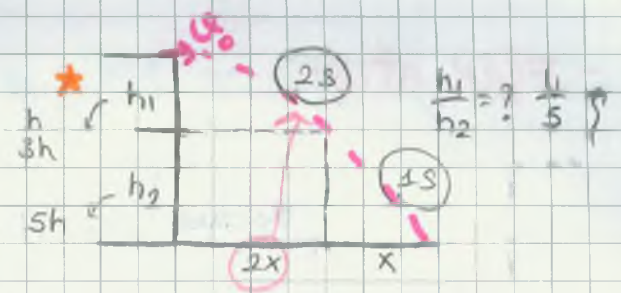
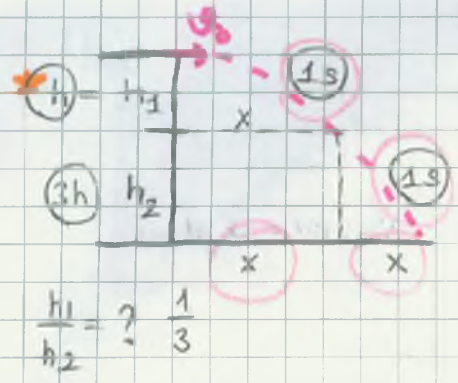
$$t_{\text{toplam}} = 4 \text{ s}$$

$$h = 5t^2$$

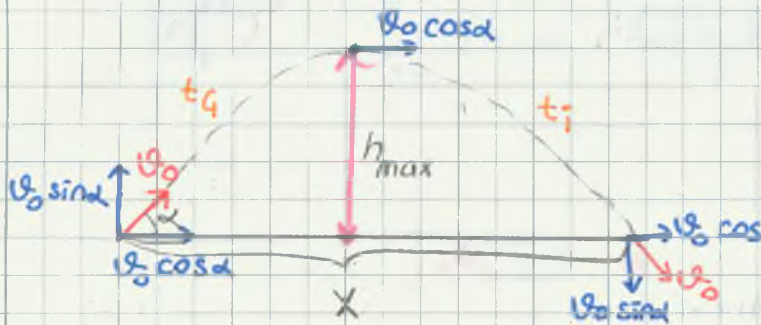
$$h = 5 \cdot 16 = 80 \text{ m}$$

$$X = v_0 \cdot t$$

$$= 30 \cdot 4 = 120 \text{ m}$$



- EĞİK ATIŞ -



$$v_0 \sin \alpha = g \cdot t_{up}$$

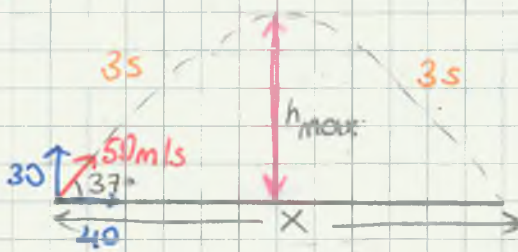
$$= v_0 \sin \alpha$$

$$t_1 = t_4$$

$$X: \text{menzil} = v_0 \cos \alpha \cdot t_{ucuz}$$

$$h_{max} = v_0^2 \cdot \frac{\sin^2 \alpha}{g}$$

★



$$t_{ucuz} = 6s$$

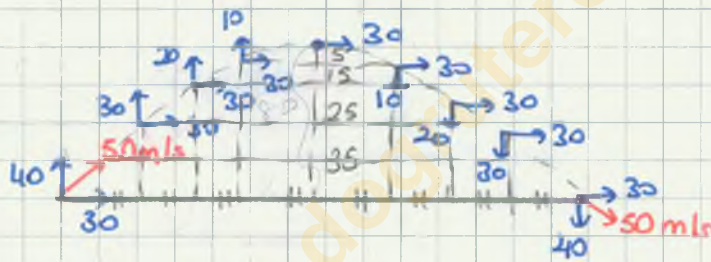
$$X = v_0 \cos \alpha \cdot t_{ucuz}$$

$$= 240m$$

$$h_{max} = \frac{1}{2} g t^2$$

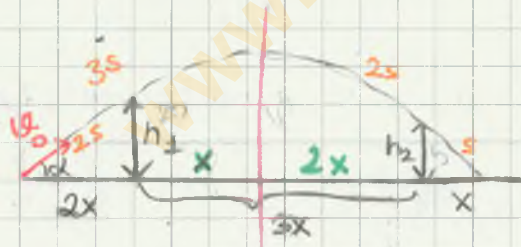
$$= 15m$$

★

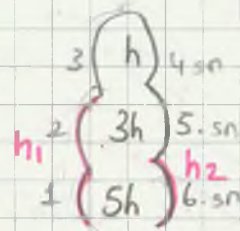


240m
 $h_1 = v_0 t + \frac{1}{2} g t^2$
 $h_2 = v_0 t - \frac{1}{2} g t^2$

★

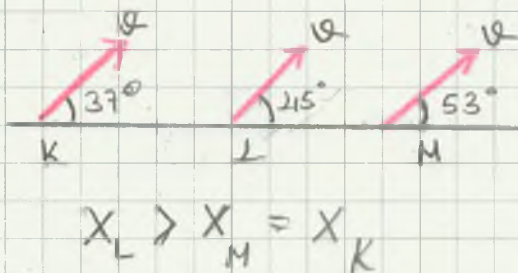


$$\frac{h_1}{h_2} = ?$$

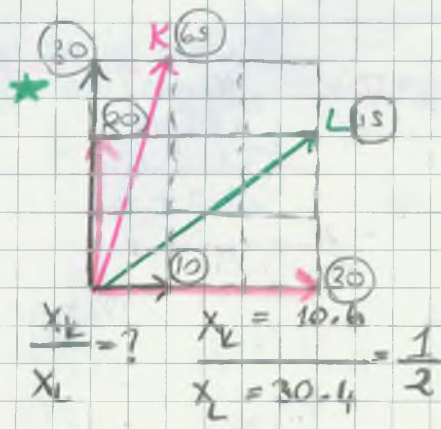


$$\Rightarrow \frac{h_1}{h_2} = \frac{8}{5}$$

! NOT !

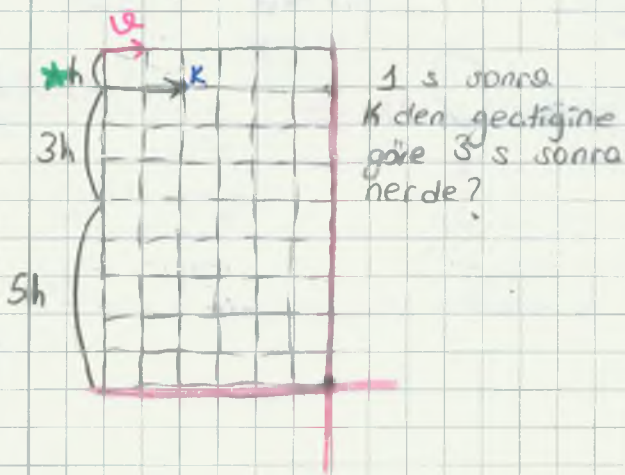
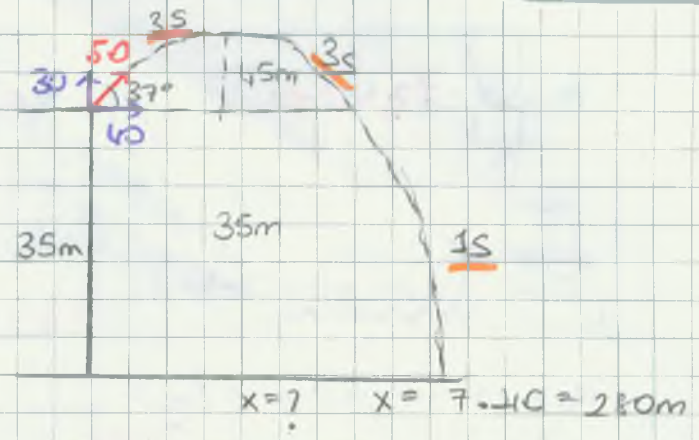


Eşit hızda eğik atılan 3 cisimden diğeri 45° olanın menzilli max iken diğerleri 90° olan açılarda menzilleri eşittir.

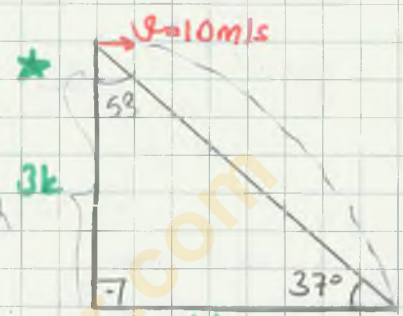


$$\frac{X_L}{X_L} = ? \quad X_L = 10,6 \quad = \frac{1}{2}$$

$$X_L = 30 - 1,4 = 28,6$$



1 s sonra K den geçtigine göre 3 s sonra nerede?



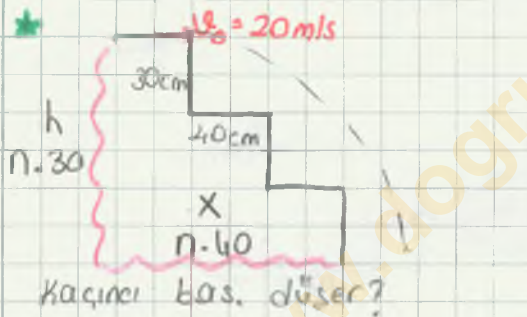
$$h = \frac{5t^2}{2} = \frac{5 \cdot 3^2}{2} = 22,5$$

$$X = 10t = 30$$

$$t = 3/2 = 1,5$$

$$h = 5 \cdot \left(\frac{3}{2}\right)^2 = 11,25$$

$$X = 10 \cdot 1,5 = 15$$

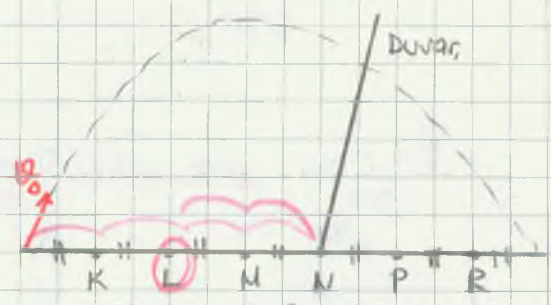


Kaçınıcı bas. düşer?

$$h = n \cdot 30 = 5t^2$$

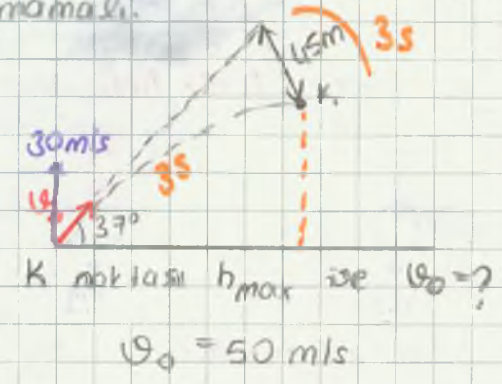
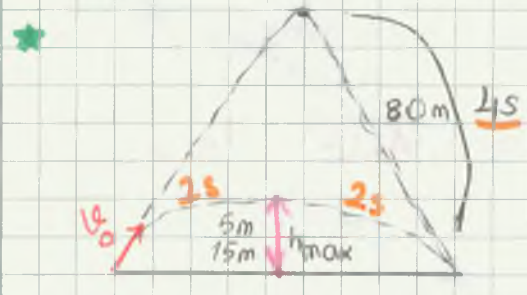
$$X = n \cdot 40 = 20t \quad \text{m ye çevir.}$$

$$t = 3s \quad n \cdot 40 \cdot 10^{-2} = 20 \cdot 3$$



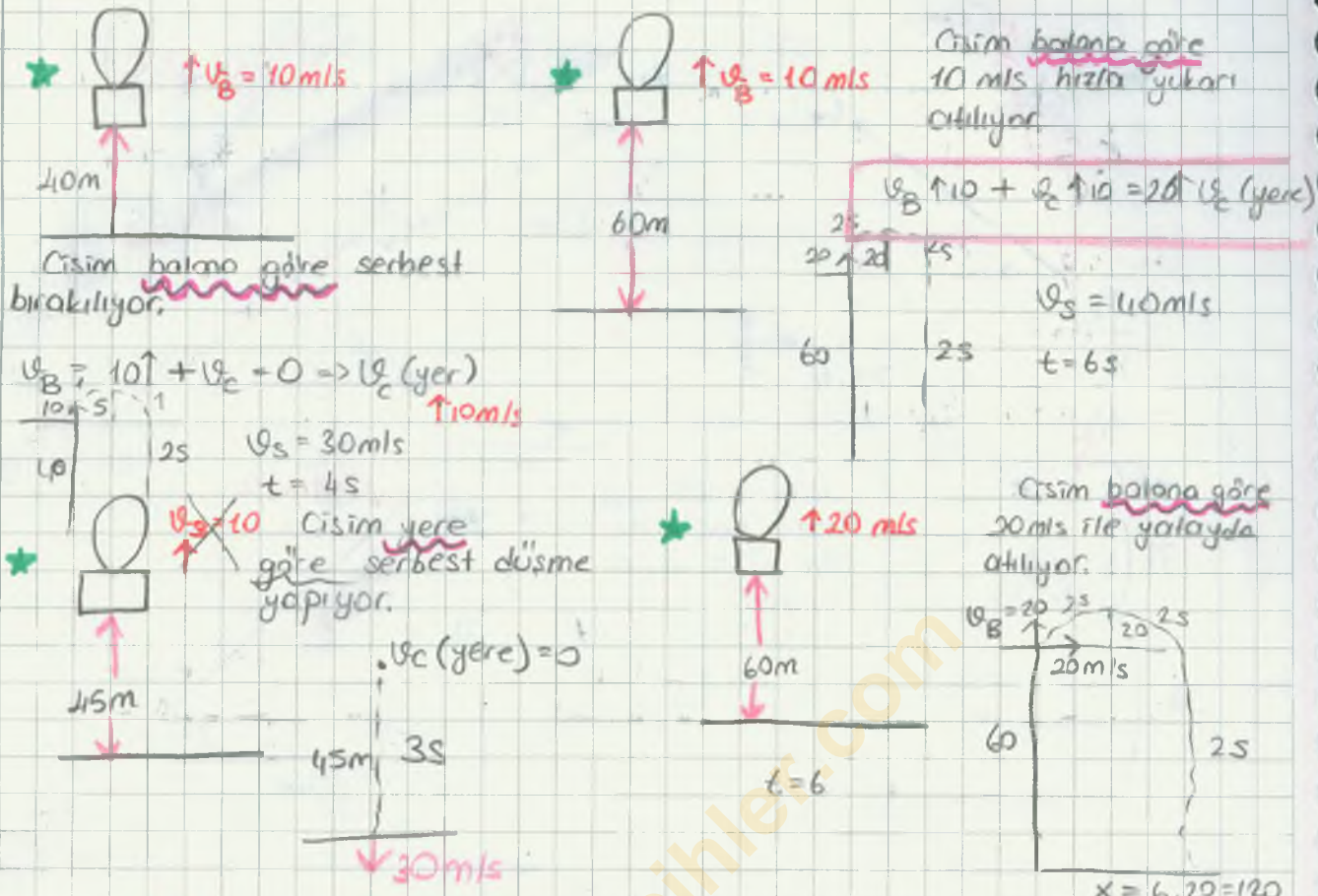
Duvar olmasaydı R noktasına çarpıp cisim duvarı çarptıktan sonra hangi noktaya düşer?

Normalde menzili 6 buru olmazmamalı.



K noktası h_{max} ise $v_0 = ?$

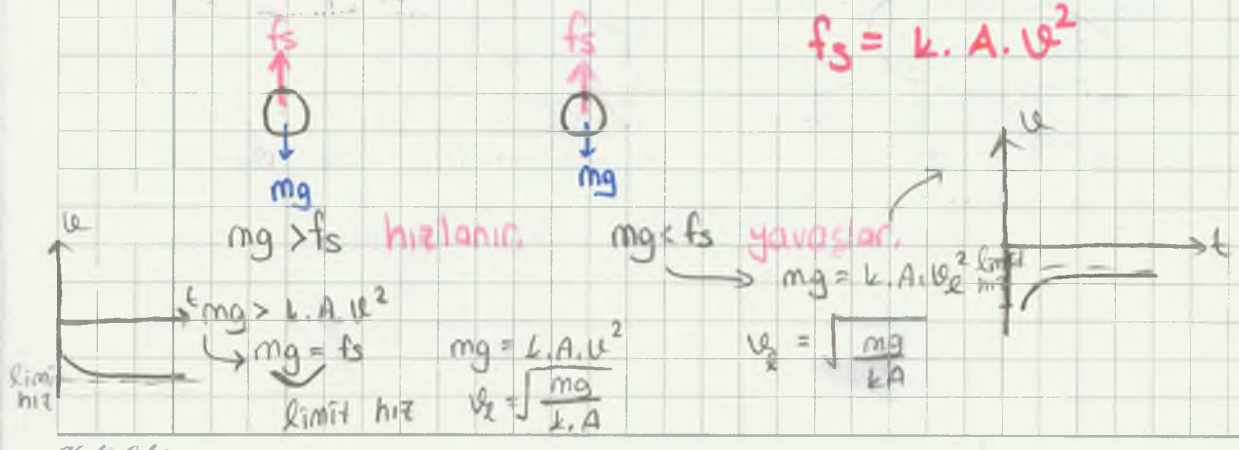
$$v_0 = 50 \text{ m/s}$$

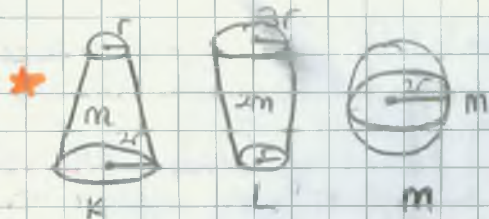


- 40
 50 m/s
 30
 40 m/s
 1- Cisim araca göre 50 m/s ile atılırsa;
 40
 $40 + 30$
 $t = 8 \text{ sn}$
 $x_c = 8 \cdot 70 = 560$
 $x_{\text{araba}} = 8 \cdot 40 = 320$
 cisim önde
- 2- Cisim yere göre 50 m/s ile atılırsa;
 40
 30
 $t = 8 \text{ sn}$
 $x_c = 8 \cdot 30 = 240$
 $x_{\text{araba}} = 8 \cdot 40 = 320$
 araq önde
- 3- Cisim yere düşt. cisim ile araç arasındaki mesafe?

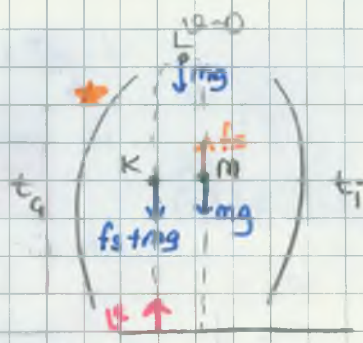
- LİMİT HIZ -

Hava ortamında cisim üzerine etki eden sürtünme kuvvetinin cismin ağırlığına eşit olmasıyla birlikte cisim sabit bir hıza ulaşır. ve bu hız değerine **limit hız** denir.





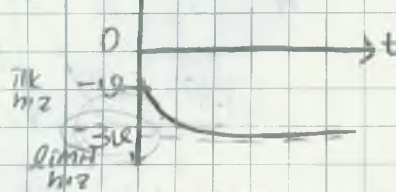
$k) mg = k \cdot 4\pi r^2 \cdot \rho_k^2$
 $l) 2mg = k \cdot 9\pi r^2 \cdot \rho_l^2$
 $m) mg = k \cdot 4\pi r^2 \cdot \rho_m^2$
 $\rho_k > \rho_l = \rho_m$



$k) F_{net} = f_s + mg$
 $l) F_{net} = mg$
 $m) F_{net} = mg - f_s$
 $F_k > F_l > F_m$
 $a_k > a_l > a_m$

$t_{g_1} < t_{g_2}$
 $a_{g_1} > a_{g_2}$

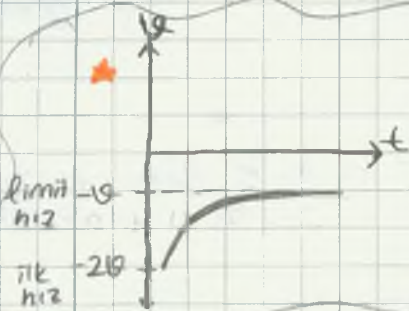
Atıldığı bndaki ivmesi kaç g dir?



$[mg = f_s \text{ (limit hız)}]$
 $[mg = k \cdot A \cdot v^2]$
 $= k \cdot A \cdot 9g^2$

$mg - f_s = m \cdot a$
 $mg - k \cdot A \cdot v^2 = m \cdot a$
 $mg - \frac{mg}{g} = m \cdot a$

$a = 9/8 \text{ m/s}^2$



$[mg = f_s \text{ (limit)}]$
 $[mg = k \cdot A \cdot v^2]$

$mg - f_s = m \cdot a$
 $mg - k \cdot A \cdot 4g^2 = m \cdot a$
 $mg - 4mg = m \cdot a$

$a = 3g$