

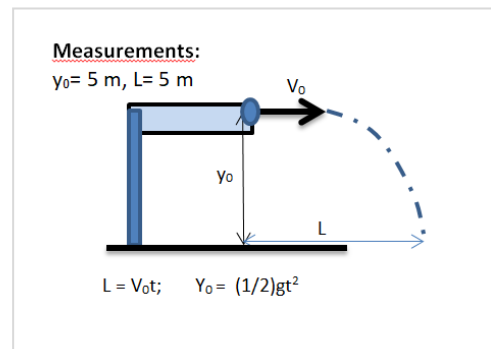
PHYSICS LAB 1 QUESTIONS (2019-2020)

NOTE: You should bring a calculator for the exam. The following questions are given as examples only. We can produce many problems on the same subject! Do not memorize any question please !

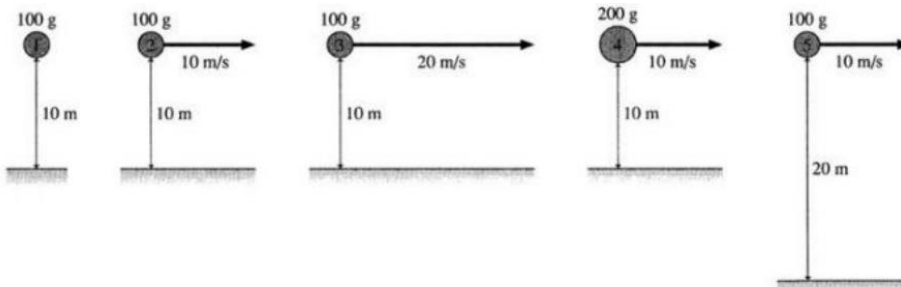
power	prefix	abbreviation	power	prefix	abbreviatio
10^{-2}	centi	c	10^3	Kilo	k
10^{-3}	mili	m	10^6	Mega	M
10^{-6}	mikro	μ	10^9	Giga	G
10^{-9}	nano	n	10^{12}	Tera	T

Quantity	SI unit	cgs Unit	Dimension
Length	m	cm	L
Mass	kg	g	M
Time	s	s	T

- 1) A careless student did the horizontal-shot experiment. He measured the range of the ball $L = 5\text{ m}$ and the height from the ground $y_0 = 5\text{ m}$ and he calculated the initial velocity of the ball as $V_0 = 5\text{ m/s}$. However, it is known that the actual speed of the ball is 3 m/s .
- A) If the measured range is true $L = 5\text{ m}$, since $V_0 = 3\text{ m/s}$, how many meters of this ball has been thrown, find the correct y_0 value.
- B) If the measured height is true, $y_0 = 5\text{ m}$, since $V_0 = 3\text{ m/s}$, find the correct x value.
- C) If the initial velocity of the ball was 5 m/s and the height $y_0 = 5\text{ m}$, calculate the range and L again.



- 2) Sort the falling times from the smallest to the largest. Some time may be the same.

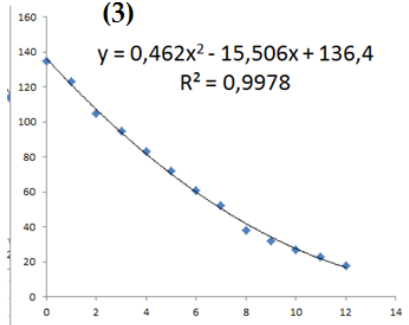
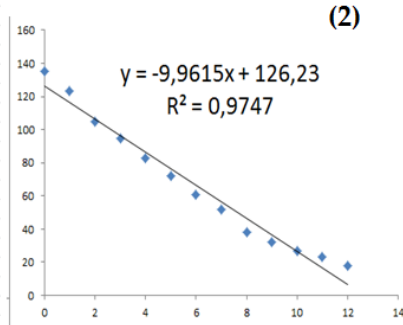
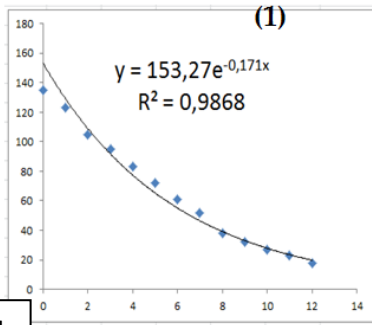


- 3) Convert the units as indicates. (Aşağıdaki birim çevirme işlemlerini yapınız.)

a) $V = 100\text{ cm/s} = \underline{\hspace{2cm}}\text{ km/h} = \underline{\hspace{2cm}}\text{ Mm/min}$
b) $\rho = 0,5\text{ g/cm}^2 = \underline{\hspace{2cm}}\text{ kg/m}^3 = \underline{\hspace{2cm}}\text{ mg/mm}^2$
c) $\omega = 0,5\text{ rad/s} = \dots\dots\dots\text{ degree/s}$

- 4) The following 3 graphs are drawn using the data in TABLE_1.
- Which is the best graph according to R^2 values?
 - Which of these 3 charts is the most practical? Briefly explain which one you would prefer.
 - If $t = 20s$, calculate M by using equation (1) and write the result here. $M = \underline{\hspace{2cm}}$
 - If $t = 20s$, calculate M value using equation (2) and write the result here. $M = \underline{\hspace{2cm}}$
 - If $t = 20s$, calculate M by using equation (2) and write the result here. $M = \underline{\hspace{2cm}}$

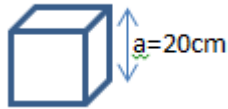
- 4) TABLO_1'deki veriler kullanılarak aşağıdaki 3 grafik çizilmiştir.
- R^2 değerlerine göre en-iyi grafik hangisidir?
 - Bu 3 grafikten hangisini en –pratik olarak görüyorsunuz. Hangisini tercih ederdiniz kısaca açıklayın.
 - Eğer $t=20s$ ise denklem (1)'i kullanarak M değerini hesaplayın ve sonucu buraya yazın. $M= \underline{\hspace{2cm}}$
 - Eğer $t=20s$ ise denklem (2)'yi kullanarak M değerini hesaplayın ve sonucu buraya yazın. $M= \underline{\hspace{2cm}}$
 - Eğer $t=20s$ ise denklem (2)'yi kullanarak M değerini hesaplayın ve sonucu buraya yazın. $M= \underline{\hspace{2cm}}$



Tablo_1

t(s)	M(g)
0	135
1	123
2	105
3	95
4	83
5	72
6	61
7	52
8	38
9	32
10	27
11	23
12	18

- 5) The density of the lead is $d = 11.3 \text{ g/cm}^3$. What is the mass of a cube bullet-block with an edge $a = 20\text{cm}$? ($d = M/V$; $V_{\text{cube}} = a^3$)
 (Kurşunun özkütlesi $d=11.3 \text{ g/cm}^3$ 'tür. Bir kenarı $a=20\text{cm}$ olan küp şeklindeki bir kurşun-bloğun kütlesi kaç kg'dır? Hesaplayınız. ($d=M/V$; $V_{\text{cube}}=a^3$))



6.) Fill the table.

Quantity	SI UNIT	cgs UNIT	DIMENSION
Example: Velocity= $V=x/t$	m/s	cm/s	LT^{-1}
acceleration $a=V/t$			
force, $F=Ma$			
Moment of inertia $I=mr^2$			
$Z= aV/ F$			

7.) Information: Imagine a planet named as ISTANBUL.

- The radius of this planet is 100 times that of the Earth. $\gggg>>R_{IST} = 100R_{earth}$.
- g of ISTANBUL is 5 times the earth g. $\gggg>>g_{(IST)} = 5g = 50m/s^2$.
- There is no atmosphere on this planet!
- One day on this planet is 10 earth hour. $1 IST_day = 10 earth_hour$

Answer the following questions using this information.

Bilgi: Adı ISTANBUL olan bir gezegen hayal ediniz.

- Bu gezegenin yarı-çapı, dünyanın yarı çapının 100 katıdır. $R_{IST}=100.R_{dünya}$.
- G ivmesi dünyadaki g'nin 5 katıdır. $g(IST)= 5g=50m/s^2$ dir.
- Bu gezegende atmosfer –hava yoktur !
- Bu gezegende bir gün 10 dünya saatidir. $1 IST_günü = 10 dünya\ saati$

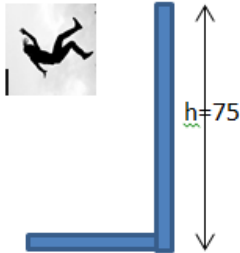
Bu bilgileri kullanarak aşağıdaki soruları cevaplayınız).

7a) A person who is 30 ISTANBUL years old on this planet, How many earth years old in the earth?

Bu gezegende "30 ISTANBUL_yılı" yaşındaki bir kişi, Dünyada kaç Dünya_yılı yaşındadır?

7b) If a person falls from the 75m height without first speed on the planet ISTANBUL, how many

seconds will he fall to the ground? And what's his last speed when he falls? (Bir kişi, ISTANBUL gezegeninde, 75m yüksekten ilk hızız düşerse, kaç saniye sonra yere düşer? Ve yere düştüğündeki son hızı nedir?)



7c) Let us consider the earth and Istanbul planets as perfect spheres. Find how many eaths will fit into the volume of a ISTANBUL planet. (Volume of the sphere: $V\text{-sphere} = 4/3\pi r^3$)

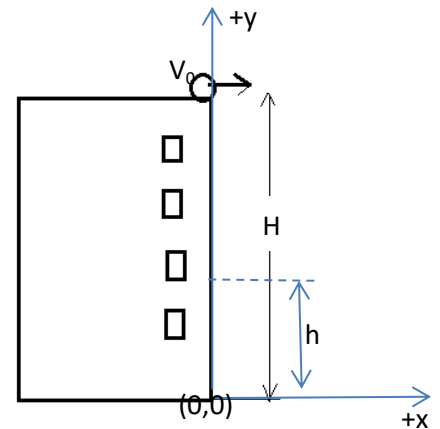
Dünya ve İstanbul gezegenlerini mükemmel birer küre olarak kabul edelim. Bir ISTANBUL gezegeni hacmi içine kaç tane dünya sığa An object is thrown from a building at H = 60m height with Horizontal speed. $V_0 = 50m/s$. Answer the followina questions.

8) An object is thrown from a building at H = 60m height with horizontal speed. $V_0 = 50m/s$. Answer the following questions.

- a) What is the time it takes to fall to the ground? $t = ?$
- b) Find out what horizontal range it falls on the ground. $x = ?$
- c) What is the speed when passing in front of a window $h=20m$ above the ground?
- d) What is the height of the object from the ground $t = 2s$ after discard?

H=60m yükseklikteki bir binadan, yatay $V_0=50m/s$ hız ile atılan cisim için aşağıdaki soruları cevaplayınız.

- a) Yere düşene kadar geçen süre t_f nedir?
- b) Yere düştüğünde $x=0$ noktasında göre kaç m uzağa düşer, $L=?$
- c) Yerden $h=20m$ yüksekteki pencerenin önünden geçerken hızı nedir?
- d) Atıldıktan $t=2s$ sonra, cismin yerden yüksekliği nedir?



$$g=10m/s^2; \quad V_y = V_{0y} - gt; \quad V_x = V_{0x}$$
$$y(t) = y_0 + V_{0y}t - (1/2)gt^2;$$

9) The measurements taken in an experiment are shown in the table below. V (m/s) is velocity and a is acceleration (m/s^2) of this object. With using measured data a graph is drawn in excel. Answer the following questions using the given graph and equation.

- Which quantity should be on the x axis, write on the graph with the unit.
- Which quantity should be on the y axis, please write on the graph with the unit.
- If $B = 30$, what is the SI unit of B?
- If $C = 4$, what is the SI unit of C?

V (m/s)	a (m/s^2)
0,2	0,2
0,3	0,9
0,4	2
0,5	3,5
0,6	5,4
0,7	7,7
0,8	10,4
0,9	13,5
1	17
1,1	20,9
1,2	25,2
1,3	29,9

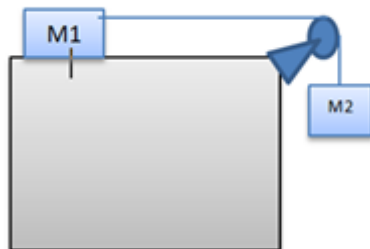
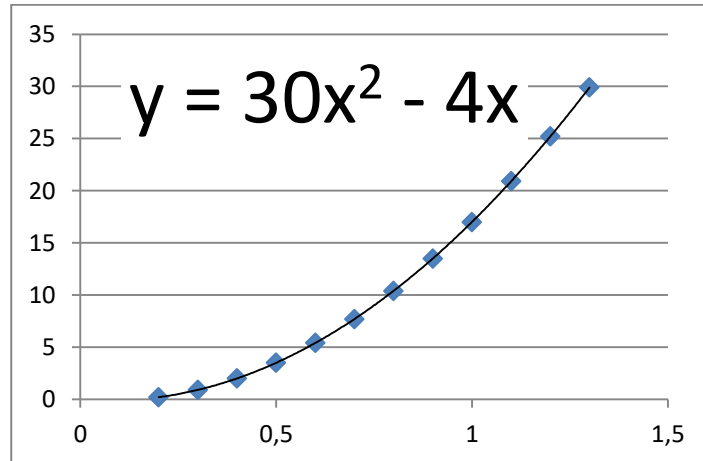


Figure 1.

In figure 1, if $k=0$ and $M_1=100\text{kg}$, $M_2=2\text{kg}$

- Find the acceleration of the object.
- If static friction between mass and the table $k=0,3$; what minimum value of M_1 will keep the system has a constant velocity.