Al-Professor Series
In Physics
For Secondary School Language

2013

Final Revision in Physics

For grade secondary one

professor of physics
0100 24 23 020

BY
Mr. Ramadan Fathi Abozied

Compare between the scalar quantity and vector quantity:

Scalar quantities		Vector quantities
Physical quantities which are characterized by magnitude only. ➢ Ex. Time, speed, mass		Physical quantities which are characterized by magnitude and direction. ➢ Ex. Force, velocity, displacement

Compare between basic quantities and derivable quantities:

Basic quantities		Derivable quantities
It is the physical quantities which can't be derived from other physical quantities.		It is the physical quantities which can be derived from the fundamental quantities.
Can't be expressed by a law		Can be expressed by a law
Mass, length, time		Velocity, force, work

	$V_0 = zero$ **Free fall ↓**	$V_t = 0$ **↑ Thrown (projected)**
Velocity	**Down ward** The velocity of the body just before touches the ground. $V_t = V_0 + at$ $\quad \mathbf{V_t = gt}$ $\therefore V_t^2 = V_0^2 + 2ax$ $\quad \mathbf{V_t = \sqrt{2gx}}$	**Up ward** The initial velocity of the body $V_t = V_0 + at$ $\quad \mathbf{V_0 = gt}$ $O = V_0 - gt$ $O = V_0^2 = 2gx$ $\quad \mathbf{V_0 = \sqrt{2gx}}$
Height	Height of the building $V_t^2 = 2gx$ $\quad \mathbf{X = \frac{V_t^2}{2g}}$ $X = V_0 t + \frac{1}{2} a t^2$ $\quad \mathbf{X = \frac{1}{2} g t^2}$	Maximum height that the body can reach to it $V_0^2 = 2gx$ $\quad \mathbf{X = \frac{V_0^2}{2g}}$ $\mathbf{X = V_0 t - \frac{1}{2} g t^2}$
Time	$\mathbf{t = \frac{V_t}{g}}$ **or** $\mathbf{t = \sqrt{\frac{2x}{g}}}$ Time to reach the earth's surface.	$\mathbf{t = \frac{V_0}{g}}$ The time taken by the body to reach maximum height.

Comparison	Newton's 1st law	Newton's 2nd law	Newton's 3rd law
Definition	Body retains it's state of rest or motion in straight line with uniform velocity unless external force upon on it.	The resultant force acting on moving body equal the rate of change of its linear momentum and it's direction is that of momentum.	For every action there is a reaction equals in magnitude and opposite in direction.
Law	$\sum F = 0$	$\mathbf{F = ma}$	$\mathbf{F_{1®2} = -F_{2®1}}$
Name	- inertia – balance	- force	- action - reaction

Mass
The resistance of body to change it's velocity
Scalar
Kg
$\mathbf{m = \frac{F}{a}}$

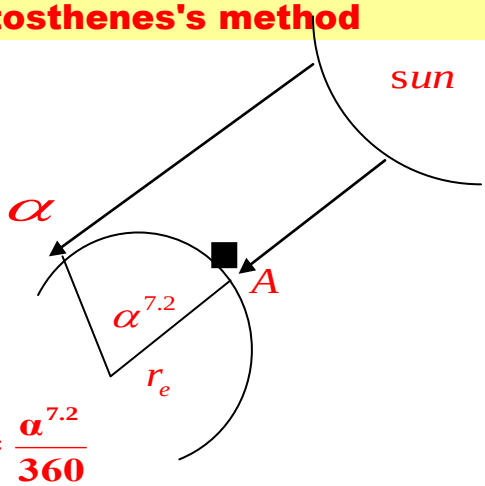
Weight
The force of earth's gravity acting on body
Vector
N or $kg\ m/s^2$
$\mathbf{Fg = mg}$

Inertial mass	Gravitational mass
It is the ratio between the velocity of a body of mass 1kg and velocity of that body when it is affected by the same force or it is the resistance of the body to change it's velocity after collision	It is the ratio between acceleration of a 1kg and the acceleration of the body when they are affected by same force.
$m_1 = \frac{v_2}{v_1}$ direct with inertia.	$m_1 = \frac{a_2}{a_1}$ Inversely proportional with acceleration

Force	Momentum
Product of mass and acceleration $F = ma$	Product of mass and velocity $p_L = mv$
(N) Newtons $kg.m/s^2 \longrightarrow j/m$	$kg.m/s \longrightarrow N.s$
The rate of change of momentum $F = \Delta mv$	Impulse is the change of momentum

Eratosthenes's method

(at noon)



$$\frac{AB^{800km}}{2\pi r_e} = \frac{\alpha^{7.2}}{360}$$

$$2\pi r_e = 40000$$

$$r_e = \frac{40000}{2\pi} = 6.363\times10^6 m$$

$$or = 6363km$$

Al biruni's method

(at sunset)

$$\alpha = \cos^{-1}\left(\frac{r_e}{r_e + h}\right)$$

$$r_e = \frac{h\cos\alpha}{1-\cos\alpha}$$

G.R..... 1- Al Birini method is preferred thon Eratosthenes's method to determine the radius of earth?

- Bec: it is most accurate and need to know the height of any building and the angle of sun only.

2- In al Biruni method, the angle of rays inclination is determined at sun set?

- Bec: The last sun ray is tangent the earth's surface so it perpendicular to the earth's radius at sun set.

Explain El Biruni method to determine the earth's radius: with drawing

Potential energy	Kinetic energy
p.e (j)	k.e (j)
It is the energy stored inside the body due to it's position from earth.	The energy gained by the body due to it's movement.
mgd	$\frac{1}{2}mv^2$

Elastic collision	Inelastic collision
There is no lose in energy before and after . Kinetic energy	The energy. Before collision is great than after. Kinetic energy
$\frac{1}{2}m_1v_1^2+\frac{1}{2}m_2V_2^2=\frac{1}{2}m_1v'^2_1+\frac{1}{2}m_2V'^2_2$	$\frac{1}{2}m_1v_1^2+\frac{1}{2}m_2V_2^2\rangle\frac{1}{2}m_1v'^2_1+\frac{1}{2}m_2V'^2_2$
(before) ***equal*** (After)	(before) ***great than*** (After)
Conserved	Not conserved
Momentum	**Momentum**
$m_1v_1+m_2V_2=m_1V_1^1+m_2V_2^1$	$m_1v_1+m_2V_2=m_1v_1^1+m_2v_1^1$
(before) ***equal*** (After)	(before) ***equal*** (After)
Conserved	Not conserved
Example; 1) billiard balls 2) gas molecules inside a container	**Example:** 1) Bowling 2) Car accidents

Note: If τωο body move together as one body after collision so → the collision is inelastic

Velocity right → (+) Velocity left → (-)	$m_1v_1+m_1v_2=(m_1+m_2)V$ $V1,2=\frac{m_1v_1+m_2v_2}{m_1+m_2}$

Orbital Velocity	Escape velocity
$V_o=\sqrt{gro}$	$V_{esc}=\sqrt{2gr_e}=11.2km/s$
The velocity by which the satellites rotate in curved path in it's orbit in a fixed position around the earth	The velocity by which the body cam escape from the earth's gravity.

Kind/comparison	Liquid	Gas	Platinum
Thermometric substance	- mercury - alcohol	Gas at constant volume	Platinum wire
Physical property that change with temperature	Length of liquid column (L)	Gas pressure (P)	Electrical resistance (r)
Law	$tc^o=100\frac{l_t-l_o}{l_{100}-10}$	$Tc^o=100\frac{Pt-Po}{P_{100}-Po}$	$tc^o=100\frac{r_t-r_o}{r_{100}-r_o}$

Heat capacity (q_{th})	(c) specific heat capacity
$q=\frac{Q}{\Delta t}j/k^o$	$C=\frac{q}{m}j/kg.k^o$
The quantity of heat required to raise the temperature of body by one degree factors: - The body mass - Kind of matter	The quantity of heat required to rais the temperature of 1kg of a body by one degree factors: always remains constant The kind of matter only (mass number

General gravitional	Coulomb law
$F_g=G\frac{m_1m_2}{d^2}$ G=6.67x10^{-11} Nm^2/kg^2	$F_e=K\frac{q_1q_2}{d_2}$ K=9x10^9 Nm^2/C^2
Attractive force only Always (+ve)	Attraction or repulsion May be(+ve) or (-ve)
Mass	Electric charge

Prove that

1) $\boxed{V_t = V_0 + at}$

$a = \frac{\Delta v}{\Delta t}$

$a = \frac{V_t - V_0}{t}$

$V_t - V_0 = at$

$\boxed{V_t = V_0 + at \rightarrow t = \frac{V_t - V_0}{a}}$

2) $\boxed{x = V_0 t + \frac{1}{2}at^2}$

$x = Vav.t$

$x = \left(\frac{V_t + V_0}{2}\right)t$

$x = \left(\frac{V_0 + at + V_0}{2}\right)t$

$x = \left(\frac{2V_0 + at}{2}\right)t$

$x = \frac{2V_0 t}{2} + \frac{at^2}{2}$

$\boxed{x = V_0 t + \frac{1}{2}at^2}$

3) $\boxed{V_t^2 = V_0^2 + 2ax}$

$x = V_a v.t$

$x = \left(\frac{V_t + V_0}{2}\right).\left(\frac{V_t - V_0}{a}\right)$

$x = \frac{V_t^2 - V_0^2}{2a}$

$V_t^2 - V_0^2 = 2ax$

$\boxed{V_t^2 = V_0^2 + 2ax}$

4) General gravitational low

$F \alpha m_1 m_2$

$F \alpha \frac{1}{d^2}$

$F \alpha \frac{m_1 m_2}{d^2}$

$\therefore F = G\frac{m_1 m_2}{d^2}$

General gravitational eonst

$= 6.67 \times 10^{-11} N.m^2/kg^2$

5) Determination of acceleration due to gravity.

$F = G\frac{m_1 m_2}{r_e^2}$

$F = Fg = m_2 g$

$\therefore m_2 g = \frac{G m_1 m_2}{r_e^2}$

$\mathbf{g = G\frac{m_e}{r_e^2}}$

6) Prove that the impulse is equal to the change in linear momentum.

$F = \frac{\Delta P_L}{\Delta t} \rightarrow F = \frac{m\Delta v}{\Delta t}$

$F.\Delta t = m\Delta v \longrightarrow \mathbf{I_{imp} = \Delta mv}$

7) Conclude the law of conservation of linear momentum.

$F_1 = \frac{\Delta P_{L_1}}{\Delta t}$, $F_2 = \frac{-\Delta p_{L_2}}{\Delta t}$ When $F_1 = -F_2 \rightarrow$ $\therefore \frac{\Delta P_{L1}}{\Delta t} = -\frac{\Delta P_{L2}}{\Delta t}$

$\Delta P_{L1} = -\Delta P_{L2}$

$m(v_1^1 - v_1) = -m_2(v_2^1 - v_2)$

$\mathbf{m_1 V_1 + m_2 v_2 = m_1 v_1^1 + m_2 v_2^1}$

8) Prove that (Deduce that) :

$m1V1 + m_2V_2 = (m_1 + m_2)V_{12}$ ***inelastic collision***

total linear momentum before collision = m1v1 + 0 = m1v1

total linear momentum after collision = (m1 + m2) V12

from law of conservation of linear momentum

m1v1 = (m1 + m2) V12 m1=m2 $V_{12} = 1\backslash 2\ V_1$

$\mathbf{v_{1,2} = \frac{m_1 v_1}{m_1 + m_2}}$

Prove that:

9) **p.e = mgd**

$w = F_g d$

$\longrightarrow [F_g = mg]$

$w = mgd$

p.e = mgd

10) **$k.e = \frac{1}{2}mv^2$**

$V_t^2 = V_0^2 + 2ax \qquad [V_0 = zero]$

$V_t^2 = 2ax \qquad \rightarrow\rightarrow\rightarrow maltibly \times \frac{1}{2}m$

$\therefore \frac{1}{2}mV_t^2 = \frac{1}{2}m.2ax \Rightarrow\Rightarrow \frac{1}{2}mV^2 = \max \qquad F = ma$

$\therefore \frac{1}{2}mV^2 = F.x = w \rightarrow\rightarrow\rightarrow then \qquad$ **$k.e = \frac{1}{2}mV^2$**

11) $V_o = \sqrt{g.r_o}$

(weight) $F_g = F_c$

$\therefore mg = \frac{mv_o^2}{ro}$

$\therefore V_o^2 = gr_o$

$\therefore V_o = \sqrt{gr_o}$

12) $V_o = \sqrt{G\frac{me}{r_o}}$

$F_g = F_c$

$G\frac{m_e.m_s}{r_o^2} = \frac{m_s v_o^2}{r_o}$

$V_o = \sqrt{G\frac{me}{ro}}$

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13) $V_{esc} = \sqrt{2gr_e}$ k.e [after ejection] = p.e [at earth's surface]

$\therefore \frac{1}{2}mv_{esc}^2 = mgre \qquad \frac{1}{2}V_{esc}^2 = gre \qquad V^2 = 2gre$

$\therefore Vesc = \sqrt{2gre}$

Note

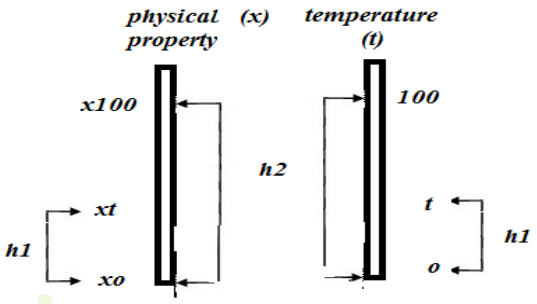
Deduction of the general law of thermometer

From the previous figure

$\left(\frac{h1}{h2}\right)_t = \left(\frac{h1}{h2}\right)_x$

$\frac{t-o}{100-0} = \frac{xt-xo}{x_{100}-x_o}$

$\therefore t = \frac{100(x_t - x_o)}{(x_{100} - x_o)}$



Therefore:

[1] $\left(\frac{h_1}{h_2}\right)_c = \left(\frac{h_1}{h_2}\right)_f$

$\therefore \frac{c^o - o}{100-0} = \frac{F^o - 32}{212-32}$

$\therefore \frac{C^o}{100} = \frac{F^o - 32}{212-32}$

$\therefore 1C^o = \frac{100}{180}(F^o - 32)$

$\therefore tc^o = \frac{5}{9}(F^o - 32)$

$tF^o = \left[\frac{9}{5}C^o\right] + 32$

[2] the temperature at which the reading of Celsius and Fahrenheit scales are equals

Let $tf^o = tc^o$

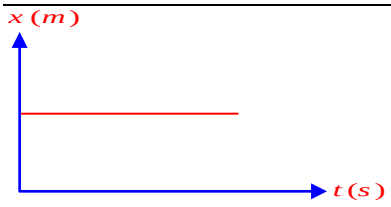
$\because tf = \frac{5}{9}(f - 32) = tc^o$

$\therefore \frac{9}{9}F = \frac{5}{9}F - \frac{5x\,32}{9}$

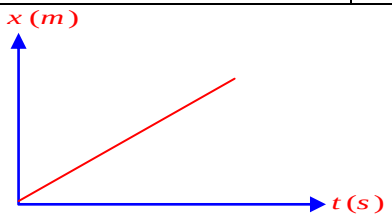
$\frac{4}{9}F = -\frac{5x\,32}{9}$

$4F = -\frac{5x\,32}{}$

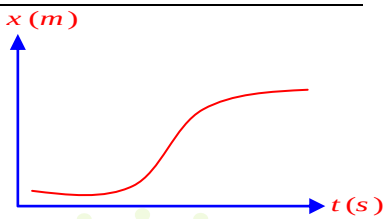
$tF^o = tc^o = -40$



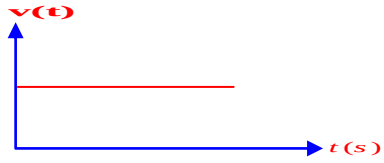
Body at rest



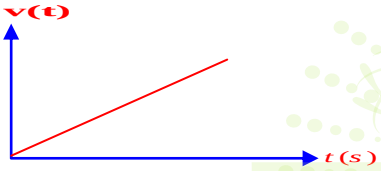
Uniform velocity a = 0



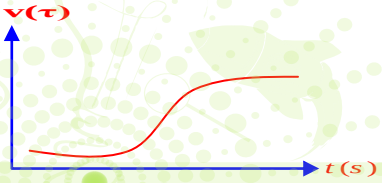
Non uniform velocity



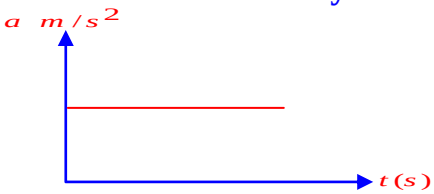
Constant velocity



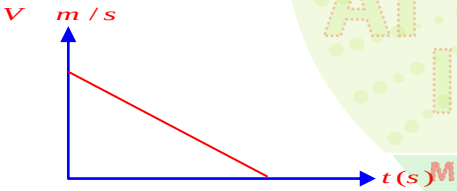
Uniform acceleration



Non uniform acceleration



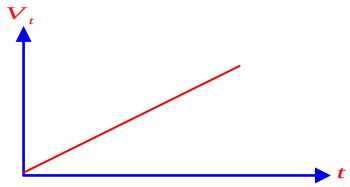
Constant acceleration



Deceleration

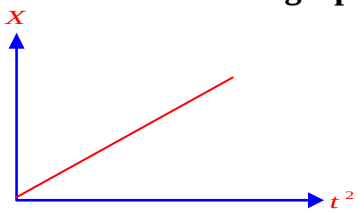
What does the slope of each graph represent [write the mathematical relation]

(free fall acceleration graphs)



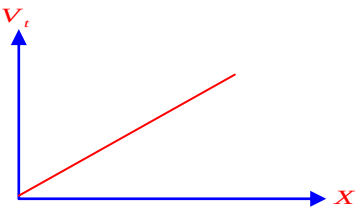
$V_t = gt$

$\text{slope} = \frac{V_t}{t} = g$



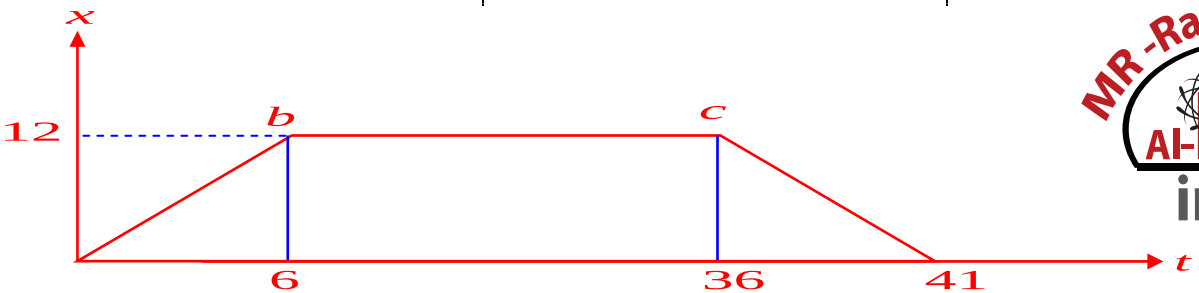
$X = \frac{1}{2}gt^2$

$\text{slope} = \frac{X}{t^2} = \frac{1}{2}g$



$V_t^2 = 2gx$

$\text{slope} = \frac{V_t^2}{x} = 2g$



$V_t = V_0 + at$

$= 0 + 2 \times 6$

$= 12 m/s$

$X_1 = \left(\frac{V_t + V_0}{2}\right)t$

$= \left(\frac{12 + 0}{2}\right) = 6$

$= 6 \times 6 = 36m$

$V = \frac{x}{t} (\text{the only law})$

$X_2 = V_t = 12 \times 30$

$X_2 = 360m$

$X_3 = \left(\frac{V_t + V_0}{2}\right)t$

$= \left(\frac{0 + 12}{2}\right)5$

$= 6 \times 5 = 30m$

$\text{total distance} = 426\text{m}$

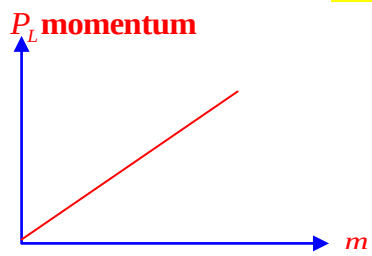
The following table represents. The relation between. The covered distance by a body fall freely and squared the time taken:

X(m)	0	5	20	A	80	125
$t^2(s^2)$	0	1	4	9	16	B

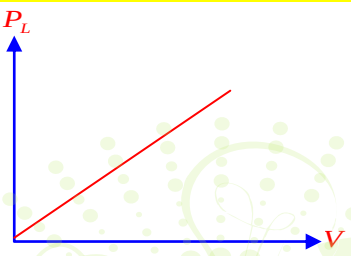
a) Draw the relation between the distance on y-axis and the squared time on X-axis. B) From the graph find.

b) 1-The value of (A) and (B). 2- The value of free fall acceleration 3-The velocity of the body after 4sec

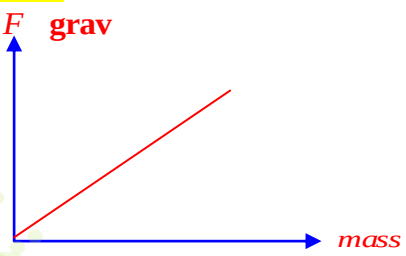
Mention what does the slope equal (with unit)



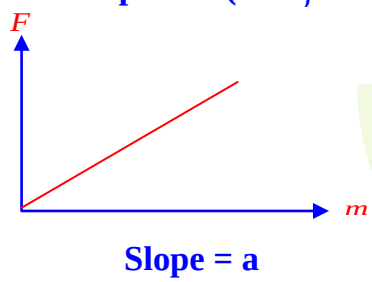
Slope = v (m/s)



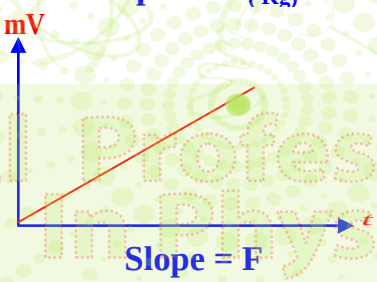
Slope = m (Kg)



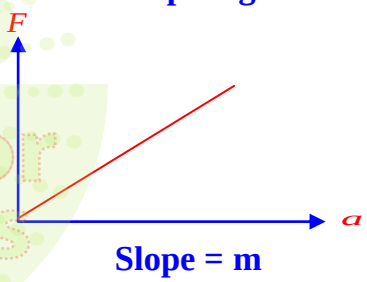
Slope = g



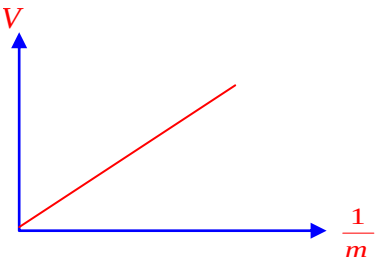
Slope = a



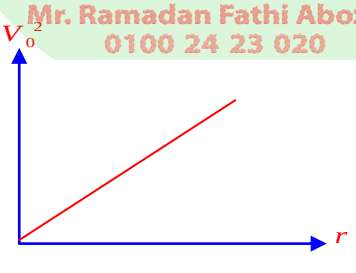
Slope = F



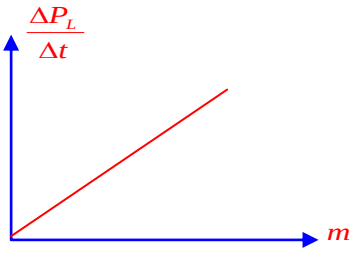
Slope = m



Slope = P_L



Slope = a_c



Slope = a

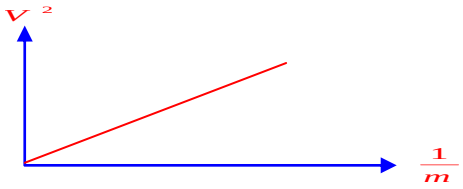
Write the mathematical relation for each of the following:

1- Newton's first law. 2- Centripetal acceleration. 3-Newton's second law

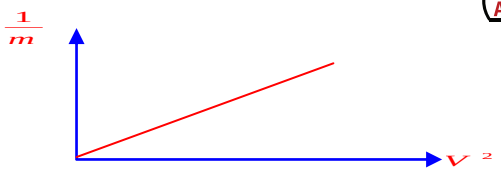
LAWS

acceleration	*displacement*	*Weight* $F_g = mg$	*centripetal force* $F_c = ma_c$
$a = \frac{v_t - v_0}{t}$	$x = v_0 t + \frac{1}{2}at^2$	Momentum $p_L = mv$	Orbital velocity $v_0 = \frac{2\pi r}{T}$
$a = \frac{v_t^2 - v_0^2}{2x}$	$x = \left(\frac{v_t + v_0}{2}\right)t$	centripetal acceleration $a_c = \frac{v_0^2}{r}$ $a_c = \frac{4\pi^2 r}{T^2}$	Time for complete cycle $T = \frac{2\pi r}{v_0}$ $T = \sqrt{\frac{4\pi^2 r}{a_c}}$
$a = \frac{F}{m}$	$x = \frac{v_t^2 - v_0^2}{2a}$	General gravitational Force $F = G\frac{m_1 m_2}{d^2}$	General gravitational constant $G = F\frac{d^2}{m_1 m_2}$ $= 6.67\times10^{-11} N.m^2/kg^2$
acceleration on inclined plane $a = g\sin\theta$	work done $W = Fd\cos\theta$	Acceleration due to gravity $g = G\frac{m_e}{r_e^2}$	Ratio between two gravity $\frac{g_1}{g_2} = \frac{m_1 r_2^2}{m_2 r_1^2} = \frac{\rho_1 r_1}{\rho_2 r_2}$

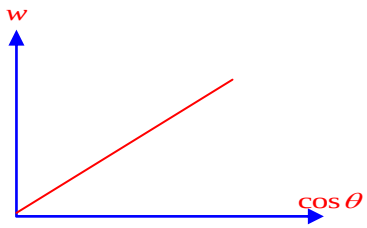
Graph



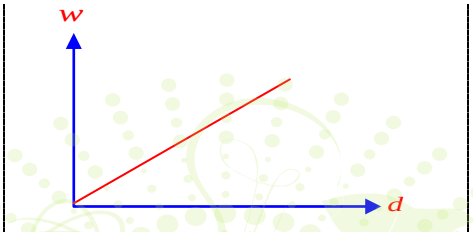
$$Slope = \frac{V^2}{\frac{1}{m}} = mV^2 = \mathbf{2k.e}$$



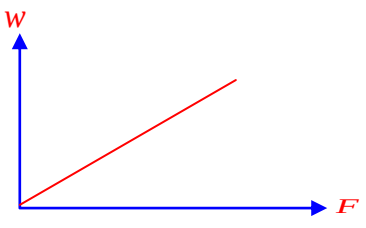
$$Slope = \frac{1}{mV^2} = \frac{1}{2.k\,e} = \frac{\mathbf{1}}{\mathbf{2}}\mathbf{k.e}$$



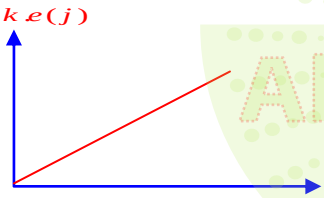
Slope = F d



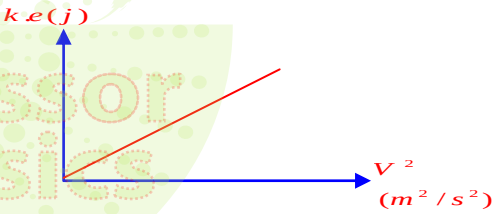
Slope = F



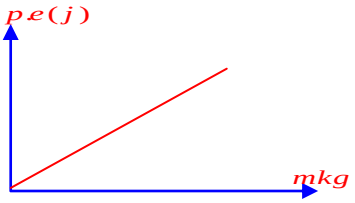
Slope = d



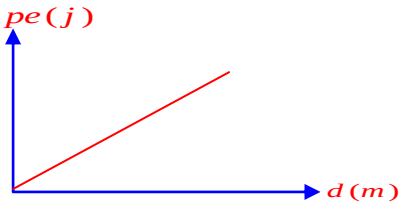
$$Slope = \frac{k\,e}{m} = \frac{\mathbf{1}}{\mathbf{2}}\mathbf{V^2}$$



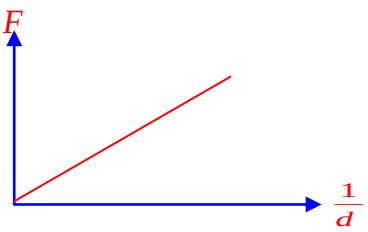
$$Slope = \frac{k\,e}{V^2} = \frac{\mathbf{1}}{\mathbf{2}}\mathbf{m}$$



$$Slope = \frac{p\,e}{m} = \mathbf{gd}$$

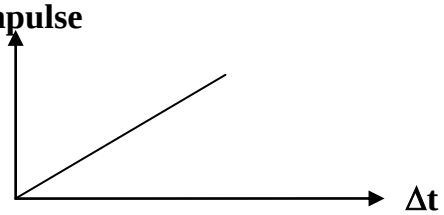


$$Slope = \frac{p\,e}{d} = mg = \mathbf{Fg}(N)$$

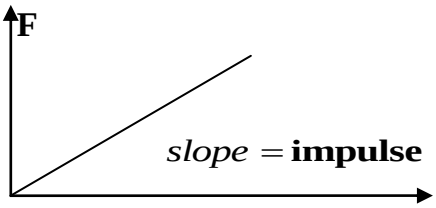


$$Slope = Fd = \mathbf{w}(j)$$

Impulse



$$slope = F = \frac{I_{inp}}{\Delta t}$$



$$\mathbf{k.e} = \frac{\mathbf{1}}{\mathbf{2}}\mathbf{mV^2}$$

$$\mathbf{V} = \sqrt{\frac{\mathbf{2k.e}}{\mathbf{m}}}$$

$$\mathbf{m} = \frac{\mathbf{2k.e}}{\mathbf{V^2}}$$

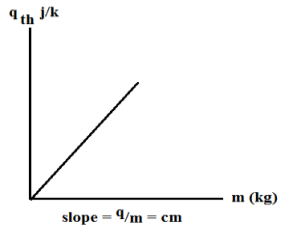
A force of 20N acted on the body if the relation between kinetic energy and the square velocity shown as in the table. (Fym. 2013)

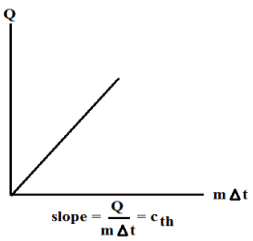
k.e	2	8	18	32	50	72
V^2	1	4	9	16	25	36

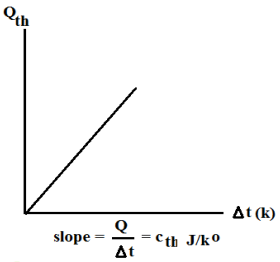
Draw: The graph between k.e on y-axis and V^2 on x-axis then find the acceleration of the body

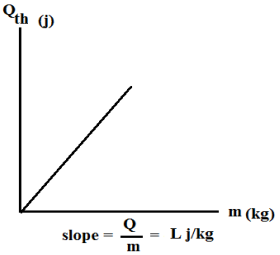
Graphs

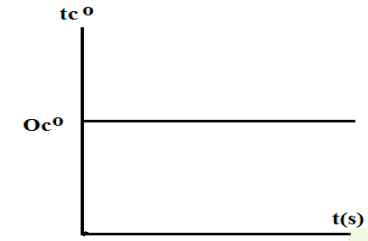
What does the slope of each graph represent? [write the mathematical relation]



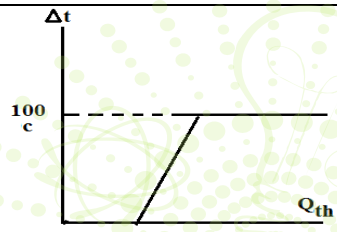




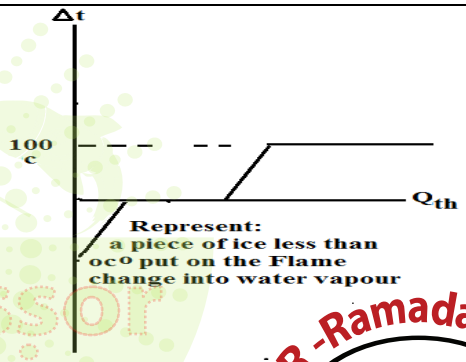




temperature of a piece of ice at oc° in melting process



Quantity of water on a flame until change in to vapor



LAWS

latent heat of vaporization $L_{th} = \frac{Q_{th}}{m}$	***Elastic collision*** $m_1V_1 + m_2V_2 = m_1V_1' + m_2V_2'$
latent heat of vaporization $B_{th} = \frac{Q_{th}}{m}$	**inelastic collision** (2 bodies move as one body after collision) $m_1V_1 + m_2V_2 = (m_1 + m_2)V_{12}$
heat capacity $q_{th} = \frac{Q_{th}}{\Delta t} = mC_{th}$	impulse $I_{impulse} = F\Delta t = m\Delta V = m(v_1 - v_2)$
Specific heat $C_{th} = \frac{q_{th}}{m} = \frac{Q_{th}}{m\Delta t}$	Quantity of heat $Q_{th} = mC_{th}\Delta t = q_{th}\Delta t$

[1] The following x able represents the relation between the heat capacity and different masses of the same material:

Mass (kg)	1	2	3	X	5
Heat capacity (j/k°)	400	800	1200	1600	200

- Draw a graph between heat capacity on "y" axis and masses on "x" axis then, from the graph find:
(1) The value of x (2) The specific heat capacity of the material.

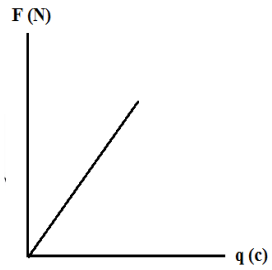
The table represents the relation between impulse and time

Impulse N.S	20	40	50	60
Time S	2	4	5	6

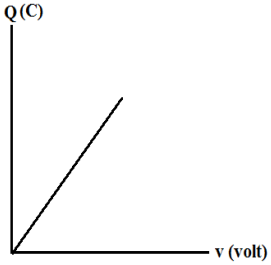
a) Plot a graph between impulse at y – axis and time at x – axis. Then from the graph find the value of the force.

b) The impulse at time 7 sec.

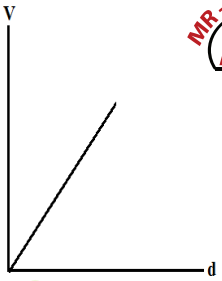
Write the name which represents the slope for every straight line:



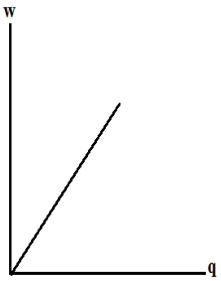
$$Slope = \frac{F}{q} = \varepsilon(N/c)$$



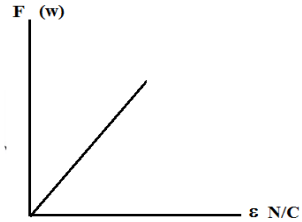
$$Slope = \frac{Q}{V} = C(F)^{c}/_{v}$$



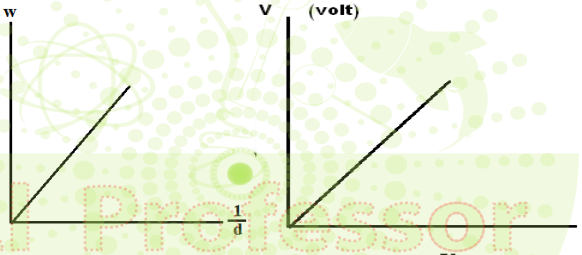
$$Slope = \frac{v}{d} = \varepsilon(v/m)$$



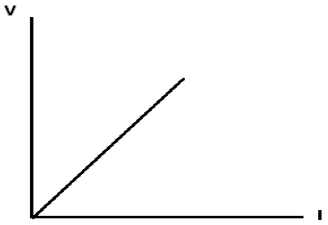
$$slope = \frac{w}{q} = v(j/c)$$



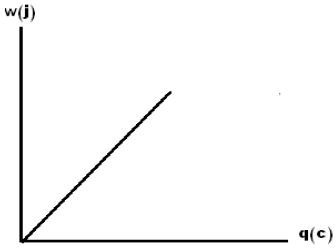
$$slope = \frac{F}{\varepsilon} \equiv q(c)$$



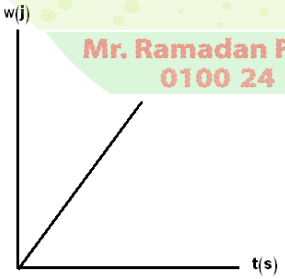
$$slope = \varepsilon d = V\ volt \qquad Slope = \frac{v}{R} = I(Amp)$$



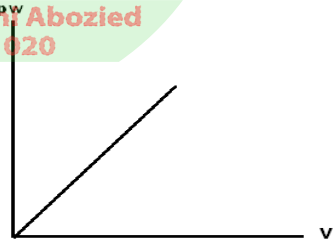
$$Slope = \frac{V}{I} = r(\Omega)$$



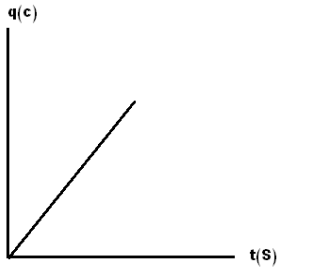
$$slop = \frac{w}{q} = v(Valt)$$



$$slop = \frac{w}{t} = p_w = VI$$



$$slope = \frac{p_w}{V} = I(Amp)$$



$$slop = \frac{q}{t} = I(Amp)$$

Electric field intensity (ε)	**Potential diff. (v)**	**Distance** $d = k\frac{q}{V}(m)$` $d = \sqrt{k\frac{q}{\varepsilon}}$	***Electric energy consumed = V I t =*** $= mC_{th}\Delta t$
$\varepsilon = \frac{F}{q} N/C$	$V = \frac{W}{q} j/c$	**Power** $p_w = \frac{w}{t} = \frac{VIt}{t} = VI = I^2R = \frac{V^2}{R}$	**Resistance** $R = \frac{V}{I} = \frac{P_w}{I^2} = \frac{V^2}{p_w}$
$\varepsilon = k\frac{q}{d^2} N/C$ $\varepsilon = \frac{V}{d}(J/c.m)$	$V = k\frac{q}{d}$ volt $V = \varepsilon d \longrightarrow$ volt	**Cost of operation** = Power (in kw) x time (hour) x cost of 1k.w.h $P_{Kwatt} = \frac{p_w watt}{1000}$	**Total resistance of series connection** $R_t = R1 + R2 + R3$ $V_t = I R_t$

[1] **From the following table:**

W(j)	*100*	*200*	*300*	*X*	*500*	*600*	*800*
V(v)	10	20	30	35	50	Y	80

(a) Draw the graphical relation between the electric work on y – axis and potential diff on x – axis

(b) From the graph find: [1] the value of x, y [2] what does the slope mean and calculate it value.

Pw (watt)	100	200	300	X	500	600	800
V(v)	10	20	30	35	50	60	70

Draw the graphical relation Pw on Y axis V on x-axis and Find [1] Value of x [2] The slope

/

1) write the name of quantity in each of the following relation

[1] $\frac{mV_0^2}{r}$

[2] $\sqrt{g \backslash ro}$

[3] $\sqrt{G\frac{me}{ro}}$

[4] m c Δt

[5] $\frac{Q_{th}}{m\Delta t}$

[6] $=K\frac{q_1q_2}{d_2}$

[7] $\frac{2\pi ro}{v_o}$

[8] $\frac{2\pi r_o}{T}$

[9] $r_e + h$

[10] $\frac{w}{q}$

[11] $=G\frac{m_1m_2}{d^2}$

[12] $G\frac{me}{r_o^2}$

[13] $=k\frac{q}{d^2}$

[14] $=V\,I\,t.$

[15] $=\frac{F}{q}$

2) What are the physical quantities which are measured by the following equivalent:

$N.m^2/kg^2$	Kg.m/s	J/kg
$m^3/kg.s^2$	Joule	j/k^o
$Kg.m^2/s^2$	N.S	j/kg k^o
farad	Volt x ampere	k .watt .hour
$\frac{coulomb}{valt}$	$\frac{columb}{sec}$	$\frac{volt}{amper}$
$\frac{joule}{columb}$	$\frac{joule}{sec}$	$\frac{joule}{meter}$

Quantity	Unit
Impulse	N.Sec or Kgm/s
Heat capacity	J/K^o
Specific heat	J/Kg k^o
Latent heat ***Lth or Bth***	J/Kg J.Kg-1
Current intensity	Ampere (A)
Potential diff	Volt (v)
Electric charge	Coulomb (c)
Electric resistance	Ohm ( )
Electric power	Watt or J/S or Volt.ampere
Electric energy consumed	k.watt.hour or J

Write the equivalent unit of the following:

[1] $\frac{coulomb}{volt}$ [2] volt .Ampere. **[3]** $\frac{joule}{columb}$ **[4]** $\frac{joule}{sec}$ **[5]** $\frac{volt}{amper}$ **[6]** $\frac{columb}{sec}$

Convert:

[1] 30 C^o into Fahrenheit
[2] 310 Kelvin into Celsius
[3] 68 Fahrenheit into Kelvin and Celsius

Complete:

[1] 50 F^o = ... C^6= ..... K^o
[2] 273 k^o= ..... ^oF
[3] 310 k^o= ..... F^o [Fym 2013]
[4] The heat capacity of a body of mass 100 gm. is ..... its specific heat capacity of its material

DEFINITIONS :

Law of conservation of linear momentum :

- Sum of linear momentum of 2 bodies before collision equals sum of linear momentum of the 2 bodies after collision .

Elastic collision :

- The collision in which there is no loss of energy

Inelastic collision :

- Collision in which there is a loss in kinetic energy

Impulse :

- The change in linear momentum
- The product of the force and time of its effect

Impulse of a body = 60 N.s :

- The product of the force and time of its effect = 60

Internal energy of the body :

- sum of kinetic and potential energies for body molecules .

temperature :

- the property by which we may determine whether this system is in equilibrium with the surrounding medium or not .

thermometers :

- instruments used to measure the temperature

Quantity of heat :

- heat energy gained or lost by a body

external heat :

- thermal energy that transfer from the surrounding medium to the material or vice versa

heat capacity :

- quantity of heat energy needed to raise the temperature of the body by 1oK .

heat capacity of A body 500 J/K° :

- quantity of heat energy needed to raise the temperature of the body by 1oK .= 500 J

Specific heat of a material :

- Quantity of heat needed to raise the temperature of 1 Kg of the material 1oK

Specific heat of lead 126 J/Kg0K :

- Quantity of heat needed to raise the temperature of 1 Kg of lead 1oK = 126 Joule .

Solidification (melting):

- change of substance from liquid state to solid state by cooling

Melting (fusion) :

- change of substance from solid state to liquid state by heating

Vaporization (evaporation) :

- change of substance from liquid state to gaseous state by heating

condensation :

- change of substance from gaseous state to liquid state by cooling

Latent heat of fusion :

- amount of heat energy needed to change 1 kg of substance from solid state to liquid state without changing its temperature

Latent heat of fusion of ice = 3.34 x 105 j/kg :

- amount of heat energy needed to change 1 kg of substance from solid state to liquid state without changing its temperature = 3.34 x 105 kg

Latent heat of Vaporization :

- amount of heat energy needed to change 1 kg of substance from liquid state to gaseous state without changing its temperature

Latent heat of Vaporization of water = 2.27 x106 j/ kg

- amount of heat energy needed to change 1 kg of water from liquid state to gaseous state without changing its temperature = 2.27 x106 j

electric conductor :

- the substance which contains free electrons that flow through it .

electric current :

- stream of charges that move in the circuit (conductor)

electric current intensity :

- quantity of electric charge Heat pass though a certain cross section of the conductor in one second

electric current intensity = 20 Ampere :

- quantity of electric charge heat pass though a certain cross section of the conductor in one second = 2- coulomb

ampere :

- the electric current intensity that flow in a circuit when a charge of 1 column passes through it in 1 sec.

Potential difference between 2 points :

- work done to transfer a charge of 1 coulomb from a point to another

Electromotive force :

- Total work done to transfer a unit charge through the whole circuit

Volt :

- Potential difference between 2 points when work of 1 joule is done to transfer a charge of 1 coulomb between them .

Resistance :

- Ratio between potential difference across a conductor and the current intensity flowing through it

Resistance of a conductor = 2 ohm :

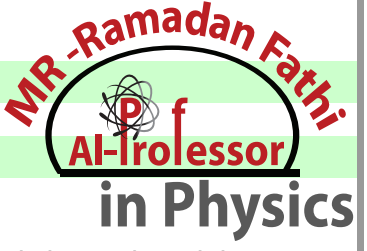
- Ratio between potential difference across a conductor and the current intensity flowing through it = 2

Ohm :

- Resistance of a conductor when electric current passing through it 1 ampere and the potential difference is 1 volt .

Electric power :

- Rate of doing work
- Or Electric energy consumed in 1 sec.



Electric power = 10 watt

- Electric energy consumed in 1 sec.= 10 joule

Watt :

- Power of electric set when the work done is 1 joule in 1 sec.
  Or
- The power of an electric set when the potential difference across its terminals is 1 volt and the current passing through it is 1 ampere

An electric lamp is signed (200 watt- 20 volt)

- The electric energy consumed in 1 sec. by this set is 200 joule when the potential difference across it = 20 volt .

Magnetic materials (substances) :

- Substance that attract things made of iron or nickel

Magnetic dipole :

- Every magnet consist of 2 pole north and south pole , there are no single poles in nature and also small magnet have 2 poles

Magnetic field :

- Zone (area) that surrounds the magnet in which its magnetic effect (force) appears .

Magnetic field lines (magnetic flux lines):

- Number of imaginary lines that are produced from the north pole to the south pole which help in studying the distribution of magnetic force .

Magnetic flux density :

- Number of magnetic flux line That p[ass normally (perpendicular) on a unit area around a certain point .

Permanent magnet :

- Magnet which keeps its magnetism patently (always)

Electromagnet :

- Circular coil wounded around a soft iron nail which transfer into a magnet when electric current passes through it .

Give reason for

1) Cesium play am important role in measuring time?.

2) Cesium atomic clock is preferable to b used to calibrate standard second?

- it's accuracy is one pert of 100 thousand millions of one second
- discrepancy between two cesium clock is one second every 5000 year

3) No measurement can be done with 100% accuracy?

- Bec always error due to 1- instrument error. 2- personal error. 3- environmental error.

4) We can't add force to kinetic energy.

- Ans. They haven't the same unit.

5) For a body moves with uniform velocity the acceleration equals zero?

- There is no change in velocity Vo = Vt $a = \frac{v_t - v_o}{t} = zero$

6) When a body fall freely from rest it's velocity increases

- the body moves in the same direction of gravity acceleration.

7) When body moves by an acceleration, its displacement time graph is not a straight line?

- The velocity of the body in not constant.

8) The velocity of the throwing body upwards decreases until reaches zero?

- The body moves against the gravity with deceleration.

9) A driver finds a difficulty in ascending a bridge of large inclination angle.

- The weight component (Fg sin θ) increases as the inclination increases.

10) When the angle of inclined plane is 90 the body falls freely.

$\theta = 90 \longrightarrow \cos\theta = 0 \quad \sin\theta = 1 \longrightarrow F_g \sin\theta = F_g \quad F_g \cos\theta = 0 \longrightarrow$ *Vanish* تتلاشى

11) A driver applies the brakes in going down a bridge.

- To decelerate the car to overcome to $F_g \sin\theta \longrightarrow great$

12) The gravitational force is clear between the celestial bodies .

- The masses very larg gravitational force is directly proportional to masses.

13) Doubling the distance between two masses decreases the mutual gravitational force between them into quarter its original value .

- The gravitational force is inversely proportional to (distance)2

14) The density of the earth (core) is more than the value of the average density of the earth's crust

- The earth's core contains materials of greater density.

15) The work done is scalar quantity. **(Fym. 2013)**

→ **Bec.** $w = \vec{F}.\vec{d}$ = vector. vector = scalar

16) Maximum work is done when the force is parallel to displacement and long its direction?

➔

17) There is no work done when a student carries the school bag.

➔

18) In uniform velocity the total work = ZERO ?

➔

19) The centripetal force acting on body in circular path does not do any work.

➔

20) Work done by a body inside a moving car = zero?

→The force of body weight acts perpendicular to the displacement direction. $w = Fd\cos 90 \longrightarrow w = zero$

21) A person holds an object and moves horizontally does not do work?

➔

22) As a bullet is shot from a gun, the gun recoils.

- Bec of the impulse according to Newton's 3rd law

23) 2. If an object falls on someone's head, he is harmed. But if the object bounces off the person's head, the harm is even greater.

- Bec the impulse in this case is doubled

24) The linear momentum is a vector quantity.

- →Bec it is scalar product of (mass X velocity) Scalar. q X Vector. q = Vector. q

25) It is necessary to use the seat belt while driving.

- →To make the linear momentum of the driver zero at the instant of collision

26) When moving body collides with another at rest then. They are moving as one body this collision is in elastic.

→

27) The final appearance of the rocket resembles a cigar.

- To minimize the air resistance on every part as possible.

28) You can a big man with one finger inside a space ship.

- Due to the absence of gravity.

29) The satellites continue rotation around the earth although it is affected by the earth's gravity.

- →B.C it must be in equilibrium under the effect of fg=fc.

30) Tennis player must apply a follow through after he hits the ball ?

- To elongate the time period in which the ball is in contact with racket to increase the impulse

31) When an egg fall on a pillow from a height it doesn't break ?

- Because the time of contact between the egg and pillow increases So force of impulse decreases .

32) Recoiling of gun when the bullet is shot ?

- Bec. Man feel with the impulse in his hand mbvb = - mgvg

33) Inside the space ship on flight it is not necessary to wear a space suit.

- →B.C everything is normal [oxygen-pressure] but there is no gravity

34) In a space ship ،astronauts can jump up high and stay hanging

- →Due to the weightlessness of astronauts

35) Orbital velocity of a satellite doesn't depend on its mass.

- → Bec it depend only on radius of orbit

36) We don't feel the Earth movement?

- → Due to earth's gravity so we and earth move as one body.

37) The first stage of the rocket has more engines?

- → To give the rocket the impulse needed to escape frame earth's gravity.

38) A space suit must be worn outside the space ship?

→

39) In the multi stage rocket the second stage provided with 5 engines while the third stage provided with one engine?

- → Bec to provides the rocket with the velocity needed to escape from atmosphere while 3th only for direct the ship.

40) apparent weight of a body inside an elevator = zero when the elevator falls freely?

- → a=g then the elevator has no weight (weightlessness).

41) Heater is placed on the floor ground?

- →Bec hot air move up while cool air move down (more density) so room warms.

42) Formation of sun spots on sun surface ?

- → due to convection current

43) Mercury is used as thermometric material while water is not water is not used

- → Bec mercury column can be seen and resist high temperature and has regular expansion.

44) Joints are lefts in the design of bridges and railway tracks :

- To protect them from bending

45) Electric wires are not perfectly pulled :

- To protect them from cutting when contract in winter

46) The temperature of the body is considered as measure of internal energy :

- Bec. When the body gains a quantity of heat energy its internal energy increases ,

47) When a body loses a quantity of heat its temperature decreases.

- Amplitude of vibration of it's molecules decrease- K.E & internal energy decrease, So. The temp decrease.

48) Existence of four fixed vanes in joule's experiment.

- → Bec. To avoid water rotation. to change the work done to internal energy so increase the water temp.

49) temperature of ice doesn't change during melting process although it is supplied by heat energy until ice is completely melting?

- ➔ Bec. The heat energy is consumed in to break the bond among molecules

50) The specific heat capacity is considered as a physical property of substance?

- ➔ While specific heat doesn't depend on mass

51) Cooking pans are made of copper or Aluminum ?

- bec . Copper or Aluminum have low heat capacity

52) Specific heat depends on mass number ?

- Because it decreases by increasing mass number

53) Equal volumes of different materials a quire different heat quantities to achieve same temperature

- bec . they have different heat capacity

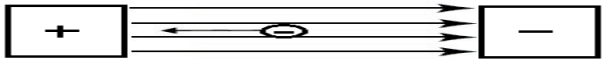
54) [4] The body of living creatures contain a large amount of water?

- Bec.. The largest specific heat capacity so can resist the rapid change in temperature.

55) The electrostatic force between two equal and opposite charges decrease to quarter its value when the distance between them is doubled.

$$F_e = K\frac{q_1 q_2}{d_2}$$ so When d increase to double F decreases to quarter

56) Negative charge no ove in opposite direction to electric field?

Bec  The electric field is directed from positive to negative so negative charge attract to positive [move opposite to electric field]

3) Metals are good conductors?

- Bec: It have free electrons

57) The presence of static potential diff across two plats of capacitor.

- Bec: Each of them plats is charged with different charge.

58) If capacitor is charged by D.C potential no current flows in the final stat.

- Bec: the charged process is done and the resistance become great.

59) Generating heat due to the passage of an electric current has desired result and undesired results.

Undesired	Desired
➢ Loss energy damage wire	➢ Heat use in same electric sets

60) It is necessary to know the electric power of electric appliances before use.

- To avoid using them in same time and increase above normal limit to avoid damage of electric sets

61) It's working to repair the fuse by using hick wire.

- It has small resistance it become difficult to cut and damage the circuit

62) It is preferred to use thin wire in fuse:

- Bec: The thin wire melts due to its high resistance and protect home from fire when current increase

63) Coils of heaters are made of nickel chrome :

- Bec. It has high resistance

64) Magnetism is highly related to electricity

- Bec. When electric current passes through a conductor a magnetic field is produced

65) A single magnetic pole can't be found

- Because every magnet has 2 poles (N & S) however its size is small

WHEN DOES EACH OF THE FOLLOWING HAPPEN?

[1] apparent weight of a body equal zero. *[2] Weightlessness.*

WHEN DO THE FOLLOWING VALUES EQUAL TO ZERO?

[1]- Weight of body inside lift (elevator). *[3]- electrical difference between two points.*
[2]-The work done to move an object? (Fym. 2013)

MENTION WHEN THE FOLLOWINGS ARE EQUAL: Fym 2013

1) Distance covered by a body and displacement.
2) Heat capacity and specific heat.

1) Science of physics:

- is the science that seeks the explanation of all physical and universal phenomena and setup the mathematical laws that explain these phenomena

2) Standard units: (Fym. 2013)

- standard references for units of measuring the physical quantities have a precision and stability

3) A body move with a uniform acceleration

4) Velocity of a car is go m/s (Fym 2013)

5) The acceleration of a moving train equals (-4m/s2)

6) The free fall acceleration for a falling body = 9.8 m/s2

- It means that the increase in velocity of the body per second due to gravity equals 9.8m/s

7) A body moves with uniform velocity.

- It means that the body covers equal displacement in equal intervals of time.

8) The distance covered by a body is 100m?

- The sum of actual path covered by this body is 100m.

9) The displacement of a body is 50m?

- The direct shortest distance covered by body from starting point to ending point is 50m.

10) An object moves in a straight line although its acceleration is zero?

- The object moves with constant velocity.

11) The linear momentum of a body = 10kg m/sec.

- The product pf the body mass time its velocity equals 10kg.m/s.

12) The inertial mass of the body equals 80kg.

- The ratio between the velocity of mass 1kg and the velocity of the body when affected by game force = 80.

13) The force acting on the body equals 60N..

- Rate of change of linear momentum of the body equal 40kgm/s.

14) The gravitational mass of a body equals 20kg.

- Ratio between acceleration of body of mass 1kg to the acceleration of the body are affected by some force =20.

15) The rate of change in linear momentum equals 25kg m/s2.

- The force = 25N..

16) The weight of a body equals 30N.

- The force of earth's gravity acting on the body equal = 30N.

17) The centripetal force of a body equals 200N.

- The force that acts on this body that moves in circular motion towards the center to change it's direction = 200 N .

18) The linear momentum of a body = 0

- The body at rest m.V=0 V= 0.

19) The centripetal acceleration = 25m/s2

- The quotient of square orbital velocity over the radius of circular path = 25

$$a_c = \frac{V_0^2}{r}$$

20) The mechanical energy of a body = 250 Joule

- Sum of both (p.e + k.e) of moving body equal 250j.

21) The work done equals 300J.

- It means that farce 300N acts on am body displacement 1m.

22) The work done by a force of 4 N is 20 J.

- It means that the body will be displaced 5m.

23) The K.E of an object = 7J.

- The energy gained by the body due to movement =100joule.

24) The P.E of an object =5 J

- The energy stored inside the body due to position from the earth's surface =6joule.

25) Two bodies are in thermal equilibrium. [Fym 2013]

26) The latent heat of fusion of ice equal 3.34 x 10 J/Kg

- It's mean that amount of heat needed to change 1kg of ice at $0c^o$ into water.

27) The latent heat of vaporization of water equal 2.27 x 10 J/kg.
- Amount of heat to charge 1 kg of water to vapor without changing temperature .

28) The specific heat capacity of water equals 4200 J/kg.oK
- Quantity of heat required to raise the temp of 1kg of water by one Kelvin = 4200 J

29) The heat capacity of a body = 500 J/0k
- Quantity of heat required to raise whole body by one degree is 500 J.

30) The gravitational field intensity at a point = 10 N /kg
- Gravitational force acting on a body of mass = 1kg

31) The gravitational potential difference between two points = 10 J kg
- Work done to transfer the unit of mass = 10 j

32) The electric potential at a point 3 V.
- Work done to transfer the unite of charge = 3j

33) The electric capacity of a conductor = 3 x 10-8 farad
- The ratio of charge and potential difference across its palates is 310.

34) The potential difference between two points is 4 volt.
- Work done to transfer a unit change between th equals 4J.

35) The electric current intensity is 5 ampere.
- Electric charges flow through certain section = 5 c/1s

36) Electric device does a work of 20 J in 0.5 sec.
- Power = 40 watt

37) The power of an electric lamp is 6 watt.
- Does work 6 J in one sec.

38) The electromotive force of an electric device is 8 volt.
- Total work done to transfer a unit charge through circle is 8 j

1) The instrument that depending on using pointer. (.....)
2) it is the science seeks the interpretation and cosmologic phenomena and understanding of how things work (.....)
3) An abbreviated form for physical description that is too long to be done by words.(.....)
4) Instrument use pointer to measure a physical quantity. (.....)
5) The simplest form to express the relation between the physical quantities **(mathematical equation)**
6) They are just a short hand for concepts **(mathematical equation)**
7) Cylinder of iridium and platinum has fixed dimension kept at $0c^{o}$ Fym. 2013- **(standard kilogram)**
8) Standard references of measurable quantities that are kept in special labs **(standard units)**
9) Labs wed to keep the standard units **(calibration labs)**
10) Are the laws used to describe any universal phenomena **(physical laws)**
11) The slope of the straight line relating (Vt2,x) for a body moving with uniform acceleration and starts motion from rest. (.....)
12) Rate of change in displacement covered by a moving object. (.....)
13) The rate of change of velocity when a body moves vertically due to the force of earth's gravity. **(free fall acceleration)**
14) The body which doesn't change it's position as the time passes. (.....)
15) The motion in which the body repatents it's motion every a definite period.(.....)
16) The product of mass and velocity. . (.....)
17) A type of motion where the Particle repeats its motion with an equal interval of time and has no starting or ending point. (.....)
18) Rate of change of momentum. (.....)
19) For every action there is an equal and opposite reaction. (.....)
20) Tendency of the body to keep its state of rest or motion in straight line with uniform velocity.
21) Rate of change of direction of velocity. (.....)
22) The reaction force for centripetal force. (.....)
23) It is the mass of 1m3 of earth. (.....)
24) The ratio of the mass to the volume of earth. (.....)

25) The path of a projectile thrown vertically upward with inclination angle (.....)
26) The mutual attractive force between two bodies of mass 1 kg and the distance between them is 1 meter. (.....)
27) The ratio between the mass and the volume of earth. (.....)
28) The gravitational force between two bodies is directly proportional to the product of two masses and inversely proportional to the square of the distance between their centers (.....)
29) The work done by a force of one Newton in moving a body through a distance one meter in the direction of the body. (.....)
30) Scalar product of force and displacement in the direction of force. (.....)
31) The sum of p.e and k.e. (.....)
32) Energy is neither destroyed nor created but change from one form to another. (.....)
33) The energy gained by a body due to its position. (.....)
34) The ratio of the kinetic energy of the body to its square velocity. (.....)
35) It is the ability or capacity to do work. (.....)
36) Change in momentum of a moving body. (.....)
37) The product of the force and time. (.....)
38) The property, which indicates wither the body is in thermal equilibrium with the surrounding medium or not. **Temperature**
39) The sum of the K.E and P.E of the molecules of the body. **Internal energy of the body**
40) The movement of not air upward and the cold air down ward. **Convection current**
41) The measuring unit of temp. in the international system unit. **Kelvin (ko)**
42) A type of thermometer in which the pressure of gas changes regularly with change in temperature. **Gas thermometer**
43) Current in which hot air goes up and cool air goes down. (.....)
44) It is a process of changing the substance from solid state to liquid state. (.....)
45) The quantity of heat required to raise the temp of whole the body by $1k^{o}$. **[Heat capacity]**
46) The quantity of heart energy needed to change 1 kg of the substance from solid state into liquid state without changing in its temp. **[Latent Heat of Fusion]**
47) The sum of the kinetic and the potential energy of the molecules of a body **[Internal energy]**
48) The quantity of heat required to raise the temp. of 1kg of the matter by 1 ko **[specific heat]**
49) Energy transferred from one body to another according to the difference in temp **[Quantity of heat]**
50) The quantity of heat energy needed to change 1 kg of the substance from liquid state into gaseous state without changing in its temp **. [Latent heat of vaporization]**
51) An insulated beaker from the surrounding medium to prevent heat transfer from it or to **[Calorimeter]**
52) work done to transfer unit mass between two points in the gravitational field. (.....)
53) A device used to store the electric charge. (.....)
54) Surfaces at which all points have the same electric potential. (.....)
55) The work done in moving a unit charge between two points . (.....)
56) Work needed to transfer a charge of one coulomb between two points. (.....)
57) The work done to transfer a unit charge between two points. (.....)
58) The product of electric power and time. (.....)
59) The rate of electric work done. (.....)
60) The relation between the voltage diff and the current intensity. (.....)
61) It is the electric current intensity flowing through a circuit if the rate of flow of charge is 1 c/sec.
62) The potential diff between two point when a work of 1 Joule is done to move unite of charge between them (.....)

What happens if

1) An object fall freely: (accelerated downward)
- the velocity increases with 9.8 m/s in sec.

2) When does it happen? (Fym. 2013) the distance = the displacement
- when the body move in straight line.

3) When do the following physical quantities equal zero.
The change in displacement of the body when the time passing.
- When the body at rest.
- or when the body returns back to it's starting point.

4) A body of mass 5kg when it is transferred from Earth to moon.

5) Presence of rock and melted metals in the core of the earth?

6) The mass of the moving body is doubled and its velocity is also doubled?

7) The height of a body from the ground increases and the mass increase.

8) Potential energy of body = 100j

9) The force doing work acts with an angle (0) with the displacement direction.

10) We increase velocity to its double value. What happen to k.e

11) The force doing work acts perpendicular to the direction of motion

12) The body is projected upward against [gravity

13)The direction of rotation of the satellite is the opposite direction of rotation of the earth.
- Don't stile down in fixed position from the earth.

14) . An elevator cable breaks.
- a=g then the elevator has no weight (weightlessness).

15) . An astronaut pushes a body forward inside a space ship.
- According to neuton's 3rd low with pushes back with same force

16) There satellites are spaced at 120o a part.
- Full coverage of earth.

17) A body gains a quantity of heat.
- Amplitude of vibration increase → K.e and internal energy increase→ temperature increase

18) A body loses a quantity of heat.
- Amplitude decrease → k.e. internal energy decrease → temperature decrease.

19) Two bodies of different temp become in contact with each other.
- The heat transfer frame higher to low in temperature.

20) **There are two objects in contact and there is no change of heat between them?**

21) Two bodies of different temperatures contact together.

22) The quantity of heat gained by a body is doubled. [related to its specific heat]

23) The power of electric appliances exceeds the safety limit when used at the same time?
- → The wire of fuse is cut and electric current cuts off

24) electric [direct current] flows through a circular or spiral coil wounded a round a soft iron core?
- → Converted into magnet

25) The periodic time of a satellite in its orbit is equal 24 hour
- it remains at constant height from the surface of the earth

WRITE THE MATHEMATICAL RELATION FOR EACH OF THE FOLLOWING:

1- Newton's 1st law .....
2- Newton's 2nd law.....
3- Newton's 3rd law .....
4- centripetal force ....
5- centripetal acceleration . .....
6- The change in linear momentum .....
7- The rate of change in momentum .....
8- The radius of the earth by El Bironi method.
9- Mechanical energy of body. .....
10- impulse .....
11- Law of conservation of momentum in elastic collision. .....
12- Escape velocity from earth's gravity .....
13- Gas thermometer of constant volume. .....
14- The general law for thermometers. .....
15- Platinum Thermometer law. .....
16- Quantity of heat. .....
17- Capacitance of a capacitor. .....
18- The electric potential .....
19- The a mount of electric charge on any plate of the capacitor. .....
20- Electrical capacity of parallel plat's condenser. .....
21- Coulomb's law .....
22- Electric energy consumed = quantity of heat produced .....

Write short account on:

[1] Geostationary satellites:

[2] Desirable and undesirable effects of heat produced from an electric coil.

V-What are the factors affecting:

1- *The kinetic energy.*
2- *The potential energy.*
3- *Doing work.*
4- *The escape velocity* $V_{esc} = \sqrt{2gre}$ **1) gravity 2) radius of the earth**
5- *The orbital velocity* $V_o = \sqrt{gro}$ **radius of the earth.**
6- *The stability of the satellite in its orbit.* **1- must be in equatorial plane. 2-Rotate in the same direction of earth's rotation 3- Periodic time of it and earth = 24 hours**
7- *The quantity of heat*
8- *The electrostatic force between two charges* **Value charges and (distance)2 between them** $Fe = k\frac{q}{d^2}$
9- *The electric capacity of conductor consists of two metal plates between an insulator material.* $C = \frac{q}{v}$ **charge of one plate and p.d**
10- The electrical potential at a point V=εd **Electric field intensity , distance.**
11- **power**
12- **consumed electric energy**

Mention the scientific basic on which the following depends

1- Drying machine.
2- multi – stage rocket (Fym 2013)
3- . Platinum thermometer.
4- Candy floss.
5- pathological labs.
6- measuring mass of earth
7- Jet chair.
8-electric bell
9- Rotating barrel in park

What is the function of each the following:

1) **The seat belt in car.**
2) **Rheostat in electric circuit** *Fym (2013)*
3) **The light gates in the two rides experiment .**
4 - **The ammeter**
5 - **Voltmeter in an electric circuit.**
6- **electromagnet**
7) **Space shuttle.**
   - it can embark on a journey to outer space and came back to the earth and do that repeatedly
8) **multi – stage rocket** placing a satellite in its orbit around the earth ,
   - or to free the space ship from the earth's gravity to carry out its journey in space.
9) **Obstacles (barriers) which are used in Joule's apparatus**
   - prevent circulation of water
10) **calorimeter** It is used in experiments which determine heat capacity and specific heat

Correct the under lined word:

[1] When the temperature in Celsius scale increases by one degree.. The temperature in Fahrenheit increases by **one degree**.

[2] The specific heat capacity of copper is 400 **joule**

[3] One kilowatt hour = **1000w**

[4] **Newton** = kg.m2/s2

[5] At the mid height of projection vertically upwards, the potential energy of a body equals its **mechanical energy**

Put (✓) (x)

[2] When the temperature decreases in Celsius scale by one degree the temperature in kelvin skill decreases by one degree. ( )

Put <or> or =

1). Internal energy for body at 72C^o (>) internal energy for the same body at 39F^o.
2). Thermal equilibrium for two system A and B then the temp. Of system A (=) temp system B.
3). Internal energy for a body at 50oC (=) internal energy for the same body at 323 oK.
4) the acceleration of the moving body is applied to Newton's first law ..... The acceleration of a moving body applied to Newton's 2nd law.
5) When two bodies are affected by the same force and the mass of first equals three times of second the acceleration of first .....The acceleration of second.
6) The mass of the body at Earth's surface is .....it mass in the moon's surface
7) The weight of a ball on the earth's surfaces is .....its weight on the moon's surface.

Elevator

Apparent weight

$F_T = F_g = mg$ ➔ **IF** ***a =o Constant velocity Rest***

$F_T = m(g+a)$ ➔ **IF** ***move upward by acceleration a***

$F_T = m(g-a)$ ➔ **IF** ***move down ward by acceleration a***

temperature is the measure of internal energy

So that When the body acquires a quantity of heat

k.e. increases → Internal energy increase → Temperature increases → becom e hot

So that When the body loses quantity of heat

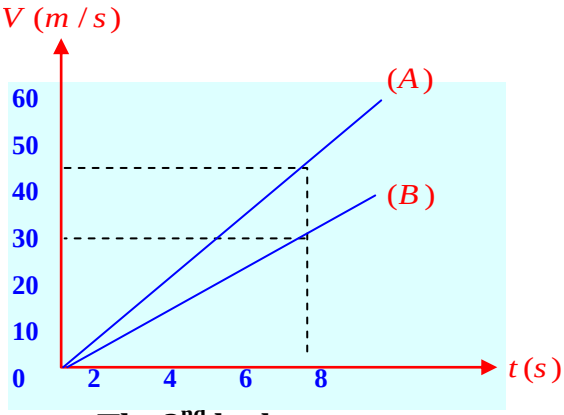
k.e. decreases → Internal energy decreases → Temperature decreases → becom e cold

If the total power increases than normal limit :

The fuse wire melts
The electric current is Cut off

Problems

1) The opposite graph represents the relation (V-t) for two bodies (A) and (B) start from rest **find:**
1. The distance covered by the two bodies after 6 sec.
2. Time taken for (B) to cover the same displacement of (A) after 6 sec.



solution

The 1st body

1)

$$x = \left(\frac{V_0 + V_t}{2}\right)t = \left(\frac{0+45}{2}\right)6 = 135m$$

The 2nd body

$$x = \left(\frac{V_0 + V_t}{2}\right)t = \left(\frac{0+30}{2}\right)6 = 90m$$

2) given

$$x = V_0 t + \frac{1}{2}at^2 \qquad t = \sqrt{\frac{2x}{a}}$$

$$t = \sqrt{\frac{2\times 135}{5}} = 7.35sec$$

2) A car is moving at speed of 40 m/sec when the brakes are applied the time taken by the car until stop is 10 sec. calculate:

1- The deceleration of the moving car.
2- The distance covered by the moving car from the instance
3- at which the brakes are applied until its velocity becomes 20m/sec.

solution

Given:

$V_0 = 40m/s$
$a = ?$
$t = 10sec$
$V_t = zero$
$x = ?$
$V_t = 20m/s$

$$V_t = V_0 + at$$
$$0 = 40 + 10a$$
$$10a = -40$$
$$a = -4m/s$$

$$V_t^2 - V_0^2 = 2ax$$
$$x = \frac{V_t^2 - V_0^2}{2a} = \frac{(20)^2 - (40)^2}{2\times -4}$$
$$x = \frac{-1200}{-8} = 150m$$

3) A saving over plane flays at height 490m from the earth's surface it drops freely a food box calculate

solution

1- velocity when box covered 40m

$$V_t = \sqrt{29x}$$
$$V = \sqrt{2\times 9.8}\times 40 = 28m/s$$

2- distance after 7 sec

$$x = \frac{1}{2}gt^2 = \frac{1}{2}\times 9.8\times 7^2$$
$$x = 240.1m$$

3- time to reach the ground.

$$t = \sqrt{\frac{2x}{g}} = \sqrt{\frac{2\times 490}{9.8}} = 10sec$$

4) A body moves according to the relation $t = \frac{1}{2}V_t - 6$ **find 1- initial velocity 2- acceleration**

solution

$$t = \frac{1}{2}V_t - 6 \quad multiply \times(2) \quad \therefore 2t = V_t - 12$$
$$\therefore V_t = 12 + 2t \quad simulat \quad V_t = V_0 + at$$
$$\therefore V_0 = 12m/s \quad and \quad a = 2m/s^2$$

3- the covered distance after 10sec

$$X = V_0 t + \frac{1}{2}at^2 \longrightarrow x = 12\times 10 + \frac{1}{2}(2)^2(10)^2 = 320m$$

5) A mass of 0.2kg moves in circular path of radius 200cm take 4 sec. to make one complete cycle **calculate**: the centripetal force and mention its direction.

➢ .....

.....

.....

.....

6) A trolley of mass 10 k.g is pulled a long a frictionless surface with a velocity 20 m/s. If a force of 5 N acts on it in time interval 20 sec. **Calculate** : its velocity.

.....

.....

.....

7) A body of mass 2kg moves in circular path of radius 4m and am centripetal acceleration 16 m/sec2 **Calculate**:

1- speed of moving body. 2- Centripetal force.
3-Time which taken by body to revolution.

➢ .....

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8) **calculate**: the ratio between the acceleration due to gravity on the moon's surface and that of the earth's surface knowing that :

$m_e = 6\times10^{24}\,kg$ $\quad r_e = 6.4\times10^{6}\,m$

$m_m = 7.4\times10^{22}\,kg$ $\quad r_m = 1.74\times10^{6}\,m$

$$\frac{g_m}{g_e} = \frac{M_m}{M_e}\times\frac{r_e^2}{r_m^2} = \frac{7.4\times10^{22}\times(6.4\times10^{6})^2}{6\times10^{24}\times(1.74\times10^{6})^2}$$

$$= 0.16685 = \frac{1}{6}$$

9) A newly discovered planet has twice the density of the earth but the acceleration due to gravity on its surface is exactly the same as on the surface of the earth **what is its radius?** Given the radius of the earth is 6.38 × 10^6m .

$$\frac{g_e}{g_p} = \frac{r_e\rho_e}{r_p\rho_p} \Rightarrow \frac{1}{1} = \frac{r_e\rho_e}{r_p\,2\rho_e} \xrightarrow{=} r_p = \frac{r_e}{2} = \frac{6.38\times10^{6}}{2}$$

$$r_p = 3.19\times10^{6}\,m = \mathbf{3190km}$$

10) A helicopter plane flies at a height of 3900m from the earth's surface when the pilot recorded the angle of sun rays inclination at sun which was 2° **calculate the radius of earth .**

➢ $r_e = \dfrac{h\cos\alpha}{1-\cos\alpha} = \dfrac{3900\cos2^0}{1-\cos2^0} = 6.398\times10^{6}\,m$

11) Two balls the mass of the first is 30 kg while the second is 20 kg . the distance between their centers 0.5 m. Find the gravitational force between them (G = 6.67 × 10-10 N.m2 / kg2).

➢ $F_g = G\dfrac{m_1m_2}{d^2} = 6.67\times10^{-11}\times\dfrac{20\times30}{(0.5)^2} = 16\times10^{-8}\,N$

12) A body of mass 15 kg moves on an inclined smooth plane with angle 20° **calculate .**

a) The value of force affecting the studying of the body down wards .

b) The value of the reaction of the surface on the body .

➢ **A)** $\mathbf{F_g\sin\theta} = 15\times9.8\sin(20) = \mathbf{50.3N}$

➢ **B)** $\mathbf{F_g\cos\theta} = 15\times9.8\cos(20) = \mathbf{138.1N}$

13) A body of mass 10kg falls freely through a height of 20m if the acceleration due to gravity is 10m/s2. **Find:**

1- p.e of the body before it falls.
2- The kinetic energy of the body just before it touches the ground.
3- The velocity of the body just before it touches the ground.

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14) A mass of one kg at rest falls freely from a height 5m using the law of conservation of energy. **What is the velocity at which it arrives the ground** $\left[g = 10 m/s^2\right]$.

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solution

	Mass	Velocity	K.E
A	4kg	.....	50J
B	.....kg	15km/hour	1J
C	50kg	10m/s	.....

$V = \sqrt{\frac{2k.e}{m}}$

$m = \frac{2k.e}{V^2}$

$k.e = \frac{1}{2}mV^2$

15) A body is projected up ward with a velocity 10 m / s . If its P.E at the maximum height is 10 J . **Calculate its mass** knowing that g = 10 m / s2.

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solution

16) A car of mass 1000 kg moves with a velocity 2 m/s, then the brakes are applied. to stop the car after 2 sec **calculate .** a) The force of brakes. b) The work done by brakes.

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solution

17) A smooth ball of mass 4kg moving horizontally with velocity 6m/s colloids with another one of mass 10 kg moving with velocity 2.5 m/s in the direction of the first ball. After collision they move together as one body, **find their velocity after collision.**

$m_1v_1 + m_2v_2 = V_{1,2}(m_1 + m_2)$ $V_{1,2} = \frac{m_1v_1 + m_2v_2}{m_1 + m_2} = \frac{24 + 25}{14}$ $V_{1,2}$=3.5 m/s

solution

18) a body of mass 10 kg moving with a velocity of 5 m/s collides with another body of mass. 16 kg. moving in the opposite direction with velocity 3 m/s after collision the first body moved in after collision the first body moved in opposite direction with velocity 4 m/s.

Find velocity of the second body after use

solution

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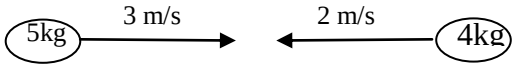
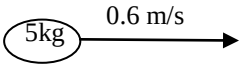
19) The following figure represents process of collision. **Find the velocity of the mass 4kg after collision.**



Before collision



4kg

After collision

solution

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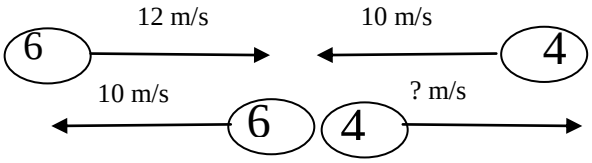
20) **An object of 6kg moving to right at velocity 12 m/s colloids with another one of mass 4 kg moving to left at velocity 10 m/s after collision the first body moves to left at velocity 10 m/s. Calculate the magnitude and direction of the velocity of the second object after collision.**

$m_1v_1 + m_2v_2 = m_1v_1^1 + m_2v_2^1$



solution

$6x12 + 4x(-10) = 6x(-10) + 4v_2^1$

$72 - 40 = 4v_2^1 - 60 \qquad 32 + 60 = 4v_2^1 \Rightarrow \qquad \mathbf{v_2^1 = 23\,m/s \longrightarrow to\ right}$

21) **A ball of mass 150 gm moving horizontally with velocity 11.2 m/s collides with a racket. The ball recoils with velocity 7 m/s find** a) The change of K.E of the ball due to the collision
b) The impulse of the rocket on the ball.

$\Delta k.e = \frac{1}{2}m_1v_1^2 - \frac{1}{2}m_2v_2^2$

$= \frac{1}{2}(0.15)(11.2)^2 - \frac{1}{2}(0.15)(-7)^2 = 9.4 - 3.67 = \mathbf{5.73J}$

solution

22) **Calculate the impulse of billiards bass when it is affected of 30 N during 0.01 sec.**

$\mathbf{I_{imp} = F.\Delta t} = 30x\,0.01 = \mathbf{0.3\ N.S}$

solution

23) **A satellite revolves in a circular orbit a height 800 Kg from Earth's surface. Calculate its orbital velocity if the mass of the Earth 6x 10^{24} Kg and G = 6.67 x 10^{-11} N.m^2/kg^2 radius of earth = 6400 kg.**

$V_o = \sqrt{6.67x\,1o^{-11}\frac{6x\,10^{24}}{7200x\,10^3}} = \mathbf{7.455x10^3\,m/s}$

solution

24) **If the gaseous products from the end of the space rocket with rate of 2.5 x 10^4 Kg/s, with thrust force 8x10^7 N. Calculate the escape velocity of the rocket.**

$\mathbf{F = V\frac{\Delta m}{\Delta t}} \qquad V = F\ \Delta t/\Delta m \qquad V = 8x10^7/2.5x10^4\,m/s$

solution

25) **If the orbital velocity of a satellite is 8km/sec. Calculate the radius of the orbit in which the satellite rotates knowing that (g=8.6 /s2).**

$\mathbf{g = v_0^2/r_o} \qquad r_o = v_0^2/g = 7.44\ km$

solution

26) **A mass of 5kg is hanged in a spiral balance placed inside an elevator. Find the apparent weight of that mass when moving of the elevator: (g= 10m/s^2)**

a) Upwards with a uniform velocity 4 m/s2 $\mathbf{F_T = m(g)}$ =5(10) =50 N
b) Down wards with acceleration 4 m/s^2 $\mathbf{F_T = m\ (g-a)}$ = 5 (10-4) = 30N
C)Upward with acceleration 5m/s2. $\mathbf{F_T = m\ (g+a)}$ = 5 (10+5) = 75 N

solution

27) **A satellite of mass 300 kg orbits the earth at a height 600 km from its surface if the mass of earth 6x1024kg and radius of earth 6400 km. [G=6.67x10-11 N.m2/kg2] find :**

(1) Gravitational force (2) Orbital velocity

solution

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28) If the gas pressure inside a constant volume gas thermometer was 60 cm. Hg when it is placed in crushed ice and 70 cm. Hg when it is placed in boiling water at the normal pressure. Calculate the temp. of an oven if the pressure of the gas in the thermometer was 90 cm. Hg when it is placed inside it. (p_{100}=60 cm p_0=60 cm $p_{t=90cm}$

solution

$$t = 100x\frac{p_t - p_o}{p_{100} - p_0} = 100x\frac{90-60}{70-60} \qquad t=300C^o$$

29) If the temp. of a body equals 60f°, calculate the temp of that body on

a) Celsius scale b) Kelvin scale

solution

$$\frac{5}{9}(f-32) = 15.6 \qquad K = C + 273 = 15.60 + 273 = 288.6k^o$$

30) A liquid of mass of 4kg and specific heat 5000 J/Kg.K° find.

a) the heat capacity of this liquid

b) The heat energy needed to raise the temp of this liquid from 10C° to 60C°.

solution

$$c = \frac{q_{th}}{m} \rightarrow q_{th} = mC \qquad q_t = 4x5000 = 20.000\ J/k^o$$

$$Q = mC\Delta t = 4x\ 5000\ x\ 50 = 1x\ 10^6\ J$$

31) Calculate the quantity of heat need to raise the temperature of 0.2 kg of Aluminum from 20Co to 70 Co if its specific heat capacity is 924 j/k ko

solution

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32) Some hat water was added to four times its mass of water at 10Co and the resulting temperature was 20Co what was the temperature of the hot water by F°?

➢ .....

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solution

33) An a mount of water 0.9kg at 90 C° is added to 0.3 kg of water at 20C° find the final temperature.

solution

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34) a piece of aluminum of mass 0.025 is heated to 100Co then dropped into a beaker containing water of mass 0.065 kg at 35Co the find temperature of the mixture is 40C°

Calculate:

The specific heat capacity of aluminum given that the specific heat capacity of water 4200 j/kg k°.

Given:

Aluminum	Water
M = kg C= ? Δt=	M = kg C= 4200 j/kg k° Δt=

Final temp 40

solution

➢ .....

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35) Find the electric field intensity and the electric potential at a point 0.6 m a part from a charge 8x10-9 if (k=9x10-9 Nm2/c2)

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36) A negative charge of 9 x10^{10}c is placed in an electric field of intensity 0.1 N/c calculate the force acting on it and show its direction.

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37) A charge of 5x10^{-7} find the electric field intensity at a point at 10cm.

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38) An electric lamp. (60 watt – 240 volt) is used to heat the water in a fish basin for 7 minutes if the mass of water is 2 kg and the specific heat of water is 4200 J/kgk^0 calculate:

a) the current intensity flowing through the lamp. b) The raise in the temp of water.

c) The cost of consumed electric energy through 10 hours if the price of one kilowatt hour =10 P.T

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39) An electric heater of power 700 watt is used to raise the temperature of an amount of water by 80co in 10 minutes knowing that the specific heat capacity of water is 4200 j/kg k^o find the mass of water

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40) The following are the data obtained in an experiment to determine the specific heat of aluminum electrically, mass of aluminum= 0.8kg, the room temp=23c^o, the passing time of the electric current = 2.5 minutes, intensity of the electric current=4A, Potential difference across the end of the heater = 12 volts, temp at the end of experiment = 33C^o

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41) An electric lamp consumes 360 kj of electric energy when it lights for one hour if the current passing through the filament = 0.4 ampere

42) Calculate: 1- The electric power of lamp. 2- Voltage supply 3- Resistance

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43) [Fym 2013] A heater of electric power is 1000 w used for 45 minutes to heat 20 kg of water calculate:

(a) The change of temperature of water.

(b) The cost of usage if it works for 3 hours daily if you know a cost of k.watt.h daily if you know a cost of k.watt.h = 15 Pt and specific heat of water = 4200 j/Kg.k^o.

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Choose the correct answer

1) The unit of electric potential is **(volt - ampere - volt/sec – joule)**
2) the measuring tape is one of the measuring instruments which (analog - digital - simple depend on direct reading)
3) All the following are vector quantities except **(force - impulse - work - momentum)**
4) The basic quantities include **(electric charge - energy - electric capacity -electric force)**
5) From the derived quantities **(mass - electric charge - electric current)**
6) Unit of measuring electric capacitance is **(Ampere - farad - joule)** Fym. 2013
7) The..... motion is characterized by the presence of initial point and terminal point **(periodic – translation – vibratory).**
8) The rate of change of velocity ..... **(force – impulse – acceleration – linear momentum)**
9) When a body fall freely its .....Increases **(velocity – potential energy – acceleration – mass).**
10) A body starts from rest with an acceleration of $2m/s^2$ it covers distance of 100m in time of ..... **(50 sec – 20 sec – 2.5 sec – 10 sec)**
11) The ratio between the total distance and the total time is ... **(average velocity – average acceleration)**
12) A body moves by a uniform velocity equals 100 m/s. so its acceleration equals..... **(100 m/s2 – 1 m/s2 – 50 m/s2 – zero).**
13) Aa body moves with an acceleration, so it's..... **(Vt > Vo – Vt < Vo – Vt = Vo – velocity uniform)**
14) The force acting on a mass 5 kg to change its velocity from 7 m/s to 3 m/s in 2 sec.
a) 10 N b) 10N c) 20N d) 5 N
15) If the force on moving body is doubled.....**a) The acceleration will be doubled.**
b) The velocity will be doubled. d) The mass will be doubled.
16) If the acting force on a body is doubled and its mass is decreased to its half the acceleration will be ..... **a) 2 a b) 3a c) 4a d) a**
17) When a body is falling freely with acceleration 9.8 m/s2 we can conclude that.....
a) The acceleration increases with the rate 9.8 m/s^2. b) The velocity increases with a rate 9.8 m/s.
18) The unit of momentum is..... **a) kg. m.s-1 b) kg. m.s-2 c) kg. m-1.s-1 d) kg. m.s**
19) The mass of the body at the earth's surface is ..... its mass in the moon's surface
a) > b) < c) ≤ d) =
20) The weight of a ball on the earth's surface ..... its weight on the moon's surface
a) > b) < c) ≤ d) =

21) the weight of body is 60N on the surface of the moon its mass on the surface of the earth is ..... (g on moon =$1.66m/s^2$) **[360 kg – 60 kg – 36 kg – 10 kg]**
22) if the distance between two bodies reduced to half its value the attraction force between them will **[doubled – reduced to half – increased four times – remains constant]**
23) the ratio of the density of earth's crust to the average density of the earth is ..... one. **[less than – greater than – equals]**
24) If the distance between two masses is doubled the mutual gravitational force ..... **[is doubled – equals its half – remains const – decreases to its quarter]**
25) The lunar gravity is approximately equal to ..... m/**s2** **[$1/6$ – 1.633 – zero]**
26) If the radius of the moon equals 1/4 the radius of earth and its density = 2/3 that of the earth. So the ratio between due to gravity on the moon's surface to that of the earth = $\left[\frac{1}{4} - \frac{1}{3} - \frac{1}{2} - \frac{1}{6}\right]$
27) Two bodies of masses m1, and m2, in space and the distance between them is d when the distance between them is doubled, the gravitational force between them .
a) Becomes double its value b) Decrease to quarter its original value c) Becomes 4 times its original value .
28) The path of pushed water from fountain takes the shape of.....
a) circle b) spiral c) straight line d) parabola
29) The attractive force of earth for a body of mass 10 kg, where g = 9.8 m/s .....
a) 9.8 N b) 9800 N c) 100 N d) 98 N
30) The unit of the gravitational constant is .....**a) N.m2 kg2 b) Nm-2 kg-2 c) N.m-2 kg d) Nm2/kg2**
31) The ratio between the density of the Earth's crust to the density of the Earth's core is .....
a) equal 1 b) less than 1 c) greater than 1 d) no correct answer
32) A body moves over an inclined smooth plane by angle (θ) from the horizontal surface the acting force can be given by the relation .... **a) mg tan θ b) mg θ (c) mg sin θ d) mg cos θ**

33) Given that the diameter of the moon is $1/4$ that of the earth and its density is $2/3$ that of earth the gravitational acceleration on the moon surface relative to that of earth is .....

a) $1/3$ b) $1/6$ c) $1/2$ d) 6

34) Halving the velocity of body decreases its k.e ..... its value [$1/2$ times - $1/4$ times - $1/8$ times]

35) A body of mass 20kg is moving with velocity 5m/s the kinetic energy is.... [250N - 250j - 350j]

36) At the mid height of a projectile, the ratio between its k.e to its p.t energy equals. [1 - $1/2$ - $1/4$ - 0]

37) When the body fall freely from a height its mechanical energy will: .....

- increases gradually. - Decreases gradually. - Remain constant. - Equal zero.

38) When a body is projected up it's kinetic energy**.....[increases – still constant – decreases]**

39) The work done by the frictional force against a moving body is... **a) –ve b) zero c) + ve**

40) The uniform velocity, the total work is ..... **.a) - ve b) + ve c) zero d) natural**

41) When the work done is maximum , the acting force on a body makes an angle ..... with the displacement direction . **a) 45° b) 90° c) 60 ° d) zero**

42) Doubling the velocity of body increases its K.E to.....of its value

a) 2 times b) 4 times c) 8 times d) half

43) On moving a body up , the sum of its P.E and K.E.....

a) decrease b) increase c) remains constant d) equal zero

44) All of the following are the units of measuring the work except.....

a) Joule b) kg.m-2.s2 c) N.m d) kg.ms

45) The velocity of a body is doubled and its mass decreased to its quarter, so its K.E.....

a) decrease to half b) remains constant c) is doublet d) decrease to quarter

46) The change in total momentum of two isolated bodies before and after collision equals…..

a) zero b)1 c) <1 d) >1

47) The momentum of an object at a given instant is independent of its….

a) mass b) inertia c) velocity d) acceleration

48) .The physical quantity impulse, has the same unit as that of ……

a) force b)power c) momentum d) work

49) When a body of velocity (v) colloid with another body at rest and their masses are equal, after collision they move together as a one body with a common velocity …….**a)** $\frac{1}{4}v$ **b) 2v c)** $\frac{1}{2}v$ **d) v**

50) (Fym 2013). Escape velocity of rocket of mass 2 tons is **(greater than – less than – equal to)** escape velocity of rocket of mass 4 tons

51) When an elevator moves up by acceleration (a) the apparent weight **[increase – decrease – does not change]**

52) If the temperature of a person increases by 2 on the Celsius scale, the temperature increases on kelivin scale by ……. **a) 2o b) 275o c) 371o d) 375o**

53) The normal temperature of the human body of Fahrenheit scale is …**a) 237 b) 37 c) 98.6**

54) If the resistance of platinum thermometer at 0oC is 6 ohm and at 100oC is 6.12 ohm, its temp. corresponding to resistance = 6.36 ohm is……**a) 7.1oC b) 14.2oC c) 21.6oC d) 300oC**

55) A material in a state of thermal equilibrium with surrounding medium so its temp is ……. The temp of medium. **a) less than b) greater than c) equal to d) no correct answer**

56) -40 Fo equals …… Co **[54 / 32 / 212 / -40]**

57) The boiling point of water in Kelvin scale ok is **……[373 – 273 – 100 – 212]**

58) in james joule experiment the mechanical work convert into **[motion – potential – thermal]**

59) The joule is the unit of **……[quantity of heat – thermal energy – both the them]**

60) If the normal body temp was 37co so temp on Fahrenheit degree will be. **[96.8 – 98.6 – 32 – 212]**

61) The lower fixed point on Kelvin scale is **co [273 – 373 – zero – 274]**

62) The temperature of healthy person in Kelvin scale is **…….[210 – 310 – 37]**

63) Heat capacity of body of a mass ……. g equals numerically the specific heat of its material.

a) 1 b) 10 c) 100 d) 1000

64) The specific heat is considered as a distinguishing characteristic for the materials as it changes by the change of **a) the volume of the substance. b) the mass of the substance c) the kind of the material**

65) A body made of copper has a mass 0.64 kg and has specific heat capacity =400 J/Kg0K. Then its heat capacity is **a) 2560 J/0K b) 256.0 J/0K c) 2560 J/kg d) 2560 J/Kg0K**

66) The specific heat capacity of a material depends on **[its mass – its volume – the nature of material]**

67) If a mass of body decreases to one forth its specific capacity ……

- remains constant - decreases one fourth - increases four times -halved

68) Body of mass 10 kg needs 1000 j of heat energy to raise it's temperature from 40 co to 50 Co its heat capacity **[10 j/Ko/ 100 j/Ko / 1000 j/K° /10000 j/K°]**

69) The unit of specific heat is **[J – J/kg / j/kg K°]**

70) The time of heating express **on** **[quantity of heat – latent heat – heat capacity]**

71) The unit of specific latent heat is **[J – J / kg – j /c]**

72) The specific heat of the body 50 j/kg k5. if its mass is doubled so it's specific heat **[increases – decreases – still constant]**

73) Two electric charges q1 and q2. The distance between them is (d). If the quantity of one of them is doubled and the distance is doubled therefore the mutual force between them is …..

a) remains constant b) increases to its double . c) decreases to half d) decreases to its quarter

74) The unit of the coulomb proportional constant is the **a) Nm2 /kg2 b) Nm2C-2 c) N/m2 kg2**

75) The electric potential difference at a point equals the intensity of the electric field when the distance equals …… m from the point. **a) 1 b) 25 c) 4 d) $1/2$**

76) . Two equal charges, separated by distance (d) , the attraction force between them (f), if the proportion constant (k), the charge of each equals…. Coulomb.

a) $k\sqrt{fd}$ **b)** $d\sqrt{\frac{f}{k}}$ **c)** $d\sqrt{klf}$ **d) f d2/k**

77) Volt is equivalent to ……. **a) N/c b) J/c d) J/ kg d) N/kg**

78) The electric field intensity is ……

a) Scalar quantity, its unit is N/c b) a vector quantity, it unit N/c d) a vector quantity, its unit is N

79) The unit of the electric field intensity is ……. **[N/kg – N/c – N/kg.k°]**

80) An electric heater of power 700 watt is used to raise the temp of an amount of water 80C in 10 minutes, knowing that the specific heat of water is 4200 J/kgoK, so mass of water equals…

a) 0.25 kg b) 1.25 kg c) 1kg d) 12.5 kg

81) The kilowatt is the unit of measuring… **a) energy consumed b) power c) work d) electric charge**

82) . Kilowatt hour equivalent to …….. Joule **a) 3.6 x 106 b) 3.6 x 105 c) 3.6 x 10 d) 3.6 x 103**

83) An air condition of power 5 kilowatt, the potential difference in volt needed for its function when an electric current of 20 A flows through it equals…**a) 200 v b) 220 V c) 250 V d) 110 V**

84) When a body falls freely it moves with acceleration **[8.9m/s2 – x-9.8 m/s2 – 9.8 m/s2 - -8.9 m/s2]**

85) The slope of the straight line resulting from the graphical relation between (x– t^2) equals Free falls acceleration. **[double – root – half – quarter]**

86) When a body is thrown vertically up wards then …. **a) (vo= 0) b) (vt + vo = o) c) (vt =o)**

87) According to Newton's first law, the body moves with ….. velocity unless an external forces acting an it **[uniform – vanished - non uniform – increasing]**

88) Newton's 1st law is called the law of **…… [inertia – gravitation – force]**

89) The body keeps its state of rest if it is affected by …..

[horizontal large forces – balanced forces – unbalanced forces – horizontal small forces]

90) The product of the mass of a body times the rate of change of its displacements is called……

[force – momentum – acceleration – weight])

91) Temperature 373°k equals ……..°F **(32°، 100° ، 212°)**

92) 45° on the Celsius scale equals …….. on Fahrenheit scale. **(123° ، 113° ، 103°)**

93) If the temperature of a body is doubled the specific heat of its material ……

(will be doubled – decreases to half – remains constant)

94) When the mass of a body equals 1kg the ratio between its heat capacity and the specific heat is …… one **(greater than – less than – equal to)**

95) Temperature of 77°C equals ……. K **(186°k ، 77°k، 350°k)**

96) The specific heat of a body depends on its ……. **(material – mass – temperature)**

97) If the increase in temperature of a person is 2° on the Celsius scale so the increase in his temperature on Kelvin scale is ……. **(275° - 2° - 375° - 271°)**