- İŞ, GÜÇ, ENERJİ -

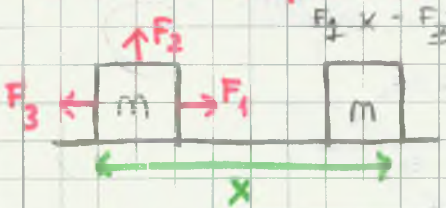
- İŞ -

$W = F \cdot x$

Newton → metre

= Joule (skaler)

* F ile x : paralel

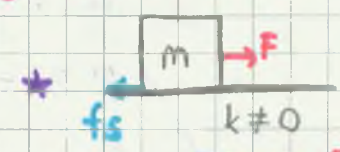


$F_1 \cdot x - F_3 \cdot x$

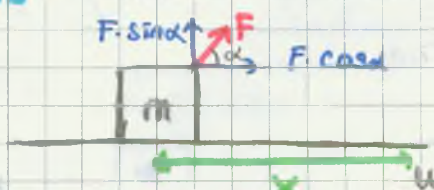
$+F_1 \cdot x = F_1$ in yaptığı iş

$-F_3 \cdot x = F_3$ " " "

$F_2 \perp x$ old. için iş yapmaz.



$F \cdot x - f_s \cdot x = W_{net}$

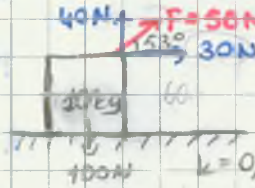


$W = F \cdot \cos\alpha \cdot x$

$W = F \cdot x$

$75 = 15 \cdot 5$

5 m yol alınca yaptığı net iş ?



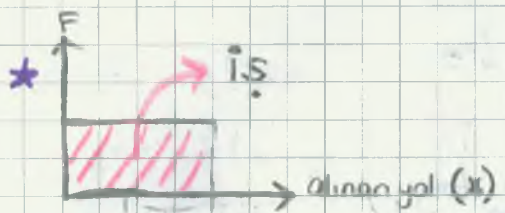
$W_{net} = (30 - 15) \cdot 5$

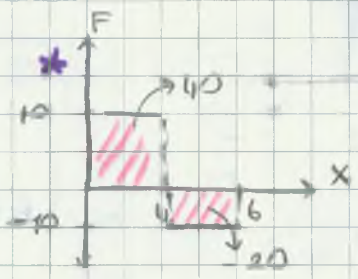
$= 75$ joule

$W_{net} : (F_1 - F_3) \cdot x$

$W = F \cdot x$

$= 30 \cdot 2.5$





$W_{net} = 20$ Joule

$E_k = \frac{1}{2} m v^2$

$E_p = mgh$

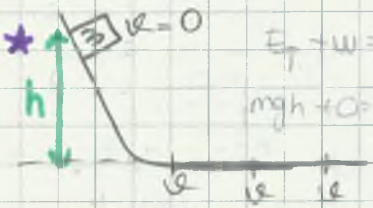
– Enerji Korunumu –

$E_i + W = E_s$

$W = 0 \Rightarrow E_i = E_s$

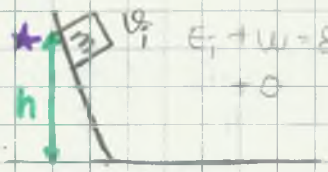
$W = E_s - E_i$

$W = \Delta E$



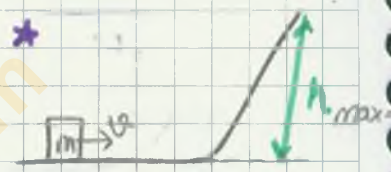
$E_i + W = E_s$

$mgh + 0 = \frac{1}{2} m v^2$

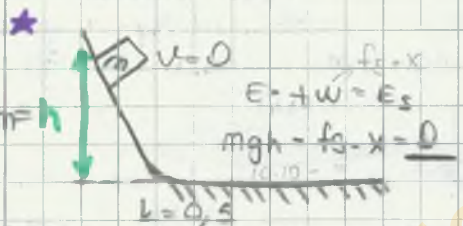


$E_i + W = E_s$

$\frac{1}{2} m v_i^2 + mgh + 0 = \frac{1}{2} m v_s^2$



$\frac{1}{2} m v^2 + 0 = mgh_{max}$



$E_i + W = E_s$

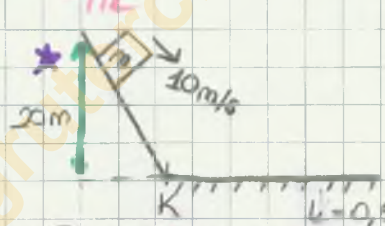
$mgh - f_s \cdot x = 0$

Kaç m yol alıp durur?

$m.10.10 = mgk.x$

$100 = 10.0,5.x$

$x = 20m$



1- K noktasındaki hız?

2- Kaç m yol alıp durur?

① $E_i + W = E_s$

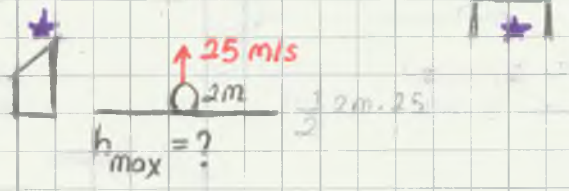
$mgh + \frac{1}{2} m v^2 + 0 = \frac{1}{2} m v_k^2$

$10.20 + \frac{1}{2} 100 = \frac{1}{2} v_k^2$

② $E_i + W = E_s$

$mgh + \frac{1}{2} m v^2 - f_s \cdot x = 0$

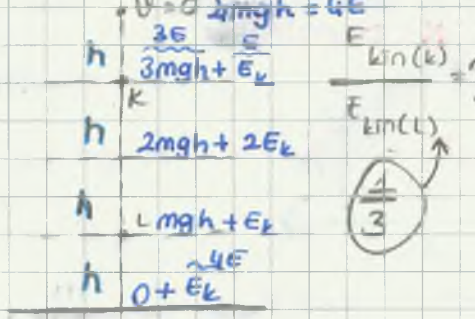
$m.10.20 + \frac{1}{2} m.100 = m.10.0,5.x$



$E_i + W = E_s$

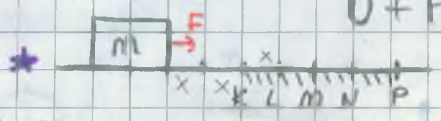
$\frac{1}{2} m v^2 + 0 = mgh_{max}$

$\frac{1}{2} . 625 = 10 . h_{max}$



$E_i + W = E_s$ $\quad W = F \cdot x$

$0 + F \cdot 3x - f_s \cdot 4x$ $\quad 0 + F \cdot 3x - f_s \cdot 4x = 0$



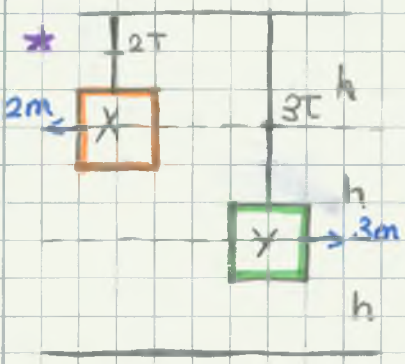
1) F kuvveti 1 ye kadar uygulanıyor. Ve cisim P de duruyor $f_s = ?$ F

$E_i + W = E_s$

$0 + F \cdot 3x - f_s \cdot 4x = 0$

$3Fx = 4 f_s x$

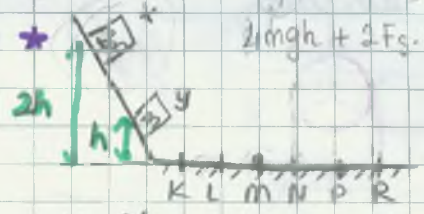
$f_s = 3F/4$



$\frac{E_{p(x)}}{E_{p(y)}} = ? \quad \frac{2mg2h}{3mgh} = \frac{4}{3}$

$E_i + W = E_s$

$2mgh + 2F_s \cdot x = 0$



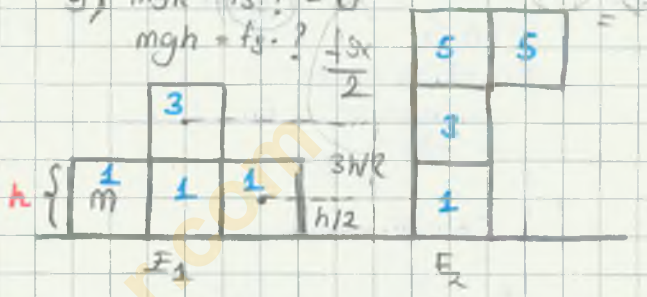
X, M noktasında durduğuna göre y nerde durur?

x) $E_i + W = E_s$

$4mgh + f_s \cdot 2x = 0$ $\quad 4mgh = f_s \cdot 2x$

y) $mgk - f_s \cdot ? = 0$

$mgh = f_s \cdot ?$ $\quad \frac{f_s x}{2}$ $\quad f_s x = 2mgh$

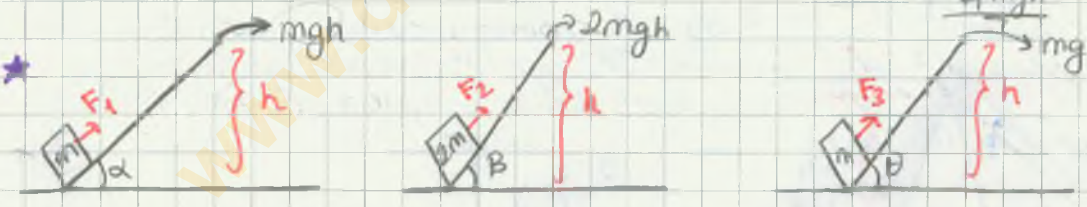


a) $\frac{E_1}{E_2} = ? \quad \frac{6}{14} \quad \frac{3}{7}$ b) Şekil 1'i şekil 2 deki hale getirmek için yer çekimi kuvvetine karşı yapılan iş kaç mgh olur?

* Yerçekimi kuvvetine karşı yapılan iş E_p deki değişime eşittir.

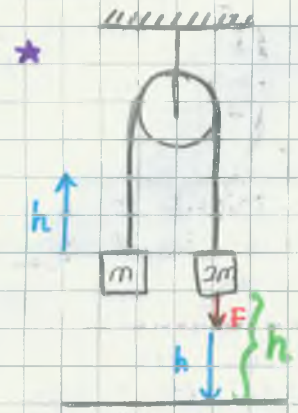
b) $E_{p(son)} - E_{(p)ilk} = 14 \cdot mg\frac{h}{2} - 6mg\frac{h}{2}$

$= 4\,mgh$



Cisimleri eğik düzlemin en üst noktasına çıkartmak için yerçekimi kuvvetine karşı yapılan işler?

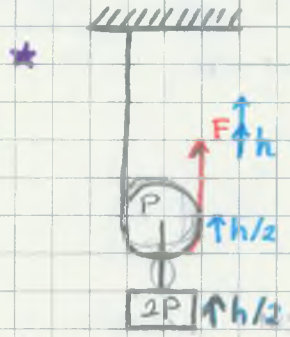
Yapılan işler de se (Potansiyel değişimini alırız)



2m kütleli cisim F kuvveti ile sabit hızla h kadar çekilirse yerçekimi kuvvetine karşı yapılan iş kaç mgh olur? (F)

$$-2mgh$$
$$+mgh$$
$$+$$
$$-mgh$$

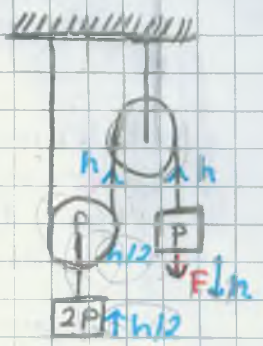
(-) olursa yerçekimi bize karşı iş yapmış oleriz.



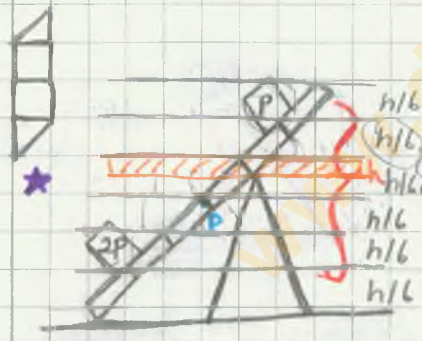
F kuvveti h kadar çekilirse yerçekimi kuvvetine karşı yapılan iş kaç ph dir? (Makara ağırlığı : P)

$$+2P\ \frac{h}{2}$$
$$+P.\frac{h}{2}$$
$$+$$
$$\frac{3Ph}{2}$$

ayni sey →

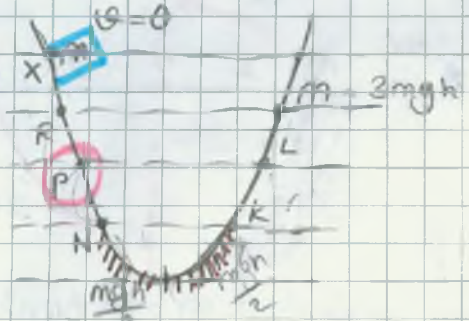


$$-P.h$$
$$+2P\ \frac{h}{2}$$
$$+P.\frac{h}{2}$$
$$+$$
$$\frac{Ph}{2}$$



P ağırlıklı homojen türdeş çubuk F kuvvetinin yardımı ile yatay konuma getirilene kadar yer. hiçbir kuvv. karşı yapılan iş kaç Ph tir?

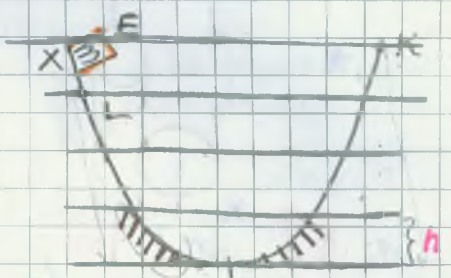
$$3.\frac{h}{6}.2P$$
$$+1.\frac{h}{6}.P$$
$$-1.\frac{h}{6}.P$$
$$+$$
$$+P.h$$



X noktasından serbest bırakılan cisim M noktasına kadar çıkabiliyor.
Dönüşte nereye kadar çıkabilir?

$4mgh - f_s \cdot 2x = 3mgh$

$f_s \cdot 2x = mgh$

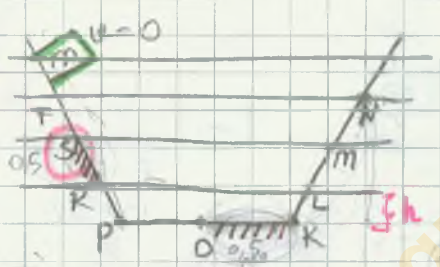


X noktasından E_K enerjisiyle atılan m kütleli cisim K noktasına kadar çıkıp dönüşte L noktasına çıkabilirken, $\Rightarrow E$ kaç mgh dır?

$E + 4mgh - f_s \cdot 2x = 4mgh$

$4mgh - f_s \cdot 2x = 3mgh$

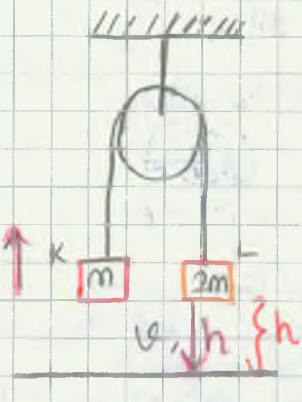
$mgh = E$



1h yüksekliğinden serbest bırakılan cisim N noktasına kadar çıkabilmekte S-R ve O-K arasındaki sürtünme sabit ve eşit olduğuna göre dönüşte nereye kadar çıkabilir?

$4mgh - 2f_s \cdot x = 3mgh$

$f_s \cdot x = \frac{mgh}{2}$



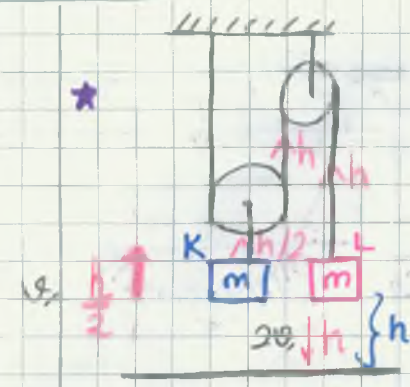
Serbest bırakılan sistemde 1 cismi yere çarptığında K nın E_K si kaç mgh'dir?

Kaybedilenler = Kazanılanlar

$2mgh = mgh + \frac{1}{2}mv^2 + \frac{1}{2}2mv^2$

$mgh = 3\frac{mv^2}{2}$?

$\frac{mgh}{3}$



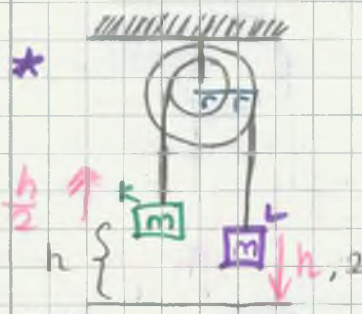
Sistem serbest bırakılıp L cismi yere çarptığında K cisminin E_k si kaç mgh olur?

$(-) = (+)$

$mgh = mg\frac{h}{2} + \frac{1}{2}m\frac{v^2}{4} + \frac{1}{2}mv^2$

$\frac{mgh}{2} = \frac{5mv^2}{2}$

$\frac{mgh}{10} = E_k(k)$



Sistem serbest bırakılıp L cismi yere çarptığında L nin E_k sının K Ep sine oranı nedir?

$(-) = (+)$

$mgh = mg\frac{h}{2} + \frac{1}{2}mv^2 + \frac{1}{2}m4v^2$

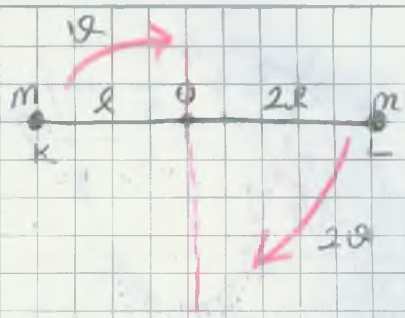
$\frac{mgh}{2} = \frac{5mv^2}{2}$

$\frac{2mgh}{5} = 2mv^2$

$E_K(L)$

$\frac{E_K(L)}{Ep(K)} = \frac{mg\frac{3h}{2}}{\frac{2mgh}{5}}$

$= \frac{4}{15}$



Sistem serbest bırakılıp çubuk düşey konumdan geçerken L cisminin kinetik enerjisi kaç mgl olur?

$(-) = (+)$

$mg2l = mgl + \frac{1}{2}mv^2 + \frac{1}{2}m4v^2$

$mgl = \frac{5mv^2}{2}$

$2mv^2 = \frac{4mgl}{5}$

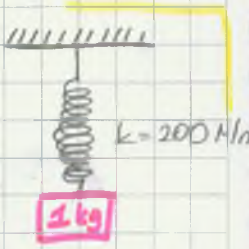
$F_{yay} = k.x$

$mg = k.x$

$x = \frac{mg}{k}$

$E = \frac{1}{2}kx^2$

$= \frac{1}{2}k\left(\frac{mg}{k}\right)^2$



$F = k.x$

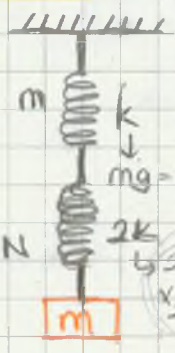
$10 = 200.x$

$x = 1/20$

$E = \frac{1}{2}kx^2$

$E = \frac{1}{2}200.\frac{1}{400}$

$= 1/4$ Joule

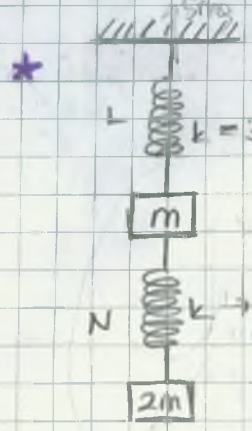


M yayında depolanan enerji E ise N yayında depolanan enerji kaç E?

$E = \frac{1}{2}k\left(\frac{mg}{k}\right)^2$

$E_N = \frac{1}{2}k\left(\frac{mg}{2k}\right)^2$

$= \frac{E}{2}$



$k = 3mg = k \cdot x_1$

$x_1 = \frac{3mg}{k}$

$2mg = k \cdot x_2$

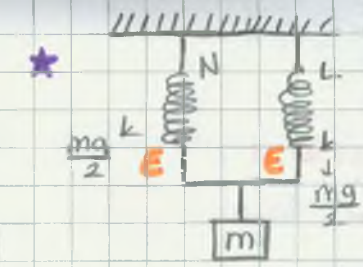
$x_2 = \frac{2mg}{k}$

L yayında depolanan enerji E ise N yayında depolanan enerji kaç E?

$E_L = \frac{1}{2} k \left(\frac{3mg}{k}\right)^2 = E$

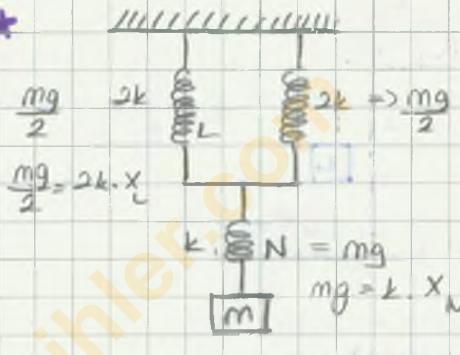
$E_N = \frac{1}{2} k \left(\frac{2mg}{k}\right)^2$

$\frac{1}{2} = \frac{4E}{9}$



N yayında depolanan enerji E ise L yayında dep. enerji?

E



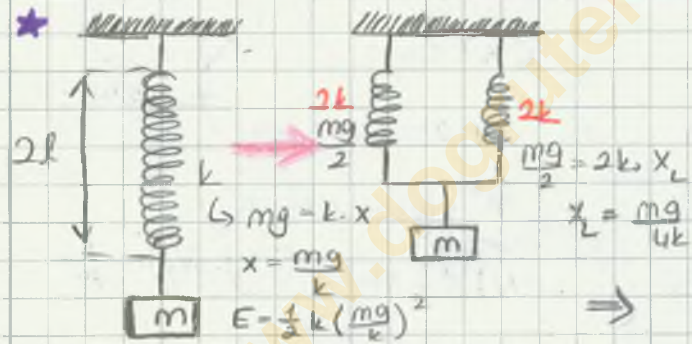
$\frac{mg}{2} = 2k \cdot x_L$

$mg = k \cdot x_N$

$E_N = \frac{1}{2} k \left(\frac{mg}{k}\right)^2 = E$

$E_L = \frac{1}{2} 2k \left(\frac{mg}{4k}\right)^2$

$= \frac{E}{8}$



$mg = k \cdot x$

$x = \frac{mg}{k}$

$E = \frac{1}{2} k \left(\frac{mg}{k}\right)^2$

$x_L = \frac{mg}{4k}$

$\Rightarrow E_L = \frac{1}{2} 2k \left(\frac{mg}{4k}\right)^2$

$= \frac{E}{8}$

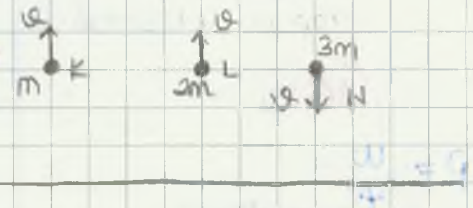
Depolanan enerji E ise 2. şekilde E_L yay enerjisi kaçtır?

Kaç m sıkışır?

$E_i + W = E_s$

$20 \cdot 10 = \frac{1}{2} 200 \cdot x^2$

$x = \sqrt{2m}$



Yere çarpma hızları arasındaki ilişki?

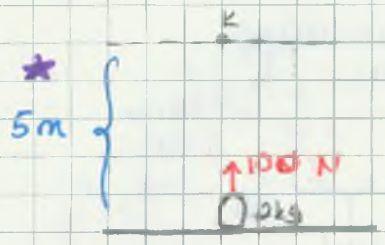
K) $mgh + \frac{1}{2} mv^2 = \frac{1}{2} mv_s^2$

L) $2mgh + \frac{1}{2} 2mv^2 = \frac{1}{2} 2mv_s^2$

M) $3mgh + \frac{1}{2} 3mv^2 = \frac{1}{2} 3mv_s^2$

$v_K = v_L = v_M$

$P = \frac{W}{t}$ $\quad P = \frac{F \cdot x}{t} \Rightarrow$ Joule (enerji)

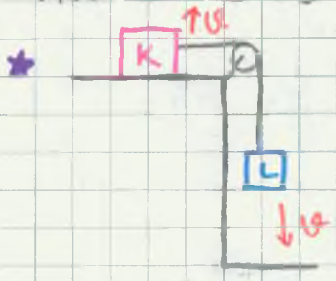


K noktasındaki hızı?

$W = \frac{1}{2}mv^2 + mgh$

$100.5 = \frac{1}{2}2v^2 + 2.10.5$

$2100 = v^2 \quad v = 20$



Sürtünmesiz ortamda serbest bırakılan cisim için;

I - Toplam mekanik enerji korunur.

II - K nın mekanik enerji artar

III - L nin " " azalır

K	L
$E_K \uparrow$	$E_L \uparrow$
$E_p -$	$E_p \downarrow$
$E_{mekanik} \uparrow$	$E_m \downarrow$

Toplam sbt. olmalı

- GÜÇ -

$P = \frac{W}{t} = \frac{\text{joule}}{\text{saniye}}$

$= \frac{F \cdot x}{t} \cdot v = \frac{N \cdot m}{s}$

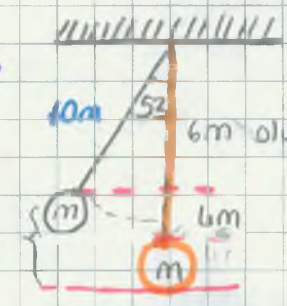
$= F \cdot v = N \cdot m/s$

$= mg \cdot v = kg \cdot m/s^2 \cdot m/s$

} Watt

$P = \frac{W}{t} \rightarrow \text{Watt} = \frac{\text{Joule}}{\text{saniye}}$

Joule = watt. saniye : Enerji
Kilowatt saniye : "

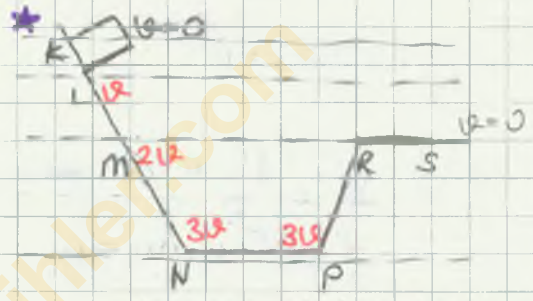


Düşeydeki hızı?

$mgh = \frac{1}{2}mv^2$

$40 = \frac{1}{2}v^2$

$v = 4\sqrt{5}$



Hangi aralıklar kesin sürtünmelidir?

K) $3mgh$

L) $2mgh + \frac{1}{2}mv^2$

M) $mgh + \frac{1}{2}m4v^2$

N) $\frac{1}{2}mgv^2$

$mgh = \frac{1}{2}mv^2$

$mgh = \frac{3}{2}mv^2$

$mgh = \frac{5}{2}mv^2$

- İTME (MOMENTUM) -

$\vec{F}_{net} = m.\vec{a}$

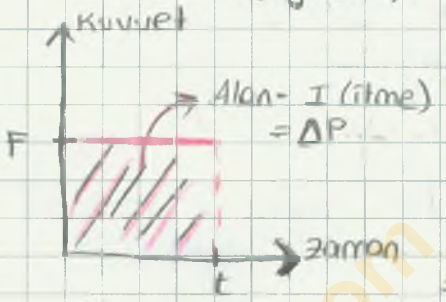
$F_{net} = m.\frac{\Delta\vec{v}}{\Delta t}$

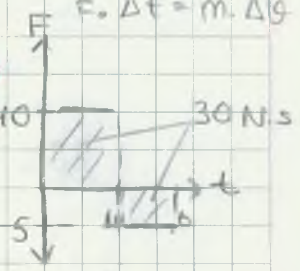
$\vec{F}_{net} . \Delta t = m.\Delta\vec{v}$

İtme (N.s) — momentum değ. $\vec{\Delta P} = P_{son} - P_{ilk}$ (kg.m/s) } Vektörel

$W = \Delta E$
$E_{ilk} + W = E_{son}$ } Skaler

$\vec{I} = \vec{\Delta P}$
$\vec{P}_{ilk} + \vec{I} = P_{son}$ } Vektörel

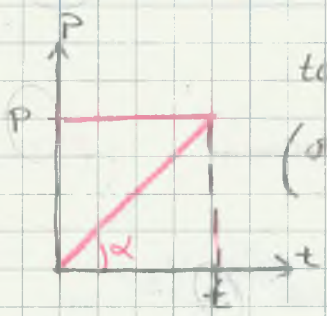




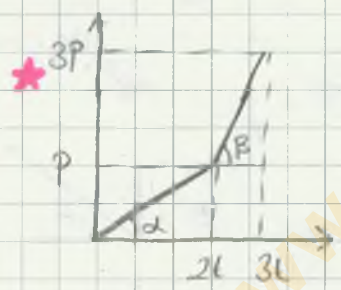
$F.\Delta t = m.\Delta v$

1- İtme = ?
2- m = 2kg $v_0 = 0 \Rightarrow v_t = ?$

① $\vec{I} = 30$ N.s
② $\vec{I} = \vec{\Delta P}$
$= P_{son} - P_{ilk}$
$30 = m(v_s - v_i)$
$30 = 2(v_s - 0)$
$v_s = 15$ m/s



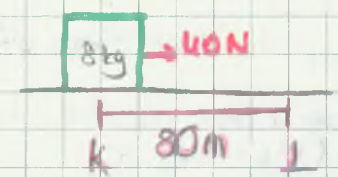
$\tan\alpha = \frac{P}{t} = F$
$\left(\because \Delta t = \Delta P,\ F = \frac{\Delta P}{\Delta t}\right)$
Eğim: Kuvvet



$\tan\alpha = \frac{P}{2t} = F_1$

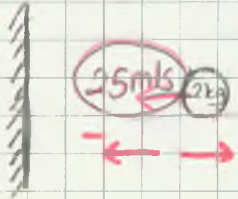
$\tan\beta = \frac{2P}{t} = F_2$

$(0,2)t \rightarrow F_1$
$(2-3)t \rightarrow F_2$
$\Big\rangle \frac{F_1}{F_2} = \frac{1}{4}$



1- KL arasındaki İtme?
$I = F.t$
$= \vec{\Delta P} = \vec{P}_{son} - \vec{P}_{ilk}$

$I = 40.t$ $\quad F_{net} = m.a \quad 40 = 8.a \quad a = 5\ m/s^2$
$x = \frac{1}{2}at^2 \quad 80 = \frac{1}{2}5t^2 \quad t = 4\sqrt{2}$ sn
$I = 40.4\sqrt{2} \quad I = 160\sqrt{2}$ N.s



Duvara çarpıp 30 m/s hızla geri dönüyor.

① I = ? $\quad m.v = \Delta P$

② Duvar ile etk. süresi 0,1 s ise duvarın itme kuvveti?

① $I = F.\Delta t = m.\Delta v$
$I = P_s - P_i = m(v_s - v_i)$
$= 2(30 - (-25))$
$= 110$ N.s

② $I = F.\Delta t$
$110 = F\,0,1$
$F = 1100$ N

$I = F.\Delta t$
$110 = F.0,1$

$I = F.\Delta t$

★ 2kg, 20N, 80m, (4s), 40 m/s ⇒ 80 = P_s

yere çarpıncaya kadar cisme etki eden itme?

$I = F.\Delta t$

$= 20.4$

$= 80\ N.s$

$\overrightarrow{\Delta P} = 80\ N.s$

★ $I = \frac{mg}{2}$ $\quad \frac{10.5}{2}$

n, $v=0$, mg, $mg\sin30$, 30°, K

K noktasına 5 s de geliyor m=2kg ise K nokt. gelene kadar cisme etki eden I=?

$F.\Delta t =$ 10 S

$\frac{2.10.1}{2} = 10N$

$= F.\Delta t$

$= 10.5$

$= 50\ N.s$

★ K, v, h_{max}, α

✓ I) Hareketi boyunca yatay momentumu sabittir.

✗ II) h_{max} da momentumu sıfırdır.

✗ III) K ve L nok'da momentumları eşittir. (Vektörel old. için eşit değil)

Hangileri doğrudur?

Yalnız I

★ 2kg, 10 m/s, 110m/s, P_i, P_s, 30°, 30°

Duvara esnek çarpan cismin momentumundaki değişim?

$\overrightarrow{\Delta P} = m.\Delta v$

$\overrightarrow{\Delta P} =$ 10, 10, 120°, 30, 30

$= 20\ kg.m/s$

★ 2kg, 20 m/s, 3s, 30m, $F.\Delta t = m.\Delta v$, 20 m/s, 30 m/s

Hareketi boyunca cisme etki eden I = ?

$\overrightarrow{\Delta P} = \overrightarrow{\Delta v}.m$

$= 30.2$

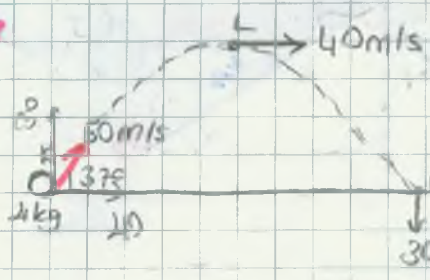
$= 60\ N.s = I$

★ Momentum, F=0, Ft, F_1, F_2, t

Kuvvetin durumunu değerlendiriniz.

$\vec{\Delta P} = m \cdot \Delta \vec{v}$

★



→ K-L arasındaki momentum değişimi = ΔP_1

→ K-M // // // = ΔP_2

$m \rightarrow 4$ kg

$\frac{\Delta P_1}{\Delta P_2} = ?$ $\quad \frac{\Delta P_1}{\Delta P_2} = \frac{120}{240} = \frac{1}{2}$

$\Delta P = 4 \cdot (0 - 30)$

$\Delta P_2 =$ $P_1 = 120$ (↑), $P_3 = 120$ (↓) $\quad P_3 - P_1 = \downarrow 120 \downarrow 120 = 240$ N.s

- GÜÇ -

★ Günde 12 saat çalıştırılan bir klima 30 günde 360 ₺'lik elektrik enerjisi tüketmektedir. Elektrik enerjisinin 1 kwatt.saati 0,5 ₺ olduğuna göre klimanın gücü kaç kwatttır?

$$P = \frac{W}{t} = \frac{\mathcal{E}}{t} = \frac{720 \text{ kw/h}}{360} \quad \begin{matrix} 0{,}5 \text{ ₺} \\ 360 \text{ ₺} \end{matrix} \quad \begin{matrix} 1 \text{ kw/h} \\ x \end{matrix}$$

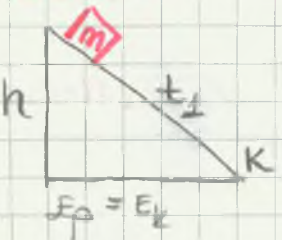
★ 20 m derinlikteki bir kuyudan 5 kg kütleli su çıkarılıp 10 m/s lik hızla fırlatan makine bu işlemi 30 sn de yapıyor. Pompanın gücü kaç wattır? $g = 20 = 10$

$$P = \frac{\mathcal{E}}{t} = \frac{\overset{p.e}{1000} + \overset{k.e.}{250}}{30} = \frac{125}{3}$$

NOT ! Bir makinenin verimi makinadan elde edilen enerjinin makinenin çalışması için verilmesi gereken enerjiye oranıdır.

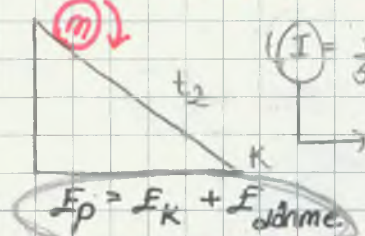
$$\text{Verim} = \frac{\text{Alınan Enerji}}{\text{Verilen Enerji}}$$

- DÖNME KİNETİK ENERJİSİ -



$E_p = E_k$

$mgh = \frac{1}{2} m v^2$



$(I = \frac{1}{5} mr^2)$ → Eylemsizlik momenti

$E_p = E_k + E_{dönme}$

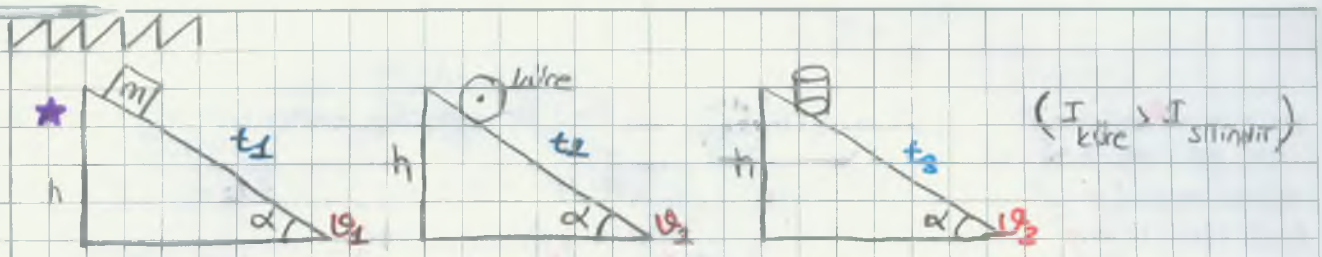
$E_{dönme} = \frac{1}{2} I \omega^2$ → $\omega = \frac{v}{r}$ → Açısal hız

$mgh = \frac{1}{2} mv^2 + \frac{1}{2} \cdot \frac{1}{5} mr^2 \cdot \frac{v^2}{r^2}$

$mgh = \frac{1}{2} mv^2 + \frac{1}{10} mv^2 \quad mgh = \frac{3}{5} mv^2$

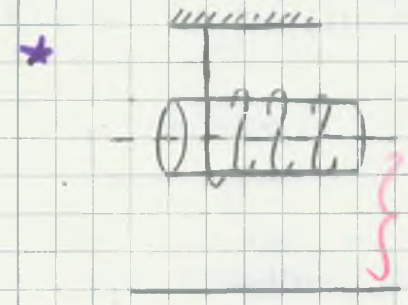
$t_2 > t_1$

$v_1 > v_2$



$v_1 > v_3 > v_2$

$t_1 < t_3 < t_2$



$mgh = \frac{1}{2}mv^2 + \frac{1}{2}\cdot\frac{2}{5}\cdot m r^2 \cdot \frac{v^2}{r^2}$

$10 \cdot 20 = \frac{1}{2}v^2 + \frac{1}{5}v^2$

$200 = \frac{7}{10}v^2 \quad \frac{2000}{7} = v^2 \quad v = 20\sqrt{\frac{5}{7}}\ m/s$

- ESNEK ÇARPIŞMA -

Tam esnek çarpışma;

1- Enerji korunur:

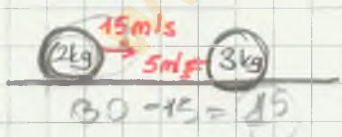
$\frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2 = \frac{1}{2}m_1v_1'^2 + \frac{1}{2}m_2v_2'^2$

2- Momentum korunur:

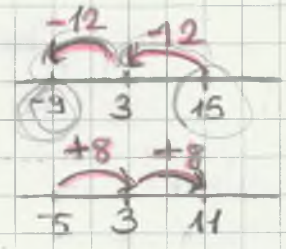
$\vec{P}_{ilk} = \vec{P}_{son}$

$m_1\vec{v_1} + m_2(-\vec{v_2}) = m_1(-\vec{v_1'}) + m_2\cdot\vec{v_2'}$

$\vec{v_1} + \vec{v_1'} = \vec{v_2} + \vec{v_2'}$



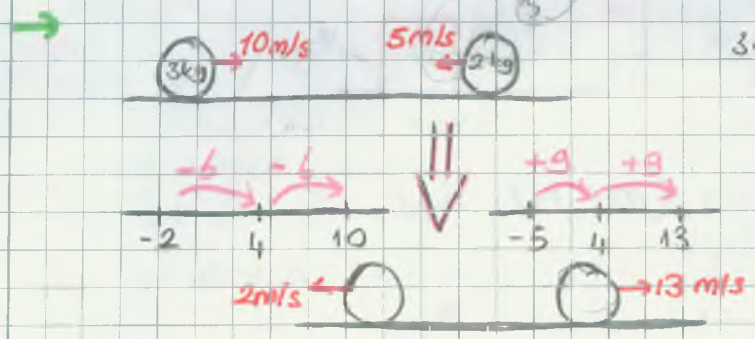
$30 - 15 = 15$



Esnek çarpışmadan sonraki hızları:

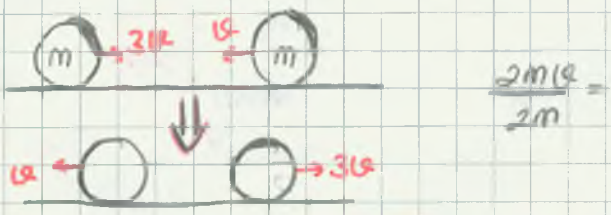
$30 \quad -15$

$\frac{15}{2+2} = 3\ m/s\ (v_{ort.})$



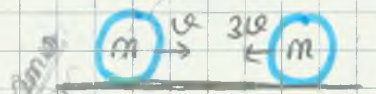
$30 - (-10) = 40$

$\frac{40}{3+2} = 4$ m/s ($v_{ort.}$)



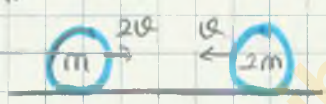
$\frac{2mv}{2m} = v$

*** Özel Durum:**

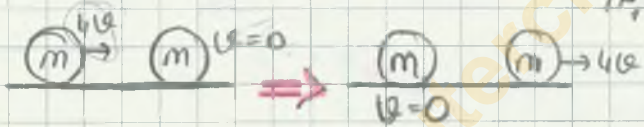


Hızlar değiş tokuş olur.
$m_1 = m_2$ ise

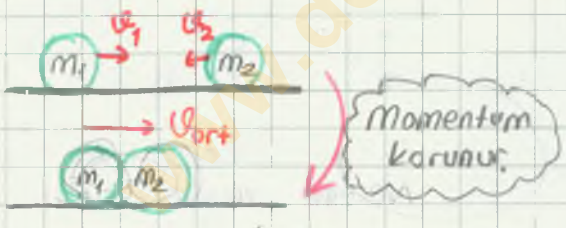
*** Özel Durum:**



$|P_1| = |P_2|$ ise aynen geri dönerler.



- ESNEK OLMAYAN ÇARPIŞMA -

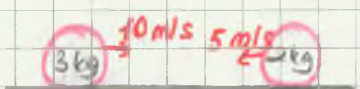


$m_1 \cdot \vec{v_1} + m_2 \cdot (-\vec{v_2}) = (m_1 + m_2) \cdot \vec{v_{ort.}}$

Enerji Korunmaz !

$$\frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 = \frac{1}{2} (m_1 + m_2) \cdot v_{ort}^2 + W_{ısı}$$

*



1 - $v_{ort} = ?$ 2 - Isıya harcanan enerji?

① $\vec{P}_{ilk} = \vec{P}_{son}$

$30 + 2 \cdot -5 = 5 \cdot v_{ort.} \Rightarrow 4$ m/s

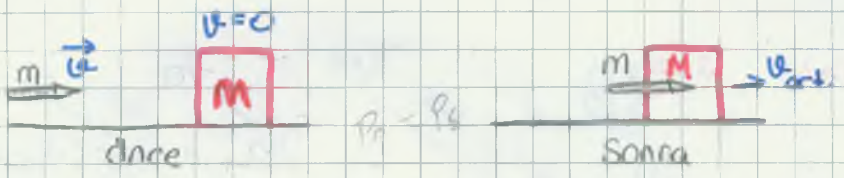
② $E_i = \frac{1}{2} 3 \cdot 10^2 + \frac{1}{2} 2 \cdot 5^2$

$= 175$ Joule

$E_s = \frac{1}{2} (3+2) \cdot 4^2$

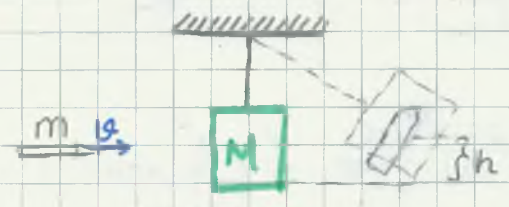
$= 40$ Joule

135 Joule Isı



$P_i = P_s$

$m \cdot v + 0 = (m+M) \cdot v_{ort}$

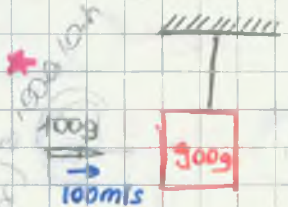


$\vec{P}_{ilk} = \vec{P}_{son}$

$m \cdot v + 0 = (M+m) \cdot v_{ort}$

$E_{ilk} = E_s$

$\frac{1}{2}(m+M) \cdot (v_{ort})^2 = (M+m) \cdot g \cdot h$



$P_i = P_s$

$100 \cdot 100 + 0 = 1000 \cdot v_{ort}$

mermi çarpıp saplanıyor

$h_{max} = ?$

$\vec{P}_{ilk} = \vec{P}_{son}$

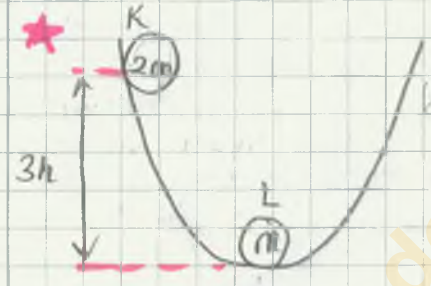
$100 \cdot 100 + 0 = 1000 \cdot v_{ort}$

$v_{ort} = 10$ m/s

$E_{ilk} = E_{son}$

$\frac{1}{2} 1000 \cdot 10^2 = 1000 \cdot 10 \cdot h_{max}$

$h_{max} = 5$ m



K, L ye yapışıp ilerliyor, $h_{max} = ?$

$E_{ilk} = E_{son}$

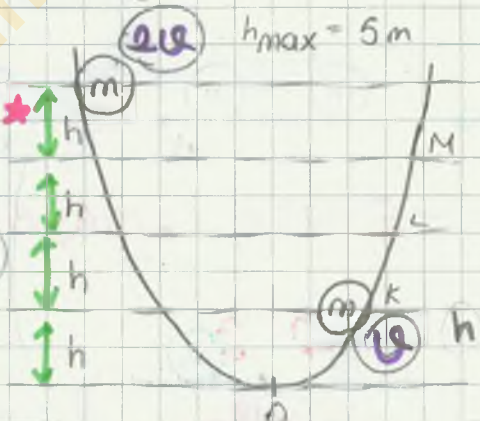
$2mg3h = \frac{1}{2} 2m v^2$

$v = \sqrt{6gh}$

$\vec{P}_{ilk} = \vec{P}_{son}$

$2m\sqrt{6gh} + 0 = 3m \cdot v_{ort}$

$v_{ort} = \frac{2}{3}\sqrt{6gh}$



O'da çarpışıp yapışıyorlar. Nereye kadar çıkabilirler?

$P_ö = P_s$

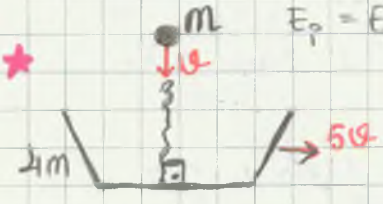
$m \cdot 2v - mv = 2m \cdot v_{ort}$

$v_{ort} = \frac{v}{2}$

$mgh = \frac{1}{2} m v^2$

$2mgx = \frac{1}{2} 2m \left(\frac{v}{2}\right)^2$

$x = \frac{h}{8}$



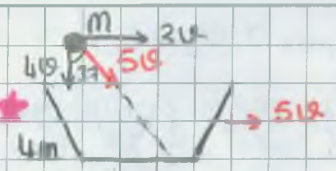
$E_p = E_s$

$\frac{1}{2} 3m \frac{4}{9} \cdot 6gh = 3mg \cdot x$

$x = \frac{6h}{13}$

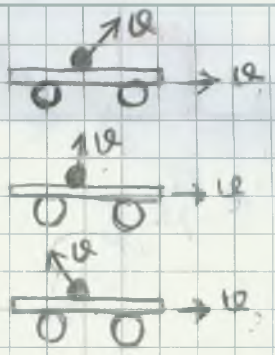
Cisim arabaya çarpıp yapışıyor, $v_{ort} = ?$

$4m \cdot 5v + 0 = 5m \cdot v_{ort}$



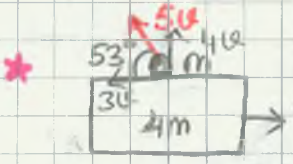
Cisim çarpip yapisiyor
$v_{ort} = ?$

$4m \cdot 5v + m \cdot 3v = 5m \cdot v_{ort}$



Cisimler atildiktan sonra arabalarin hizlari?

$v_3 > v_2 > v_1$



(Momentum yere göre hizlarda korunur.)

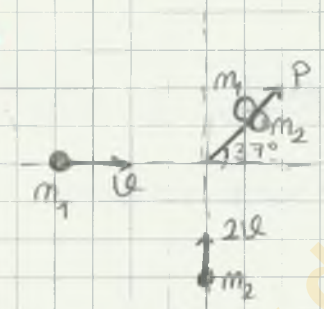
1- Cisim yere göre 5v ile atilirsa;

$5m \cdot 5v = m \cdot (-3v) + 4m \cdot v_{son}$

2- Cisim arabaya göre 5v ile atilirsa;

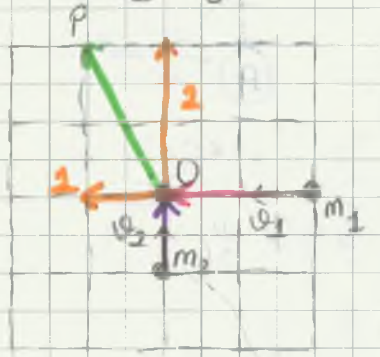
arabanin son hizi?

$5m \cdot 5v = m \cdot (+2v) + 4m \cdot v_{son}$

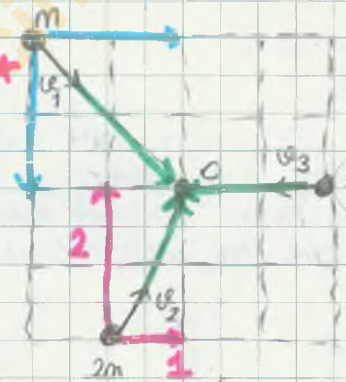


$$\frac{m_1 \cdot v}{m_2 \cdot 2v} = \frac{P \cdot \cos 37°}{P \cdot \sin 37°}$$

$$\frac{m_1}{m_2} = \frac{8}{3}$$

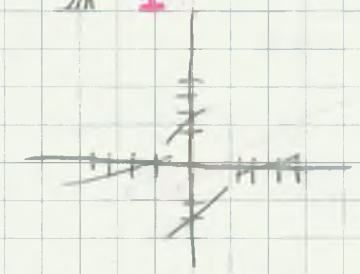


$$\frac{m_2 \cdot v_2}{m_1}$$



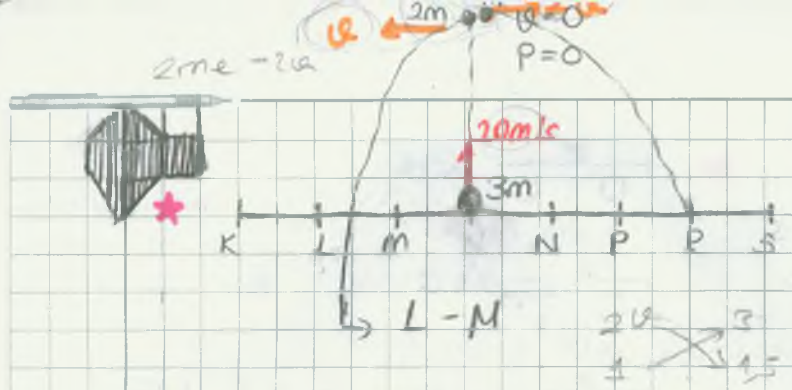
O noktasinda çarpisip yapisiyorlar. Hareket yönleri?

2m-2v



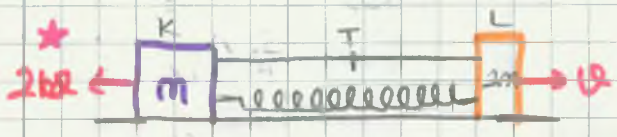
O noktasinda çarpisip yapistiklarinda momentumlari P ise $\frac{m_1}{m_2} = ?$

$$\frac{m_1 \cdot 2v}{m_2 \cdot v} = \frac{1}{2} \qquad \frac{m_1}{m_2} = \frac{1}{4}$$



h_{max}'a çıkacak $v = 0$ olur.

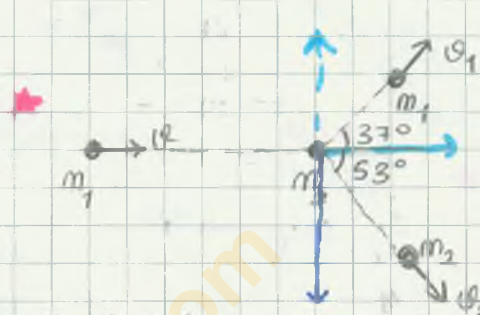
1 s sonra iç patlamaya uğrayan cisim m ve 2m'ye ayrılıyor.
m R'ye düşt. göre 2m nereye düşer?



İp kesilirse $\frac{v_1}{v_2} = ?$

$P_{ilk} = P_s$

$$0 = m \cdot v_1 - 2m \cdot v_2$$



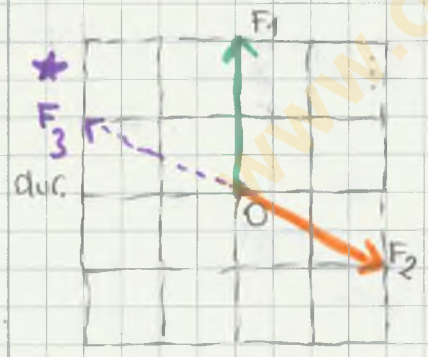
$m_1 \cdot v + 0 = m_1 v_1 \cdot \cos 37 + m_2 v_2 \cdot \cos 53$

$m_1 \cdot v_1 \cdot \sin 37° = m_2 v_2 \sin 53°$

- DENGE -

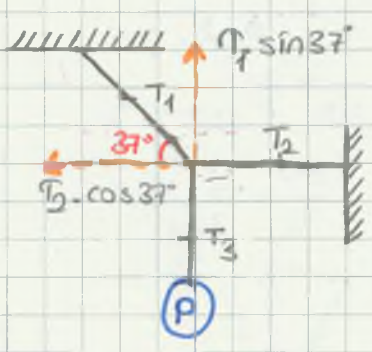
Bir cisme etki eden net kuvvet (Bütün kuvvetlerin bileşkesi) "0" ise o cisim dengededir.

Cisim sabit hızla hareket ederse ivmesinin olmadığı dolayısıyla net kuvvetin "0" old. bir durumdadır.



Üzerine 3 kuvvet etki eden O cismi dengede ise $F_3 = ?$

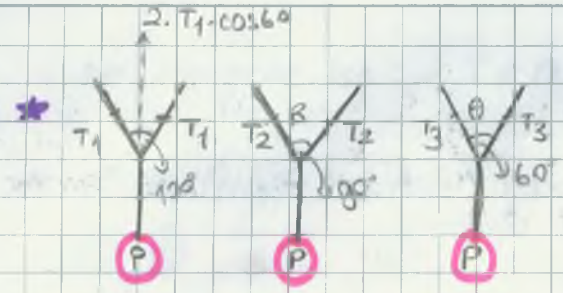
$F_1 : 0,2$
$F_2 : 2,-1$
$+ \quad F_3 : -2,1$
$0,0$

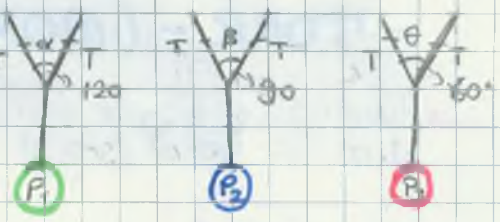


$\frac{T_1}{T_2} = ?$

$P = T_3 = T_1 \cdot \sin 37$
$T_2 = T_1 \cdot \cos 37$
$T_2 = T_1 \cdot \frac{4}{5}$

$\frac{T_1}{T_2} = \frac{5}{4}$





$\alpha > \beta > \theta$ ise T_1, T_2, T_3 ilişkisi?

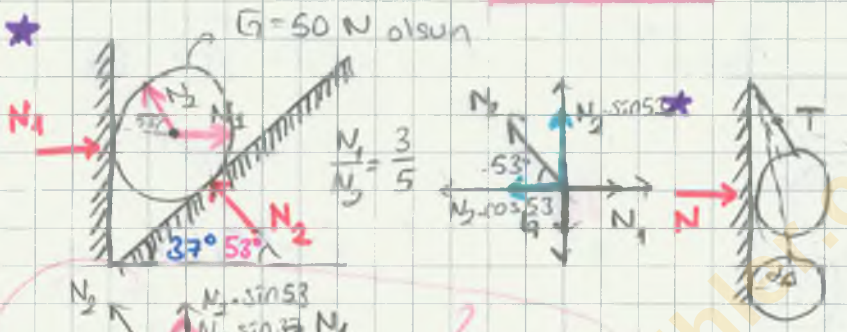
$2 \cdot T_1 \cdot \cos 60 = P$
$T_1 \cdot \cos 60 = T_2 \cdot \cos 45 = T_3 \cdot \cos 30$
$2 \cdot T_2 \cdot \cos 45 = P$
$2 \cdot T_3 \cdot \cos 30 = P$

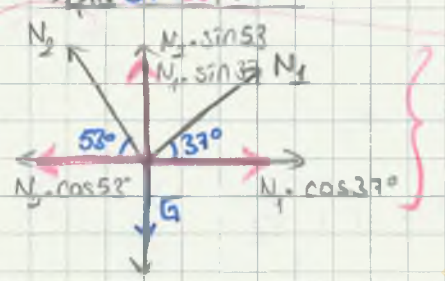
$T_1 > T_2 > T_3$

$\alpha > \beta > \theta$ ise P_1, P_2, P_3 ilişkisi?

$2 \cdot T \cdot \cos 60° = P_1$
$2 \cdot T \cdot \cos 45 = P_2$
$2 \cdot T \cdot \cos 30 = P_3$

$P_1 < P_2 < P_3$





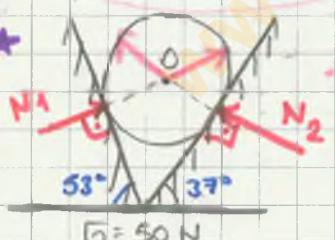
$G > N_2 > N_1$

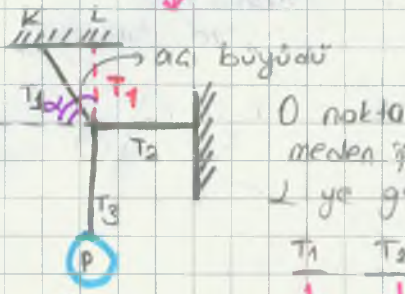
$N_2 \cdot \cos 53° = N_1 \cdot \cos 37°$ $\quad \frac{N_1}{N_2} = \frac{3}{4}$

$N_2 \cdot \frac{3}{5} = N_1 \cdot \frac{4}{5}$

$N_2 \cdot \frac{4}{5} + N_1 \cdot \frac{3}{5} = G = 50\,N$

Çözüm





O noktası değiştirilmeden ip K dan L ye getirilirse

T_1 ↓ $\quad T_2$ ↓ $\quad T_3$ — ↓ P ye bağlı

$\downarrow T_1 \cdot \sin\alpha = T_3 = P$
$\downarrow T_1 \cdot \cos\alpha = T_2 \downarrow$