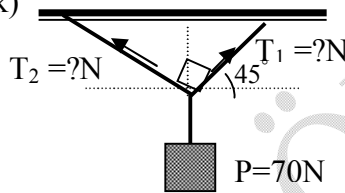


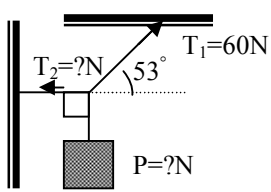
KOCAELİ ÜNİVERSİTESİ GÖLCÜK MYO FİZİK VE MÜHENDİSLİK BİLMİ  
ÇALIŞMA SORULARI ve ÇÖZÜMLERİ 2011

- 1)  $\vec{F}_1 = 2i + 4j - k$  ile  $\vec{F}_2 = 5i - 4j + k$  kuvvetleri için;  
 a)  $\vec{R} = \vec{F}_1 + \vec{F}_2 = ?$  b)  $R = |\vec{F}_1 + \vec{F}_2| = ?$  c)  $\vec{R} = \vec{F}_1 - \vec{F}_2 = ?$  d)  $R = |\vec{F}_1 - \vec{F}_2| = ?$   
 2)  $\vec{A} = 2i - 5j + 2k$  ve  $\vec{B} = 2j - k$  ise ;  
 a)  $\vec{A} \bullet \vec{B} = ?$  b)  $\cos \theta = ?$   
 3)  $10^{-2} \text{ N.m}$  kaç  $\text{dyn.cm}$  dir?( $1\text{N}=10^5 \text{ dyn}$  dir)  
 4) a) Uzunluk ; b) Zaman ; c) Elektrik yükü ; d) Hız e) Moment fiziksel büyüklüklerinin MKSA(SI) birimlerini yazınız.  
 5) a)  $v = 36\text{km/h}$  hızı kaç  $\text{cm/s}$  dir?

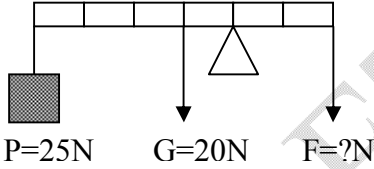
- 6) Şekildeki gibi dengelenen  $P$  ağırlığının iplerde oluşturduğu  $T_1$  ve  $T_2$  gerilmeleri kaç N dur? ( $\sin 135^\circ = \sin 45^\circ = 0,707$  alınacak)



- 7) Şekildeki sistem dengede ise  $P$  ağırlığı ve  $T_2$  gerilmesi kaç N dur?  $\sin 37^\circ = \sin 143^\circ = 0,6$  ,  $\sin 53^\circ = \sin 127^\circ = 0,8$  alınacak.

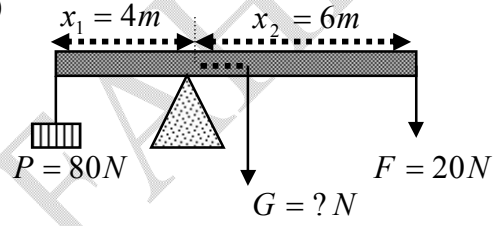


- 8) Sistemin dengesi için  $F$  kuvveti kaç N olmalıdır?

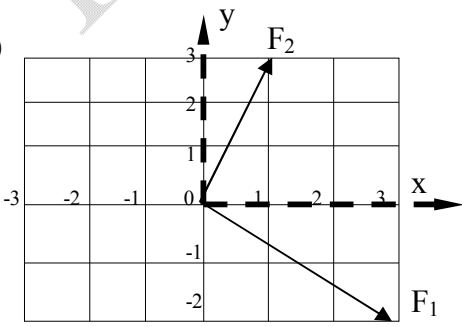


- 9)  $a$  (ivme),  $v$  (hız),  $P$  (basınç),  $W$  (iş) fiziksel büyüklüklerini temel büyüklükler cinsinden yazınız.

- 10) Şekildeki sistem dengede ise çubuğun ağırlığı  $G$  kaç N dur?



- 11) Şekildeki  $F_1$  ve  $F_2$  kuvvetlerini dengeleyen  $F_3$  kuvveti hangi yönde ve kaç birim olmalıdır?



$$\vec{F}_1 = 2i + 4j - k$$

S1) a)

$$\begin{aligned} &+ \vec{F}_2 = 5i - 4j + k \\ \vec{R} = \vec{F}_1 + \vec{F}_2 &= 7i \end{aligned}$$

b)  $R = |\vec{F}_1 + \vec{F}_2| = \sqrt{7^2} = 7$  *birim*

c)  $\vec{F}_1 = 2i + 4j - k$

$$\begin{aligned} &- \vec{F}_2 = -5i + 4j - k \\ \vec{R} = \vec{F}_1 - \vec{F}_2 &= 3i + 8j - 2k \end{aligned}$$

d)  $R = |\vec{F}_1 - \vec{F}_2| = \sqrt{(-3)^2 + 8^2 + (-2)^2}$   
 $R = \sqrt{9 + 64 + 4} = \sqrt{77}$  *birim.*

S2)  $\vec{A} = 2i - 5j + 2k$  *ve*  $\vec{B} = 2j - k$

a)  $\vec{A} \cdot \vec{B} = 2 \cdot 0 + (-5) \cdot 2 + 2 \cdot (-1)$   
 $\vec{A} \cdot \vec{B} = -10 - 2 = -12$

b)  $\cos \theta = \frac{\vec{A} \cdot \vec{B}}{A \cdot B} = ?$   $A = |\vec{A}| = \sqrt{2^2 + (-5)^2 + 2^2} = \sqrt{4 + 25 + 4}$   
 $A = \sqrt{33}$  *birim*

$$B = |\vec{B}| = \sqrt{2^2 + (-1)^2} = \sqrt{4 + 1}$$

$$B = \sqrt{5}$$
 *birim.*

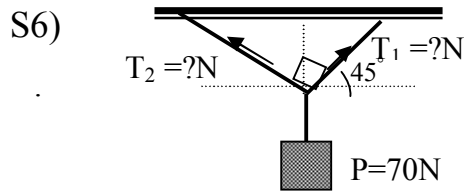
$$\cos \theta = \frac{\vec{A} \cdot \vec{B}}{A \cdot B} = \frac{-12}{\sqrt{33} \cdot \sqrt{5}} = -\frac{12}{\sqrt{33 \cdot 5}} = -\frac{12}{\sqrt{165}}$$

$$\cos \theta \approx -\frac{12}{13} = -0,92, \quad \theta = 157^\circ$$

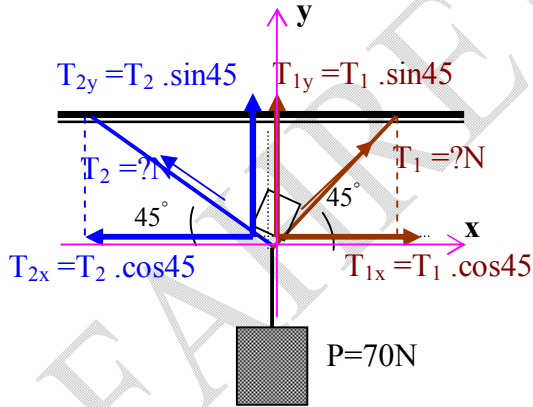
$$\begin{aligned} \text{S3)} \quad 10^{-2} \text{ N.m} &= 10^{-2} \cdot (10^5 \text{ dyn}) \cdot (10^2 \text{ cm}) \\ &= 10^{-2} \cdot 10^5 \cdot 10^2 \cdot \text{dyn.cm} \\ &= 10^{-2+5+2} = 10^5 \text{ dyn.cm} \end{aligned}$$

- S4) a) Uzunluk ; metre(m)                      b) Zaman ; saniye(s)  
c) Elektrik yükü : coulomb(C)              d) Hız ; metre/saniye(m/s)  
e) Moment; Newton. metre(N.m)

$$\text{S5)} \quad v = 36 \text{ km/h} = 36 \frac{1000 \text{ m}}{3600 \text{ s}} = \frac{36000 \text{ m}}{3600 \text{ s}} = 10 \text{ m/s}$$



1.yol;                      Dengenin 1. şartından ;



$$R_x = \sum T_x = 0, \quad T_{1x} - T_{2x} = 0$$

$$T_1 \cdot \cos 45 - T_2 \cdot \cos 45 = 0$$

$$T_1 - T_2 = 0 \quad \text{dan}$$

$$T_1 = T_2 \quad \text{olur.}$$

$$R_y = \sum T_y = 0, \quad T_{1y} + T_{2y} - P = 0 \quad \text{dan}$$

$$T_1 \cdot \sin 45 + T_2 \cdot \sin 45 - 70 = 0$$

$$T_2 \sin 45 + T_2 \sin 45 = 70$$

$$2T_2 \sin 45 = 70$$

$$T_2 \cdot 0,707 = 35$$

$$T_2 = \frac{35}{0,707} = \frac{350}{7,07} = 49,50 \text{ N} \quad T_2 \approx 50 \text{ N}$$

2. yol; sinüs teoreminden;

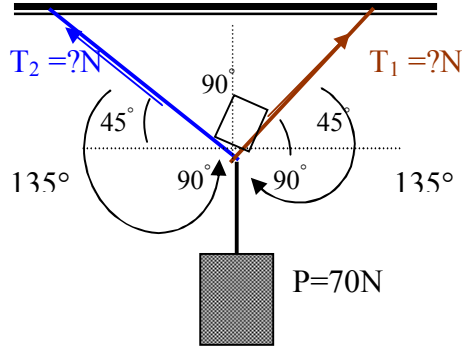
$$\frac{T_1}{\sin 135} = \frac{T_2}{\sin 135} = \frac{P}{\sin 90} \quad \text{den,}$$

$$\frac{T_1}{\sin 135} = \frac{P}{\sin 90}$$

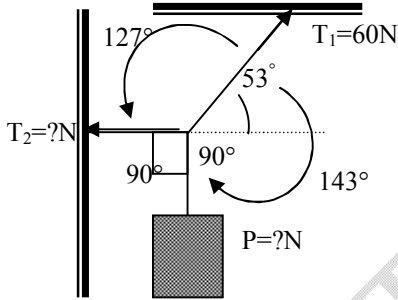
$$\frac{T_1}{0,707} = \frac{70}{1}, \quad T_1 = 0,707 \cdot 70 = 49,49N \quad T_2 \approx 50N$$

$$\frac{T_2}{\sin 135} = \frac{P}{\sin 90}$$

$$\frac{T_2}{0,707} = \frac{70}{1}, \quad T_2 = 0,707 \cdot 70 = 49,49N \quad T_2 \approx 50N$$



S7)



$$\frac{T_1}{\sin 90} = \frac{T_2}{\sin 143} = \frac{P}{\sin 127} \quad \text{den,}$$

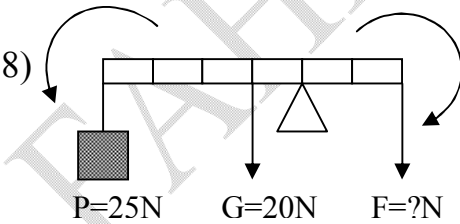
$$\frac{T_1}{\sin 90} = \frac{P}{\sin 127}$$

$$\frac{60}{1} = \frac{P}{0,8}, \quad P = 60 \cdot 0,8 = 48N$$

$$\frac{T_2}{\sin 143} = \frac{T_1}{\sin 90}$$

$$\frac{T_2}{0,6} = \frac{60}{1}, \quad T_2 = 0,6 \cdot 60 = 36N$$

S8)



Destek noktasına göre soldaki ve sağdaki momentler eşit olmalıdır

$$\sum M_{sol} = \sum M_{sag}$$

$$P \cdot 4 + G \cdot 1 = F \cdot 2$$

$$25 \cdot 4 + 20 \cdot 1 = 2F$$

$$100 + 20 = 2F, \quad F = \frac{120}{2} = 60N$$

S9)

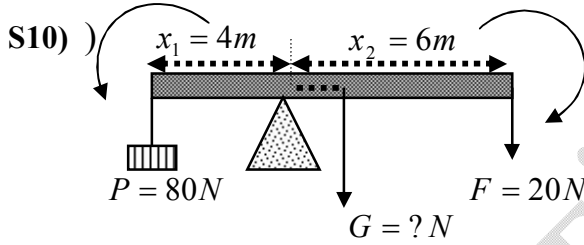
İvme;  $a = \frac{V}{T} = \frac{L/T}{T} = \frac{1}{T} \cdot \frac{L}{T} = \frac{L}{T^2}$

basınç;  $P = \frac{F}{S} = \frac{M \cdot a}{L^2} = \frac{M \cdot L/T^2}{L^2} = \frac{M}{L^2} \cdot \frac{L}{T^2}$

$$P = \frac{M}{L \cdot T^2}$$

iş;  $W = F \cdot L = M \cdot a \cdot L = M \cdot \frac{L}{T^2} \cdot L$

$$W = \frac{M \cdot L^2}{T^2}$$



Destek noktasına göre soldaki ve sağdaki momentler eşit olmalıdır.

$$\sum M_{sol} = \sum M_{sag}$$

$$P \cdot 4 = G \cdot 2 + F \cdot 6$$

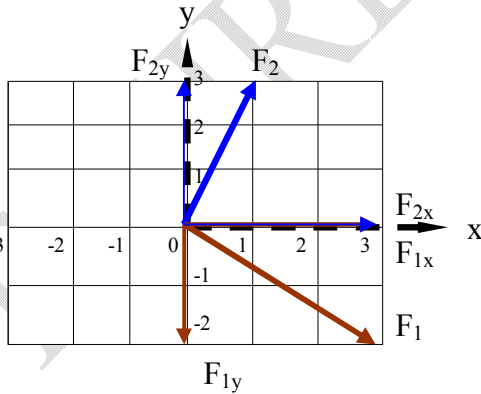
$$80 \cdot 4 = G \cdot 2 + 20 \cdot 6$$

$$320 = 2G + 120$$

$$320 - 120 = 2G,$$

$$G = \frac{200}{2} = 100N$$

S11)



$$R_x = \sum F_x = 0, \quad F_{1x} + F_{2x} + F_{3x} = 0$$

$$3 + 1 + F_{3x} = 0$$

$$F_{3x} = -4 \quad \text{birim}$$

$$R_y = \sum F_y = 0, \quad -F_{1y} + F_{2y} + F_{3y} = 0$$

$$-2 + 3 + F_{3y} = 0 \quad 1 + F_{3y} = 0$$

$$F_{3y} = -1 \quad \text{birim}$$

$F_3$  kuvvetinin; x bileşeninin büyüklüğü  $F_{3x}=4$  birim ve yönü  $-x$  yönünde,

y bileşeninin büyüklüğü  $F_{3y}=1$  birim ve yönü  $-y$  yönündedir.

$$\vec{F}_3 = F_{3x}\hat{x} + F_{3y}\hat{y} \quad \text{ifadesinde yerine yazılırsa;}$$

$$\vec{F}_3 = -4\hat{x} - \hat{y} \quad \text{veya} \quad \vec{F}_3 = -4i - j \quad \text{olur.}$$