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Some Important Questions

Q.1 What is the difference between Fundament-al and Derived Physical Quantities?

Q.2 Explain 7 Fundamental Quantities and write their S.I. (System of International) unit.

Q.3 Define unit and explain the difference between fundamental & Derived units.

Q.4 Define Dimension and Dimensional formula.

Q.5 Explain Principle of dimensional Homo-genity.

Q.6 Check Dimensional Homogenity.

1. $v^2 = u^2 + 2as$
2. $S = ut + \frac{1}{2}at^2$ (S = displacement)

Q.7 Explain about direct & indirect Measure-ment.

Q.8 What do you mean by measurement, explain all measuring devices.

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Q9 What do you mean by error, explain type of error.

Q.10 Explain absolute error & relative error.

Q.11 Explain Significant Number, also write Rules.

Answers from Here

Ans.1

	Fundamental Qty.	Derived Qty.
a	Fundamental Physical Quantities are independent.	Derived Physical Quantities or dependent on fundamental Physical Quantities
b	There are 7 types of fundamental Physical Quantities.	More than 7 Quantities are Derived Physical Quantitiess.
c	Fundamental Physical Quantities are basic Quantities	Derived Quantities are Derived from Fundamental Quantities.
d.	Fundamental Physical Quantities are measured directly	Derived Quantities can be measured with the help of formula.
Ex	Length, Time, Mass	Area (l×b), Volume (l×b×h)

Ans·2

	Physical Quantities	S.I. Unit	Symbol
1	Length	Meter	m
2	Mass	Kilogram	Kg
3	Time	Second	s
4	Electric Current	Ampere	A
5	Temperature	Kelvin	K
6	Luminous Intensity	Candela	Cd
7	Amount of Substance	Mole	Mol

Ans·3 Unit :

Unit is a standard which is used to Represent any Physical Quantities or which is used to measure any Physical Quantities

Example: Kg, gram, Centimeter, meter, Km, Second, Kelvin.

	Fundamental Units	Derived Units
a.	Fundamental Units are Independent	Derived Units are Dependent upon fund-amental Units.
b.	Fundamental Units can be measured directly.	Derived units can-not be measured directly, these can be measured with the help of formula.
c.	Fundamental Units are of 7 types.	More than 7 units types are Derived units.
d.	Fundamental units are basic units.	Derived units are derived from fundament-al units.
Ex.	Meter, Kg, Second.	Ex. Newton, $(\text{Meter})^2$, $\frac{M}{3}$ Joule.

Ans 4 **Dimensional formula :**

Any Physical Quantities represented in the form of $[M^a, L^a, T^c]$ are known as Dimension formula.

Dimension's :

Power on $[M^a, L^b, T^c]$ are known as Dimensions.

Ans5. Principal of Dimensional Homogeneity describes 2 Rules :-

- **Rule No. 1 :**

  According to Dimensional Homogeneity in any ~~Physical~~ eq. Physics equation or any physics formula L.H.S. ~~will~~ dimensional formula will always equal to RHS. dimensional formula.

- **Rule No. 2 :**

  We can add or Substract any Dimensional formula when Dimensions are same.

Ans.6

a. $v^2 = u^2 + 2aS$ (S = displacement)

$$[M^0 L^1 T^{-1}]^2 = [M^0 L^1 T^{-1}]^2 + [M^0 L^1 T^{-2}] \cdot [M^0 L^1 T^0]$$

$$[M^0 L^1 T^{-1}]^2 = [M^0 L^1 T^{-1}]^2 + [M^0 L^2 T^{-2}]$$

~~$[M^0 L^1 T^{-1}]^2 = [$~~

$$[M^0 L^2 T^{-2}] = [M^0 L^2 T^{-2}] + [M^0 L^2 T^{-2}]$$

$$[M^0 L^2 T^{-2}] = 2[M^0 L^2 T^{-2}]$$

LHS = RHS.

b $S = ut + \frac{1}{2} at^2$

~~$[M^0L^1T^0] = [M^0L^1T^{-1}] \cdot [M^0L^0T^1] +$~~

~~$[M^0L^1T^{-2}] \cdot [M^0L^0T^1]^2$~~

~~$[M^0L^1T^0] \quad [M^0L^1T^{-2}] + [M^0L^1T^{-2}] \cdot [M^0L^0T^2]$~~

~~$\Rightarrow [M^0L^1T^{-2}] + [M^0T^1T^0]$~~

$[M^0L^1T^0] = [M^0L^1T^{-1}] \cdot [M^0L^0T^1] + [M^0L^1T^{-2}] \cdot [M^0L^0T^1]^2$

$[M^0L^1T^0] = [M^0L^1T^{-1}] \cdot [M^0L^0T^1] + [M^0L^1T^{-2}] \cdot [M^0L^0T^2]$

$[M^0L^1T^0] = [M^0L^1T^0] + [M^0L^1T^0]$

$[M^0L^1T^0] = 2[M^0L^1T^0]$ (Constants are always ignored)

L.H.S = R.H.S

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Q
Ans.7

Direct Measurement

a. Any Physical Quantities which are being directly Measured with the help of Instrument. Without the help of any formula.

b. all fundamental Physical Quantity can be measured directly.

c. In direct Measurement there is no need of formula.

Example:
Mass, Lenghth, Time, Height, distance, temperature.

Indirect Measurement

a. Means measuring physical Quantities indirectly by using any kind of Instrument.

b. All Derived Physical Quantities can be Measured indirectly.

c. for measuring indirect measurement we need formula.

Q.12 Define work and it's S.I. unit.

Q.13 Define Force and write it's S.I. unit.

Q.14 Explain Positive work, Negetive work & zero work.

Q.15 Write Conservation of linear Momentum and also prove, derive formula of Recoil Velocity of gun.

Example:
Volume, area, density, force.

Ans.8 Measurement is a process by which we can weigh or measure any Physical Quantity of any material using equipments and instruments.

b Measurement of any physical quantity / Physics can be expressed by the units called "Numericals"

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c. By measuring a physical quantity we can define the property of material.

d. We can measure mass, weight and different physical properties like :-

1. Distance
2. Speed
3. Mass
4. Pressure
5. Force
6. Momentum
7. Energy

e. Measurement is a system by which we can compare the Physical Quantity with a unit.

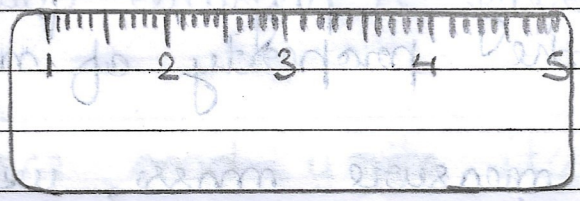
f. When we Measure with the help of formula it is known as Indirect Measurement.

Here I am illaborating some of your measuring instruments :-

1. Scale :-

Scale is used to measure the length of any object, Least count of Scale is

$$L.C. = \frac{1}{10} = 0.1 \text{ cm}.$$



Scale

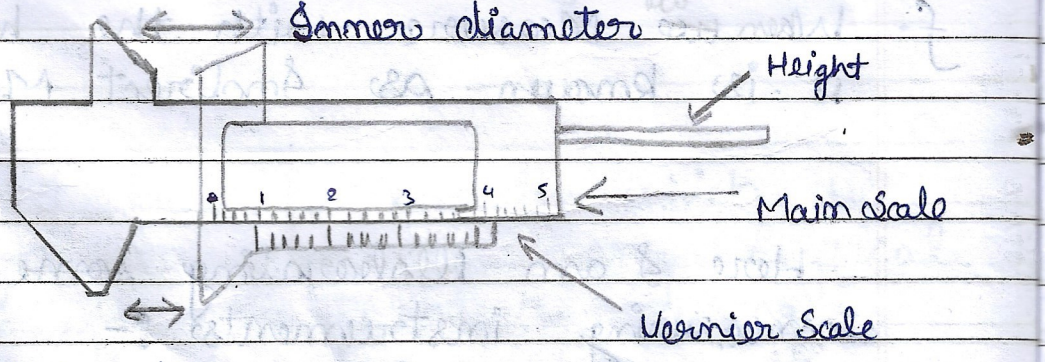
2. Vernier Callipers :

It is used to measure internal diameter, Outer diameter and dept and Height of glass.

Formula :-

$$\text{Least Count} = \frac{\text{main scale L.C.}}{\text{No. of divisions on V.S.}}$$

$$= \frac{0.1}{10} = 0.01 \text{ cm.}$$



Outer diameter

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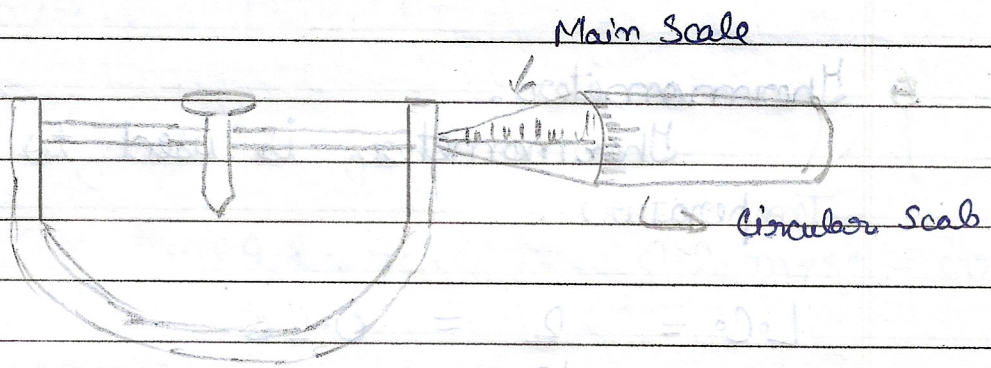
3. Screw gauge:

It is being used to measure the diameter of thin wire.

$$L.C. = \frac{\text{main scale L.C. [Pitch]}}{\text{No. of division on circular scale}}$$

$$= \frac{0.1}{100} = 0.001 \text{ cm}.$$



4. Spherometer:

Spherometer is used to measure the Radius of Curve glass.

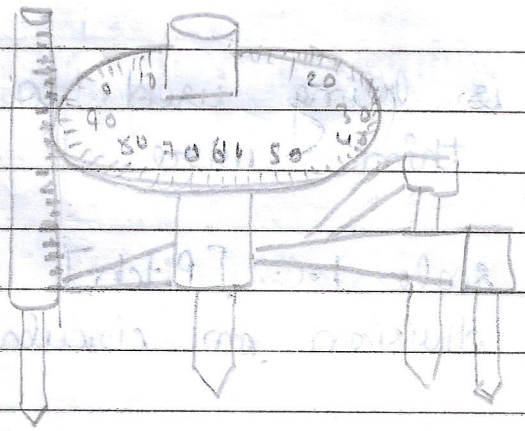
Least Count:

$$L.C. = \frac{\text{L.C. of main scale}}{\text{No. of division on Circular Scale.}}$$

$$= \frac{10/20}{100}$$

$$= \frac{0.5 \text{ mm}}{100} = \frac{0.05 \text{ cm}}{100}$$

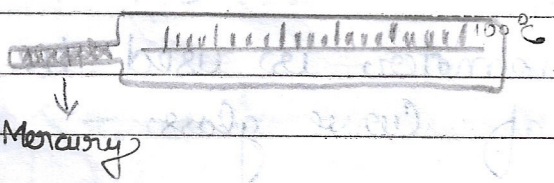
$$= 0.00005 \text{ cm}.$$



5 Thermometer:

Thermometer is used to measure room temperature.

$$L.C^\circ = \frac{2}{10} = 0.2\,C^\circ$$



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Ans 9 Error can be defined as difference between the True Value and Measured Value.

Example:

acceleration due to gravity

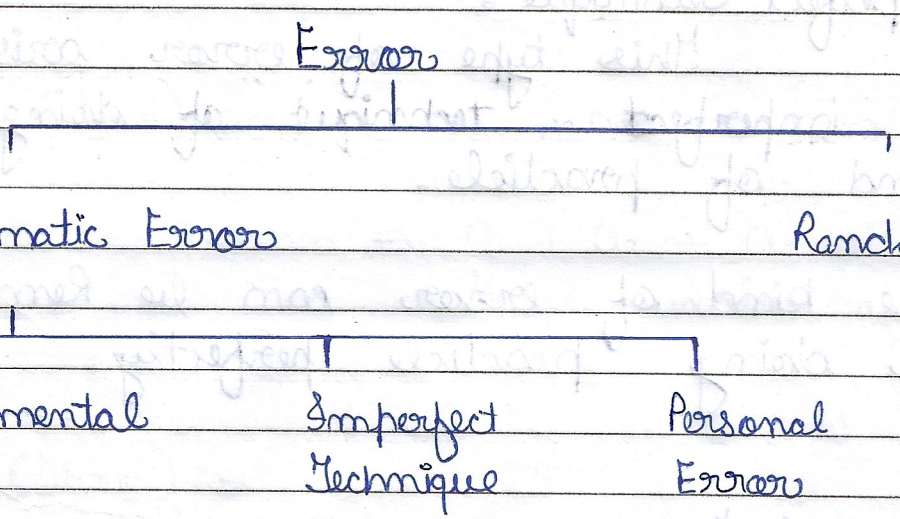
$g_1 = 9.8\ m/s^2$

$g_2 = 9.6\ m/s^2$

$$\Delta g = g_1 - g_2$$

$$= 9.8 - 9.6 = 0.2\ m/s^2 = \text{error}$$

Types of Error:-



1. Systematic Error
   a. Instrumental Error
   b. Imperfect Technique
   c. Personal error

a. Instrumental Error:

This type of error arises due to Instruments fault, due to imperfect design of Instrument and not proper calliberation in instrument / system.

- These type of error can be removed / resolved using good instrument.

b. Imperfect Technique:

This type of error arise due to imperfect technique of doing any kind of practicle.

- These kind of error can be Removed by doing practicle perfectly.

c. Personal Error:

This type of error arise due to carelessness of Observers.

These kind of error can be removed by doing practicle carefully.

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2. Random Error:

Random error arise due to fluctuation of temperature, pressure and Voltage.

Random error can be Removed by taking large Number of Readings and finding the average.

Ans 10 Here are Steps to Find-Out Absolute error & Relative error :-

1 Step.1 (one) :-

Taking Reading of the Object (a_1, a_2, a_3)

2 Step.2 (Two) :-

$$a_{mean} = \frac{a_1 + a_2 + a_3}{\text{Total Number of Readings}}$$

3 Step 3 (Three) :-

Finding out Δ of Readings :-

$$|\Delta a_1| = |a_1 - a_{mean}|$$

$$|\Delta a_2| = |a_2 - a_{mean}|$$

$$\therefore |\Delta a_3| = |a_3 - a_{mean}|$$

4. Step 4 (four) :-

Find out absolute mean error :-

$$\Delta a_{mean} = \frac{|\Delta a_1| + |\Delta a_2| + |\Delta a_3|}{\text{Total Number of Readings}}$$

5. Step 5 (five) :-

Now find out Relative error :-

$$R.F. = \frac{\Delta a_{mean}}{a_{mean}}$$

Ans.11 Significant Number means how accurately and precisely the Measurement of Physical Quantity has been taken :-

Rule No. 1 (one) :-

All non-zero digits are Significant.

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Rule No. 2 (Two) :-
If 0 (Zero) comes between the Non-zero digits than it will be considered as Significant digit.

Rule No. 3 (Three) :-
Initial zeros are Never Signifi-.

Rule No. 4 (Four) :-
If the zero comes after Decimal and in the end then it is considered as Sign.

Q.16 Explain Conservation of mechanical energy also Prove free falling body.

Q.17 Derive Formula of Kinetic Energy.

Q.18 Derive Formula of Work Energy.

Q.19 What do you mean by Power. Write its S.I. unit.

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Ans#12

Work is the product of Force & displacement.

$$W = \vec{F} \cdot \vec{d}$$

Work is a scaler Quantity.

S.I unit of Work is: Joule

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- Dimensional Formula $[M^1 L^2 T^{-2}]$

Ans # 13 Force is the product of Mass & accelaration. And it is a Vector Quantity.

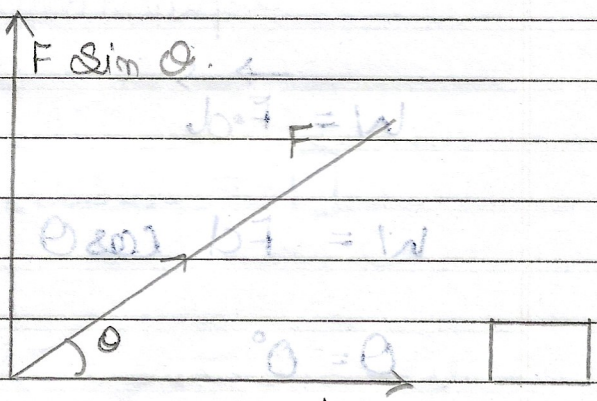
$$\overrightarrow{\text{Force}} = m \cdot \vec{a}$$

S.I. unit of Force : Newton

Dimensional formula : $[M^1 L^1 T^{-2}]$

Ans # 14

~~Positive Work~~ :



$$W = \vec{F} \cdot \vec{d}$$

$$W = F d \cos\theta$$

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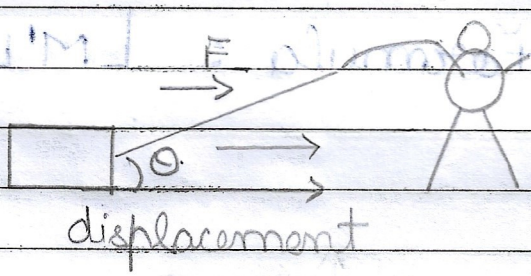
Acute Angle, $\theta < 90°$: Positive Work

Obtuse Angle, $\theta > 90°$: Negetive Work

Zero Work, $\theta = 90°$: Zero Work

- Positive Work :

If there is a acute angle between Force and displacement, & $\theta < 90°$ then the work will be consider as positive work.



$W = \vec{F} \cdot \vec{d}$

$W = Fd \cos\theta$

$\theta = 0°$ $\quad [\cos 0° = 1]$

$W = Fd \cos 0°$

$W = Fd$

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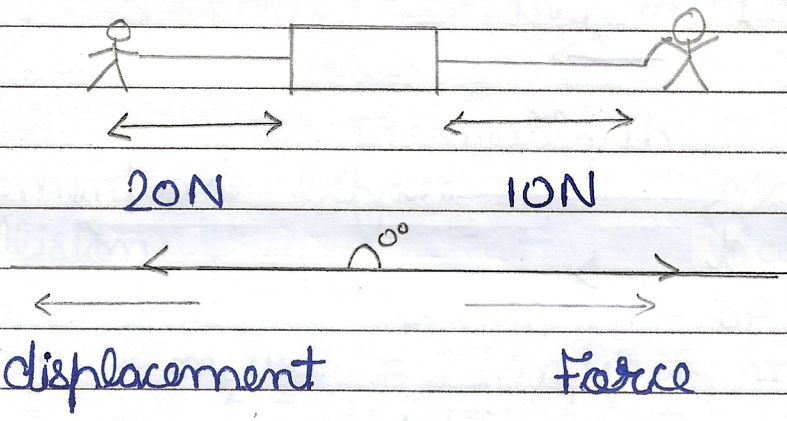
- Negetive Work :

If there is a Obtuse ~~ag~~ angle between Force & displacement and $\theta > 90°$ then Work will be consider as Negetive Work.



$$W = \vec{F} \cdot \vec{d}$$

$$W = Fd\cos\theta$$

$\theta = 180°$ $\quad [\cos 180 = -1]$

$$W = Fd(-1)$$

$$W = -Fd$$

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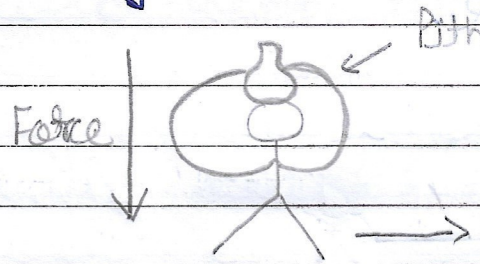
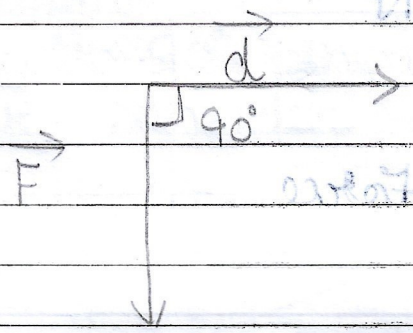
- **Zero Work:**

Work will be considered as zero when / if there is 90° angle between Force & displacement.





$$W = \vec{F} \cdot \vec{d}$$

$$W = Fd\cos\theta$$

$\theta = 90°$ $\quad [\cos 90° = 0]$

$$W = Fd\,0$$

$$W = 0$$

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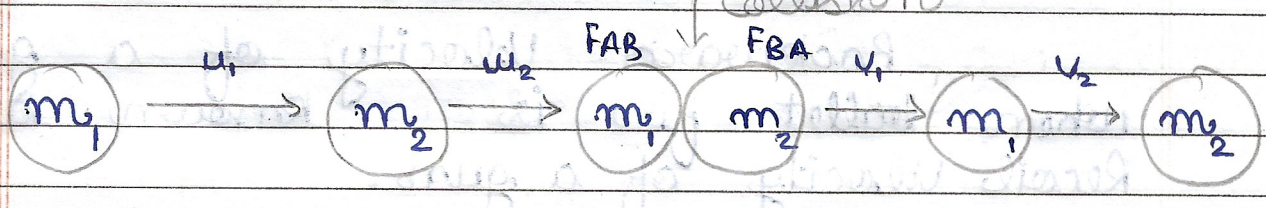
Ans #15

Conservation of Momentum:

An Isoleted System's momentum is always conserved if there is no external force applied on it's body.



Momentum before Collision = Momentum after Collision.

$$m_1u_1 + m_2u_2 = -m_2v_2 + m_1v_1$$

Proof:

$$F_{AB} = -F_{BA}$$

$$F = \frac{\text{Rate of Change of Momentum}}{\text{Time}}$$

$$\frac{m_1u_1 - m_1v_1}{\text{time}} = -\frac{(m_2u_2 - m_2v_2)}{\text{time}}$$

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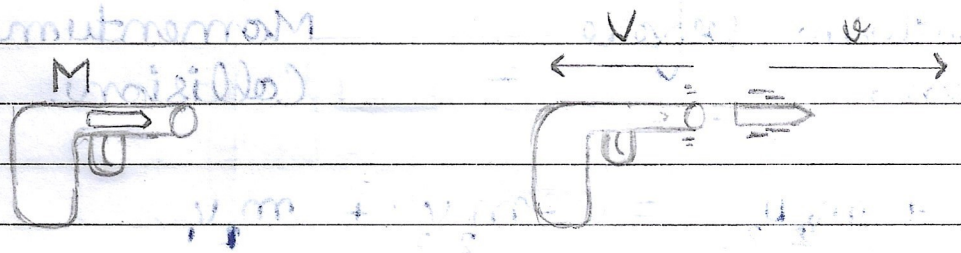
After Opening Brackets :

$$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$$

- Recoil Velocity

Backward Velocity of a gun when bullet fire is known as Recoil Velocity of a gun.



M = mass of gun

m = mass of bullet

V = Recoil Velocity of gun

v = Velocity of bullet

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Momentum before fire = Momentum after fire

Conserved (zero Momentum) $0 = MV + mv$

$-MV = +mv$

$V = \frac{-m.v}{M}$

Here, Recoil Velocity of gun = Negetive Mass of bullet x Velocity of bullet upon Mass of gun.

Q20 Explain difference between Conduction, Convection & Radiator.

Q.21 Define Newton's cooling law & also explain experimental Verification of Newton's cooling Law.

Q.22 Write Relationship between °C & F

Q.23 Explain working of PRT

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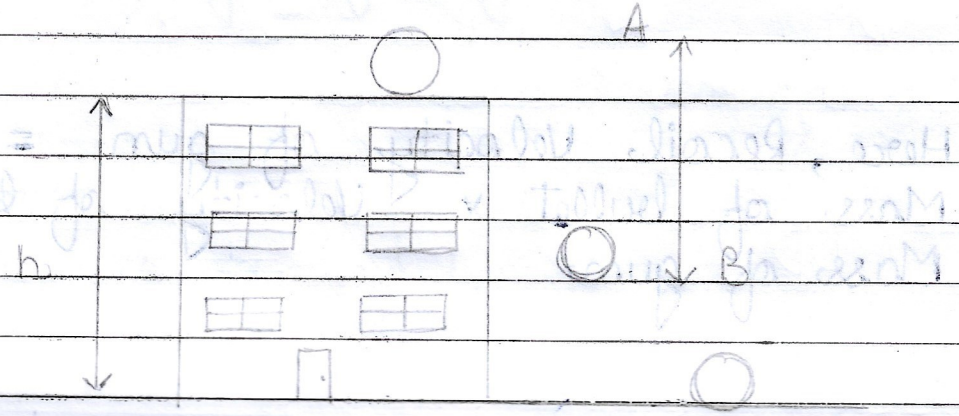
Q24 Explain working of Pyrometer.

Ans.16 The law of conservation of energy states that energy can neither be created nor be destroyed. Although, it may be transfered from one form to another.



At Point A	At Point B	At Point C
(Total Energy) T.E. = K.E. + P.E.	TE = KE + PE	TE = KE + PE
$T.E. = \frac{1}{2}mv^2 + mgh$	$TE = \frac{1}{2}mv^2 + mgh$	$T.E. = \frac{1}{2}mv^2 + mgh$
$v^2 = u^2 + 2gh$	$v^2 = 2gx$	$T.E. = \frac{1}{2}m2gh + m$
$v^2 = 0 + 2gh$		$TE = mgh + 0$
$v^2 = 2gh$	$T.E. = \frac{1}{2}m2gx + mg(h-x)$ $T.E. = mgx + mgh - mgx$	$TE = mgh$ — (3)

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T.E. = 0 + mgh	T.E. ~~mgx~~ + mgh = mgx
T.E. = mgh — (1)	T.E. = mgh — (2)

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Q25 Define Hook's law

Q.26 Explain elastic limit & yield point in stress - strain Curve.

Q.27 Explain defference between Cohesive & adhesive force.

Q.28 Define Surface tension.

Q.29 Explain angle of Contact & determine formula of Surface Tension.

Q

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Short Questions

Q.1 What do you mean by Hookes law.

Q.2 Why soap bubble is spherical?

Q.3 Explain the difference between heat & temperature.

Q.4 Define Newton's law of cooling.

Q.5 Define Power & write it's unit.

Q.6 What do mean by energy conser-vation ~~stop~~ law.

Q.7 On which principal pyrometer work.

Q.8 What do you mean by dimensional Homogenity.

Q.9 Explain difference between Fundament & Derive ~~of~~ Physical Quantity

Q.10 Define Surface Tension

Q.11 What do you mean by conservation of linear momentum.

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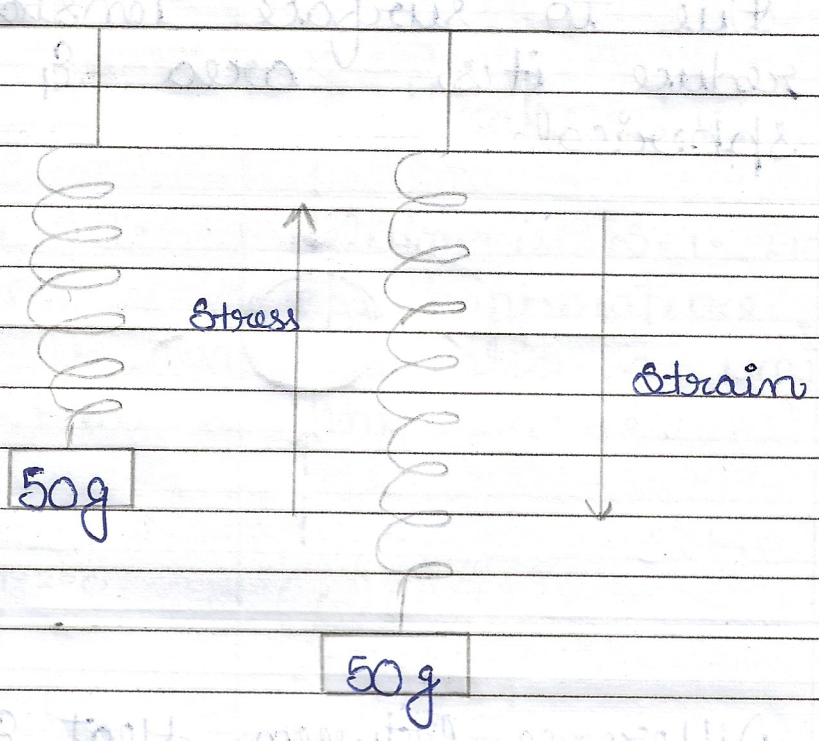
Ans of Short Questions

Ans 1



According to Hooke's law, Stress is directly proportional to strain within its elastic limit.

Stress $\propto$ strain

E = elastic Constant

Stress $\propto$ E Strain

$$\text{Unit} = \frac{\text{Newton}}{(\text{Meter})^2}$$

$$\text{D.F.} = [M^1 L^{-1} T^{-2}]$$

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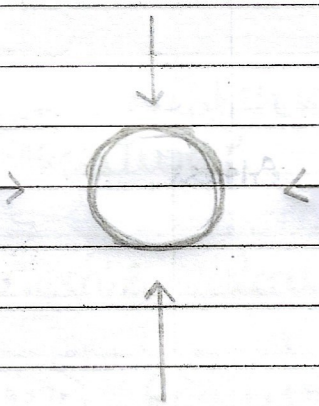
Ans. of Short Questions.

Ans 2. Due to surface tension, soap bubble reduce it's area & become spherical.



Ans 3 Difference between Heat & Temperature:

	Heat	Temperature
1.	Heat is a energy which can transfer from one place to another place.	Temperature is a Fundamental Physical Quantity which measures Hotness & coldness of any object.
2.	Heat is being represented by ΔH	Temperature is being represented by ΔT

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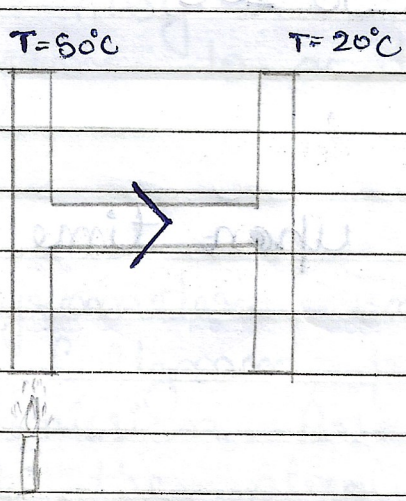
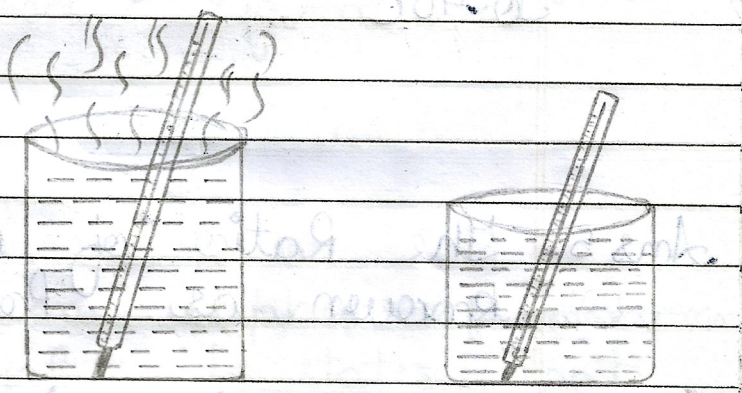
Ans of Short Questions

	Heat	Temperature
3	Joule is a S.T. unit of Heat, & Calorie is also a unit of Heat energy.	Kelvin is S.T. unit of temperature, °C is also a unit of Temperature.





Ans4 According to Newtons law, the cooling rate is directly proportional to temperature difference.

Formula: $\frac{-dQ}{dt} \propto (T - T_0)$

Q = Heat, t = time.

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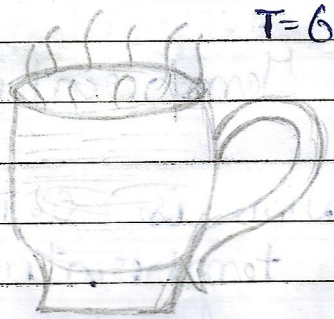
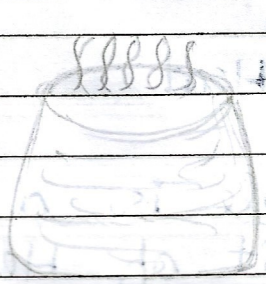
Ans. of Short Question



Room Temp:-

To 40°C



To 20°C

Ans 5 The Ratio of work upon time is known as Power.

$$(\text{Power})\ P = \frac{W\ (\text{work})}{t\ (\text{time})}$$

It's S.I. unit is Watt

M.K.S. unit : $\frac{Kg\ m^2}{s^3}$

D.F. : $[M^1 L^2 T^{-3}]$

*When power is more the time will be less

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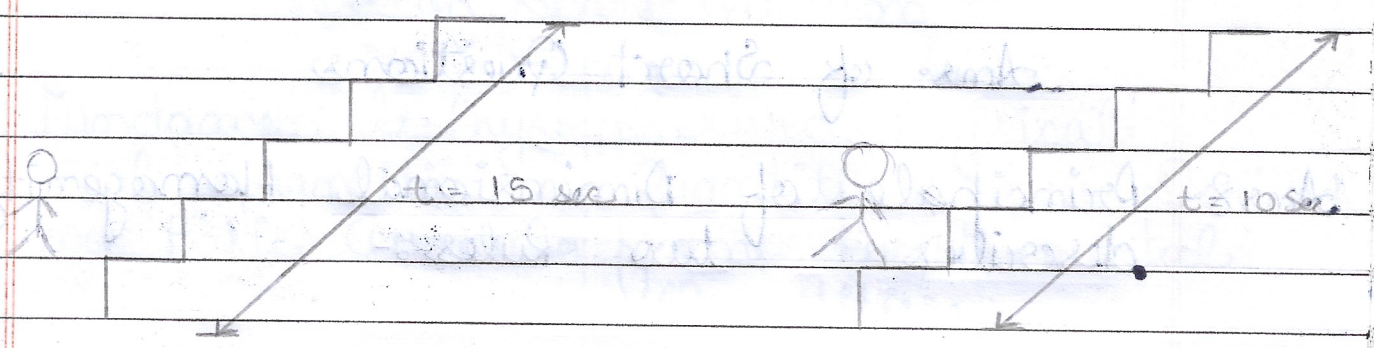
Ans. of Short Questions



Ans 6 The law of conservation of energy states that energy can neither be created nor be destroyed. Although, it may be transfered from one form to another.

Ans 7 Pyrometer works on stephen & ~~Boltzman~~ Boltzmen principal., it states that Emission Rate is directly proportional to the absolute Temperature raise to 4.

$[E \propto T^4]$

E = emmision rate

T^4 = Alesolute temperatur (Raise to the Power 4)

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Ans. of Short Questions

Ans 8. Principale of Dimensional Homogenity describe's two Rules :-

Rule NO. 1 :

According to Dimensional Homogenity, in any Physics Equation or physics Formula L.H.S. Left Hand Side will always equal to R.H.S. Right Hand Side.

Rule No. 2

We can add or & subtract any dimensional formula when Dimensions are same.

Ans 9.

	Fundamental P. Quat.	Derived Physical Quantity
1.	Fundamental Physi-cal Quantity are Independent.	Derived Physical Quantity are dependent on Fundamental Physical Quantity.
2.	There are 7 types of Fundamental Quantities	More than 7 Quantities are Derived Physical Quantity

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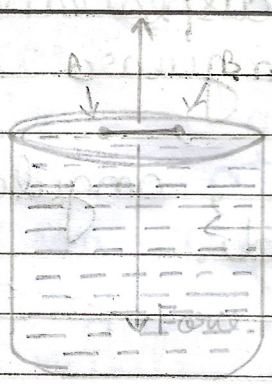
Ans. of Short Question

3.	Fundamental Physical Quantities are Basic Quantities	Derived Physical Quantities are Derived from Fundamental Quantities.
4.	Fundamental Physical Quantity can be measured directly.	Derived Physical Quantities can be measured with the help of Formula.
	Example: Length, Time, Mass	Example: Area(L×B), Volume(L×B×H)

Ans 10



Tension on water upper surface is called surface tension.

Or,

Force per unit of lenght is known as surface tension.

Formula:- $\frac{F\ (Force)}{L\ (Lenght)}$

3 Dec 2022 Ans. of Short Questions:

S.I. unit: Newton meter

D.F.: $[M^1L^0T^{-2}]$

Ans 11. An isoleted systems momentum is always conserved if there is no external force is applied on it's body.

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Q.30 Define angular displacement, angular velocity & angular acceleration.

Q31 Define frequency, angular frequency & time period.

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Ans 17 Any moving object that has energy is known as kinetic energy

In Physics, the kinetic energy of an object is the energy that it possesses due to it's motion. It is defined as the work needed to accelarate a body of a given mass from rest to it's stated velocity. Having gained this energy during it's acceleration, the body maintain this kinetic energy unless it's speed changes.

Example :

The cars of a roller coaster reach their maximum kinetic energy when at the bottom of the path. When they start rising, the kinetic energy begins to be converted to gravitational potential energy.

Formula : $K.E. = \frac{1}{2} mv^2$

S.I. unit : Joule

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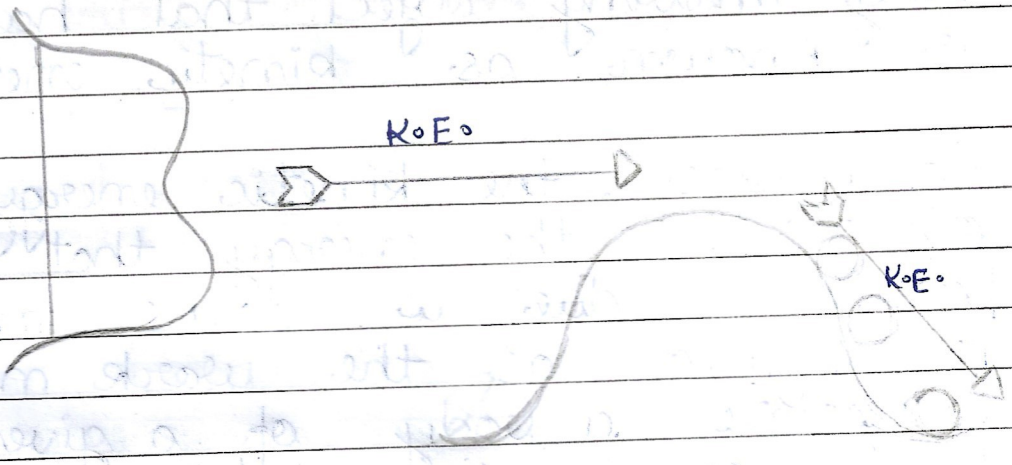

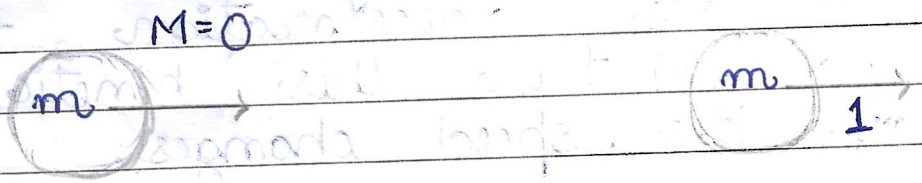

$W = F \cdot d$ ——— (1)

$F = m \cdot a$ ——— (2)

$v^2 = u^2 + 2ad$

$v^2 = 0 + 2ad$

$v^2 = 2ad$

$a = \frac{v^2}{d}$ ——— (3)

38. 39.

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From equation (2) & (3)

$$m \cdot a \times \frac{v^2}{d}$$

$$F = \frac{m \cdot v^2}{2d} \quad \text{——— (4)}$$

From equation (1) & (2)

$$W = \frac{m v^2}{2d} \cdot d$$

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

$$K.E. = \frac{1}{2} m v^2$$

Ans 18

Ans 18 Work done by force on any object is equal to change in kinetic energy.

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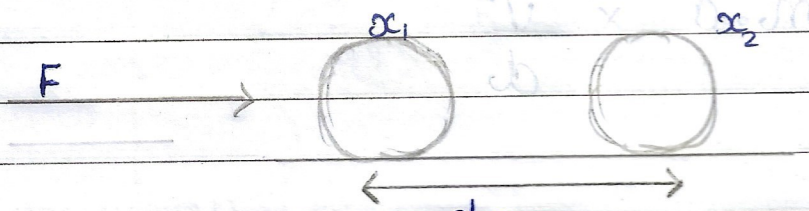
$W = \Delta K.E.$



(Shorted Path) / (Small dist.)

W = work

$$W = \int_{x_1}^{x_2} F \cdot dx \qquad \text{——— (1)}$$

$$a = \frac{dv}{dt}$$

$$a = \frac{dv}{dt} \cdot \frac{dx}{dx}$$

$$a = \frac{dv}{dt} \cdot \frac{dx}{dt}$$ (Cross Multiplication)

$$a = \frac{dv}{dx} \cdot v$$

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Force

$$F = m \cdot a$$

$$F = m \cdot \frac{dv}{dx} \cdot v \quad \text{——————} \quad (2)$$

from equation (1) & (2)

$$W = \int_{v_1}^{v_2} m \cdot \frac{dv}{dx} \cdot v \cdot dx$$

$$W = \int_{v_1}^{v_2} m \cdot v \cdot dv$$

Integrate Formula :

$$\left[\int x^m dx = \frac{x^{m+1}}{n+1} \right]$$

$$\left[\int t^m dt = \frac{t^{m+1}}{n+1} \right]$$

$$W = m \int_{v_1}^{v_2} v \cdot dv$$

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$$W = m \left[\frac{v^2}{2} \right]_{v_1}^{v_2}$$

$$W = m \left[\frac{v_2^2}{2} - \frac{v_1^2}{2} \right]$$

$$W = \frac{m \cdot v_2^2}{2} - \frac{m \cdot v_1^2}{2}$$

$$W = \Delta K.E.$$

Ans 9 The ratio of work upon time is known as power & it is a scalar Quantity.

$$P = \frac{W}{t}$$

S.I. unit = watt

M.K.S. unit = $\frac{Kg \ m^2}{s^3}$

D.F. $[M^1 L^2 T^{-3}]$

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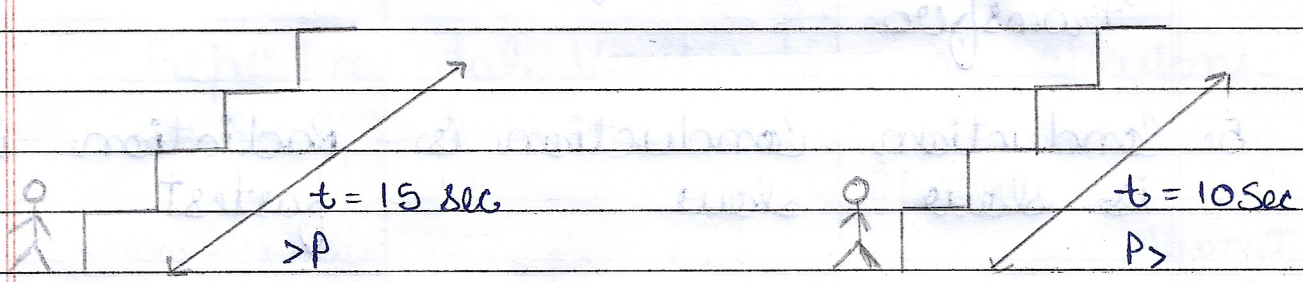
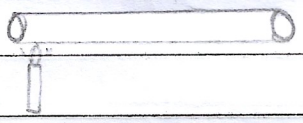
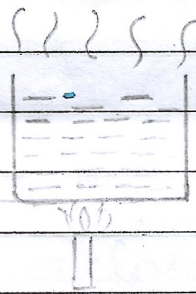
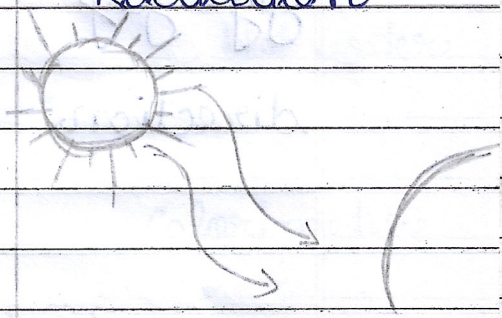
* When Power is more the time will be less!

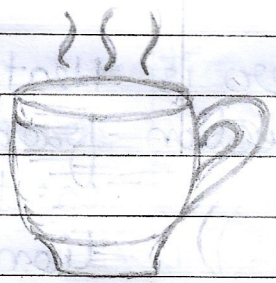


Ans 20

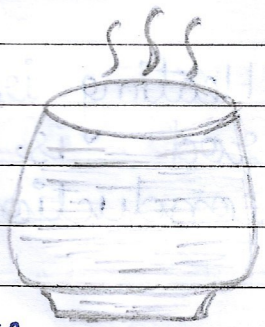
	Conduction	Convection	Radiation
			
1	Heating iron rod is conduction	Boiling water is called convection	Heat transfer from sun to earth is Radiation
2	Particles Never leave there place	Particles leave there place	No Particles Required.
3.	Heat transfer due to difference in temperature.	Heat transfer due to difference in density.	It is a electromagnetic wave.

4.	Medium required for heat transfer	Medium Required for heat transfer	No. medium is required for heat transfer
5.	Conduction is slow	Conduction is slow.	Radiation is fastest.
6	Heat transf-ers in zig-zag direction.	Heat transfer in zig-zag direction.	Heat transfers in straight direction.

Ans 21



Room Temperature
40°C



Formula :

$$-\frac{dQ}{dt} \propto (T - T_0)$$

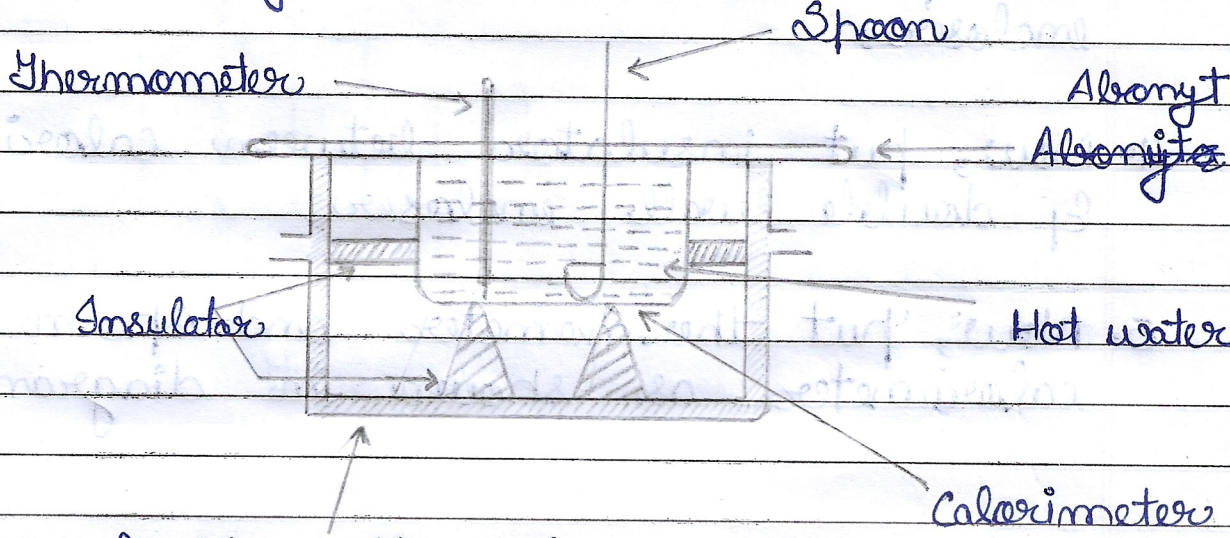
Q = Heat
t = time
T = temperature

45

6 Dec 22

Cooling Rate is directly proportional to temperature difference.

Experimental Verification of Newtons cooling law :-



Aim :

$$\frac{-dQ}{dt} \propto (T - T_0)$$

Instrument

Calorimeter, Thermometer, Spoon, stop watch, Double wall encloser.

Procedure

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1. Fill $\frac{2}{3}$ hot water in calorimeter.
2. Tightly close calorimeter mouth with ebonite cap.
3. Now put calorimeter into double wall encloser.
4. Now, put insulator between calorimeter & double wall encloser.
5. Now, put thermometer and spoon into calorimeter as shown in diagram.

Practical

1. Note Room Temperature [$T_0 = 20°C$]
2. Note reading between time & hot water temperature.

3

Time (min)	Temperature
0	60°C
5	50°C
10	40°C
15	30°C
20	27°C

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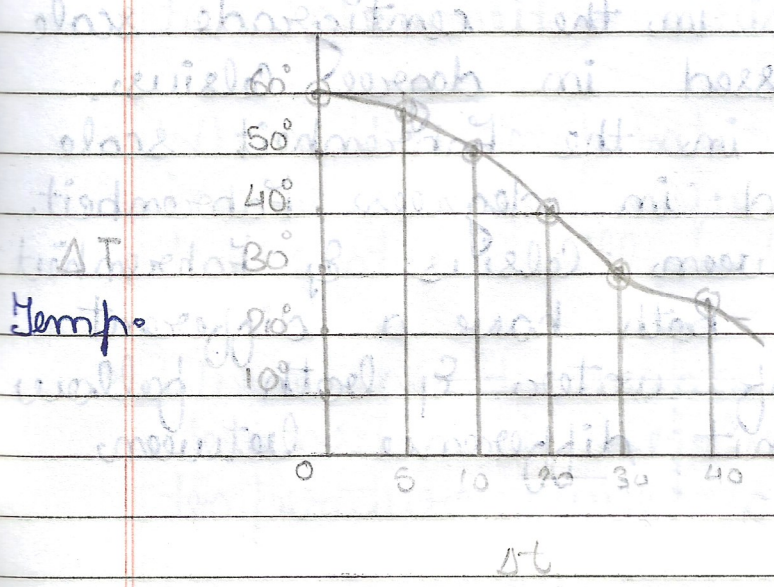
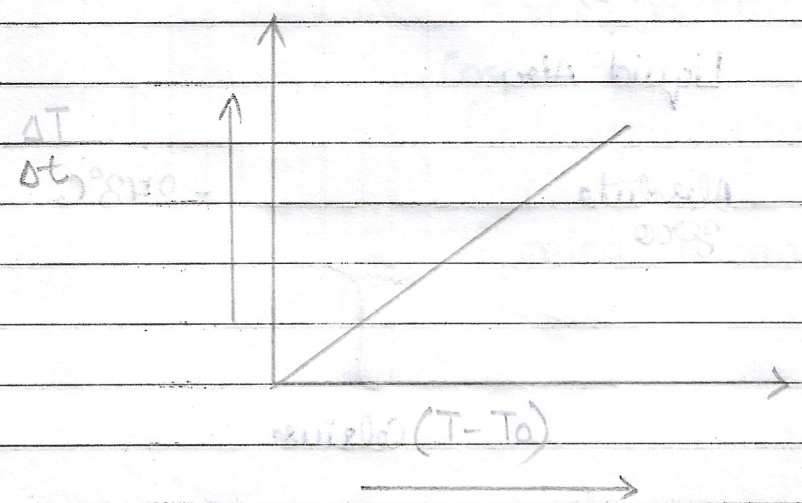
4. Make graph between t & T (Time & Temp)



5. Note ΔT & Δt from graph.

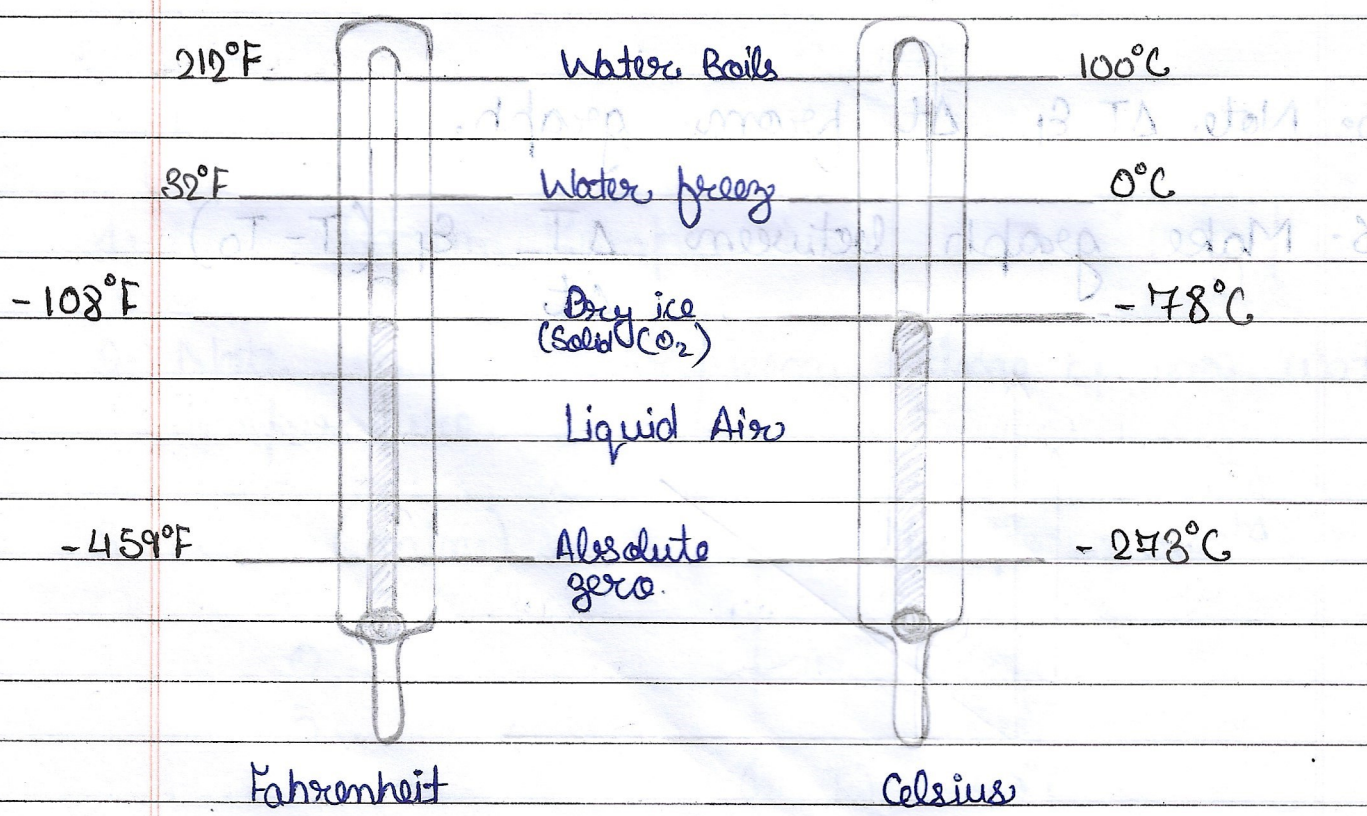
6. Make graph between $\frac{\Delta T}{\Delta t}$ & $(T - T_0)$



$$-\frac{\Delta T}{\Delta t} \propto (T - T_0)$$

Ans 22 Celsius and Fahrenheit are two scales used to measure temperature.
The temperature in the centigrade scale will be expressed in degree Celsius.
The temperature in the Fahrenheit scale will be expressed in degrees Fahrenheit.
The Relation between Celsius & Fahrenheit is proportional. Both have a different freezing point of water & both follows the varied unit difference between each scale.

Relation between °C and °F



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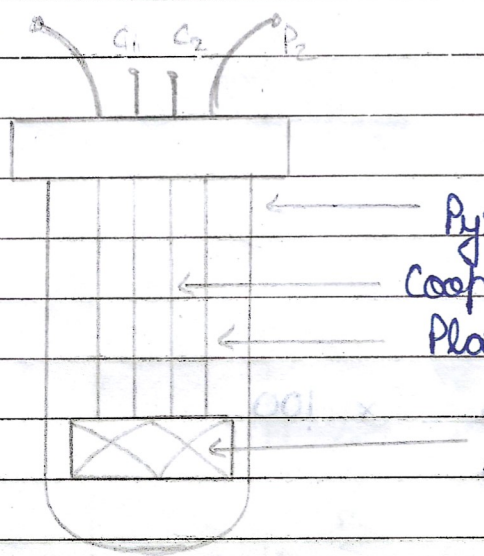
The relation between Celsius and Fahrenheit is direct. Celsius is directly proportional to Fahrenheit, which implies that -

- When the temperature in Celcius scale increases, its equivalent Fahrenheit temperature will also be high.
- When the temperature in Celsius scale decreases, its equivalent Fahrenheit temperature will also be low.

Both scales have their own thermometer for measurements.

Ans 23



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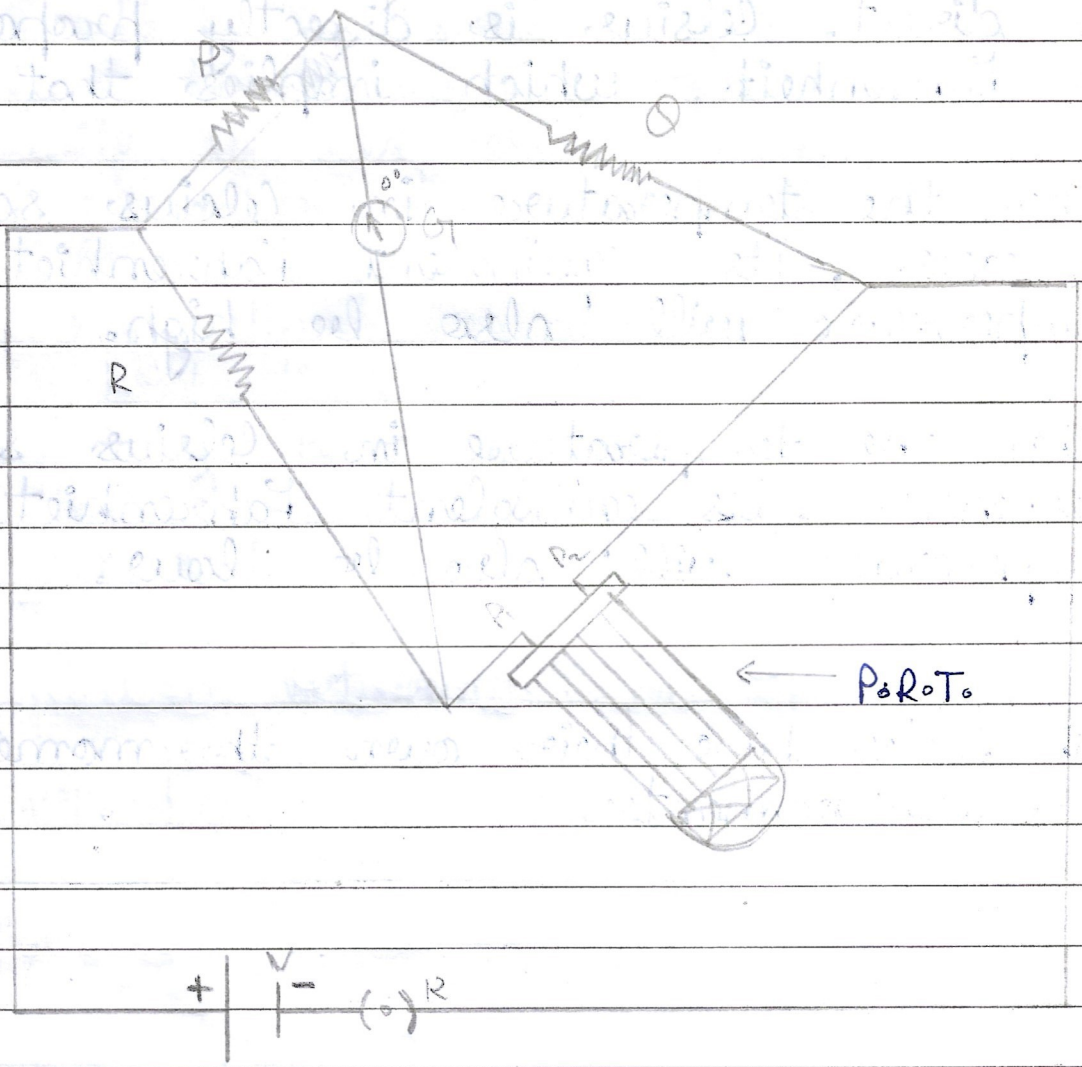
So



Formula :

$$tpt = \frac{Rt - R_0}{R_{100} - R_0} \times 100$$

Principle

P.R.T. is a temperature measuring instrument and it is based on variation of resistance with temperature.

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Date :
Page :

Range

-200°C to 1200°C with accuracy of 0.01°C

Construction

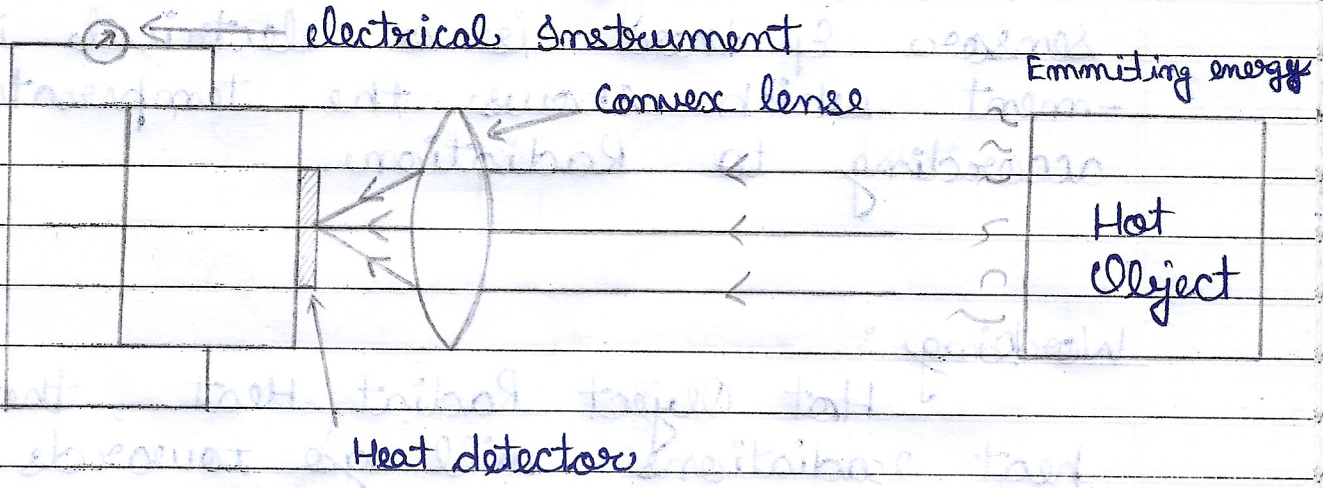
P.R.T. consist of Pyrex glass tube inside it, there is a mica frame, platinum wire's are wounded on mica frame. P_1 & P_2 platinum wire & C_1 and C_2 Copper wire.

Application

1. P.R.T. can be used to measure temperature of Airplane Fuel, wire in power-plant.

2. P.R.T. can be used in Food Industry, & Chemical Industry.

Ans 24



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Usage

Pyrometer is used to measure the temperature of distant Object Or moving object without touching it.

Principal

Pyrometer works on Stephen & boltzmen principal.

$[E \propto T^4]$ which say's emission rate is directly proportional to fourth power of ~~Temperature~~ Absolute Temperature.

Construction

Pyrometer is Consist of a Convex lense, Convex lense convergent radiations rays towards Heat Detector sensor & there is a electrical instrument which shows the temperature according to Radiation.

Working :

Hot Object Radiat Heat, these heat radiations will go towards the Convex lense, Convex lense, Centralize

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all rays on heat detector, Now electrical instrument show temperature according to Heat radiation.

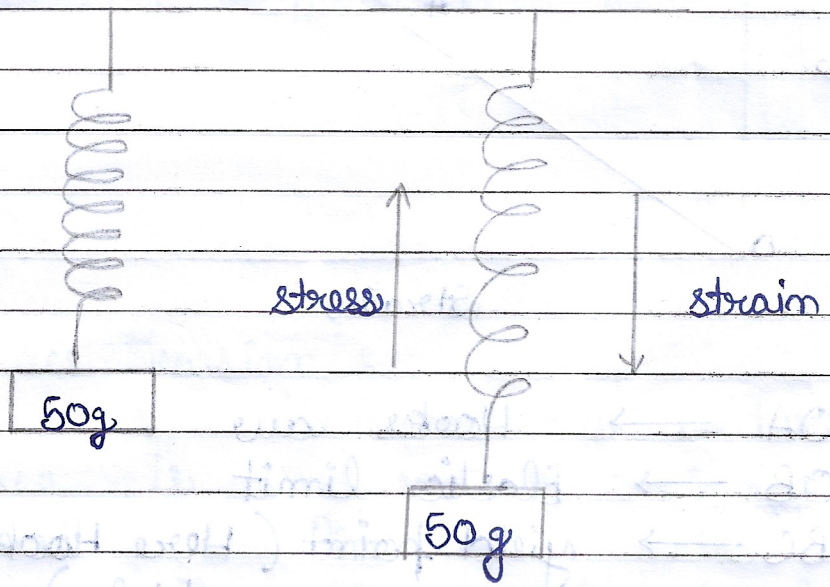
Range

400°C to 3200°C

Application

1. Pyrometer can be used to measure the temperature of moving object or distant object with touching.
2. Pyrometer can be used in Neuclear power plant industry, Food Industry or Chemical Industry.

Ans 25



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Within elastic limit Stress is directly proportionate to strain.

[Stress ∝ Strain] within elastic limit.

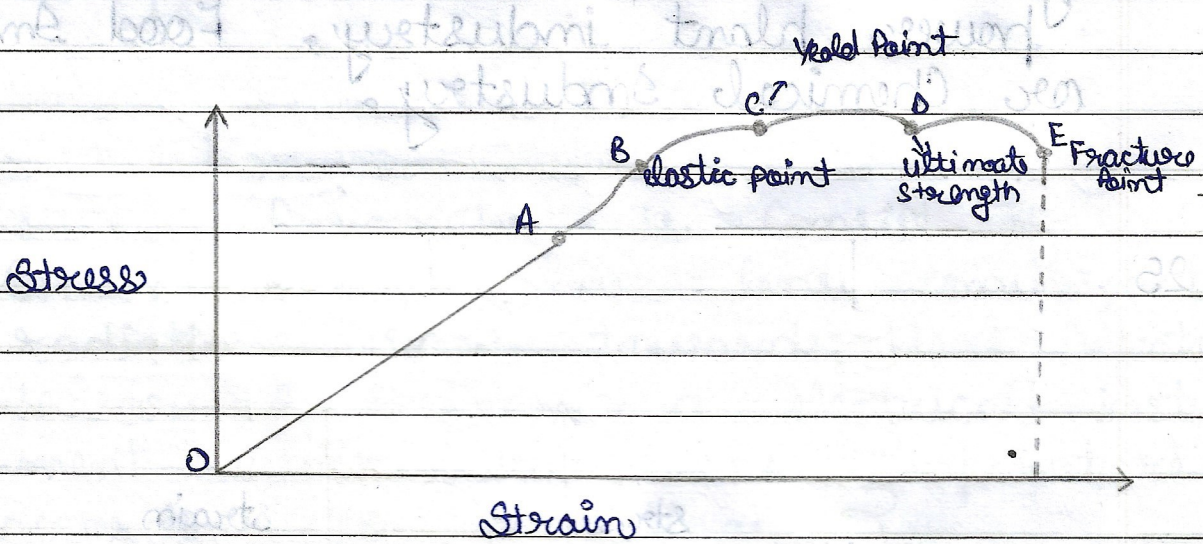
E = elastic Constant.

Stress = E strain

$$\text{Unit} = \frac{\text{Newton}}{(\text{Meter})^2}$$

D.F. = $[M^1 L^{-1} T^{-2}]$

Ans 26



OA ⟶ Hooks law
OB ⟶ Elastic limit
BC ⟶ yield point (Here Hooks law doesn't apply)
CD ⟶ ultimate strength.

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E ⟶ fracture Point

Ans 27

	Cohesive Force	Adhesive Force
1	Force between same substance molecule is known as Cohesive force	Force between different substance molecule is known as Adhesive force.
2.	Water + Water	water + oil
	oil + oil	water + glass
	Hg + Hg	Hg + oil

Ans 28 Surface Tension :

Tension on water upper surface is known as surface tension.

Or

$\frac{F}{L}$ = Force per unit of length is known as Surface tension.

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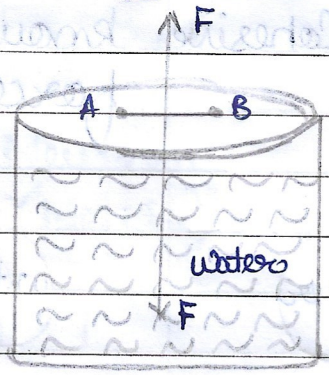
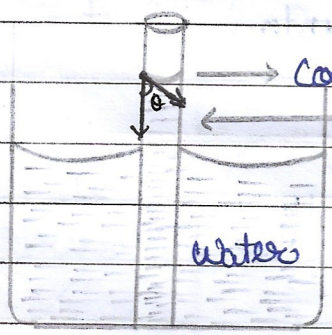
Formula : $\frac{F}{L} = \frac{\text{Force}}{\text{Length}}$

S.I. unit : $\frac{\text{Newton}}{\text{Meter}}$

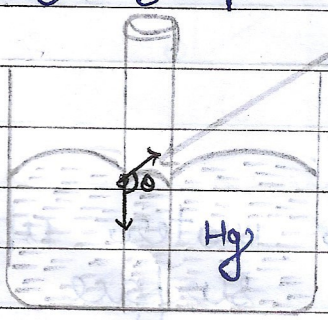
D.F. $[M^1 L^0 T^{-2}]$



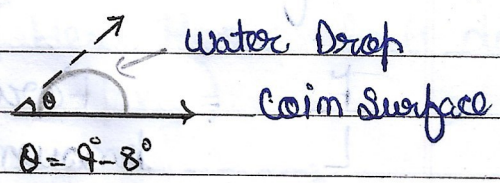
Ans 29



$\theta = 8° - 9°$



$\theta = 135°$



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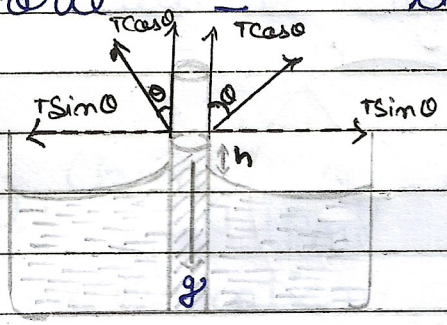
Angle of Contact is the angle between two tangent line, One tangent line draw to the solid surface & another tangent line draw to the liquid surface.

For water Angle of Contact is less than $90°$, $\theta < 90°$

For mercury Angle of Contact is greater than $90°$, $\theta > 90°$

Derivation of Surface

Upward Force = downward Force



$$2\pi r \times T\cos\theta = \text{Cylinder Volume} \times d \times g$$

$$2\pi r \cdot T\cos\theta = \pi r^2 h \times d \times g$$

$$T = \frac{\pi r^2 h\, dg}{2\pi r \cos\theta}$$

$$T = \frac{r h d g}{2\cos\theta}$$

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Ans 30

1 Angular Displacement $\left[\frac{\text{Arc}}{\text{Radius}}\right]$

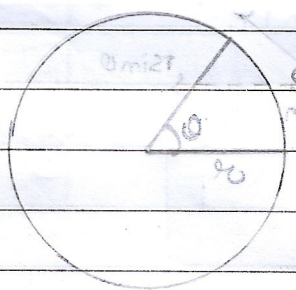
The Ratio of arc upon radius is called angular displacement & it is Dimensional less Quantity.

S.I. unit = Radian

Dimensionless = $[M^0L^0T^0]$

Formula :

$$\theta = \frac{S}{r} = \left[\frac{\text{Arc}}{\text{Radius}}\right]$$



2. Angular velocity $\left[\Omega = \frac{\theta}{t}\right]$ $\theta = \frac{\text{Arc}}{\text{Radius}}$

The Ratio of $\frac{\text{Angular displacement}}{\text{time}}$ is known as Angular Velocity.

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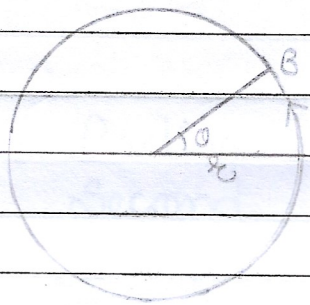
$$\omega = \frac{\theta}{t} = \frac{\text{Angular Displacement}}{\text{time}}$$

S.I. unit = $\frac{\text{Radian}}{\text{Second}}$

D.F. = $[M^0 L^0 T^{-1}]$



3. Angular Accelaration $\left[\alpha = \frac{\omega_2 - \omega_1}{t_2 - t_1} = \frac{\Delta\omega}{\Delta t}\right]$

Rate of Change of Angular Velocity with Respect of time is called Angular Accelaration.

$$\alpha = \frac{\omega_2 - \omega_1}{t_2 - t_1} = \frac{\Delta\omega}{\Delta t}$$

$$\alpha = \frac{\text{Angular Velocity}}{\text{time}}$$

S.I. unit = $\frac{\text{Radian}}{\text{Second}^2}$

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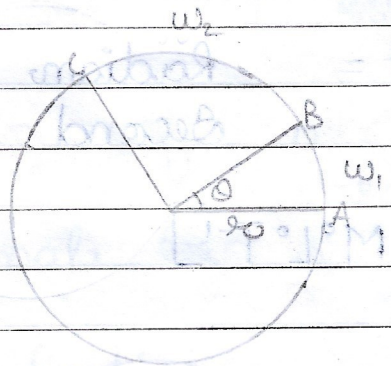
D.F. $[M^0L^0T^{-2}]$



Ans 31

1. Frequency :

No. of Vibration in one second is called frequency.

Formula :

$$f = \frac{1}{T}$$

S.I. unit = Hertz

D.F. = $[M^0L^0T^{-1}]$

$t = 1$ Sec

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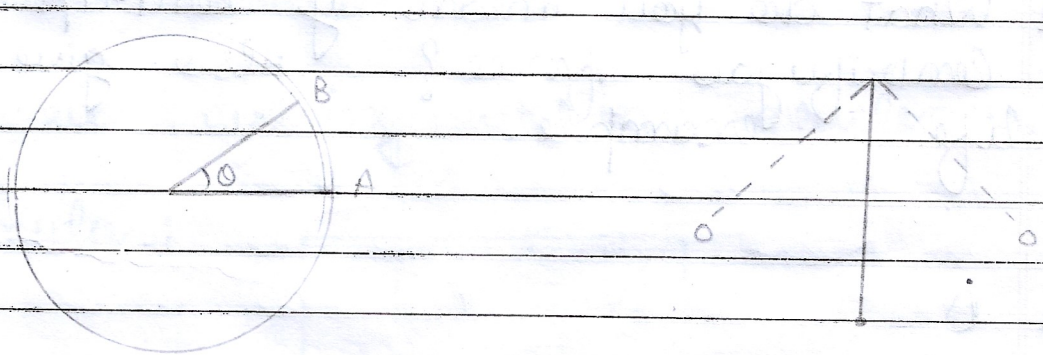
2. Angular Frequency

No. of Vibration in 1 cycle is called Angular Frequency.

ω = Angular Displacement $\times \frac{1}{T}$

$\omega = \frac{2\pi}{T}$

S.I. unit : Radian / Second



D.F. = $[M^0L^0T^{-1}]$

3. Time Period

Time taken to complete 1 cycle is called Time Period.

Formula : $\frac{1}{f}$

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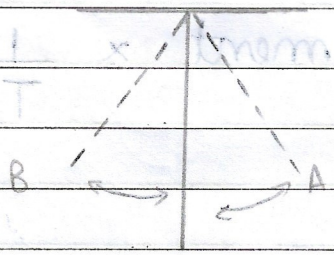
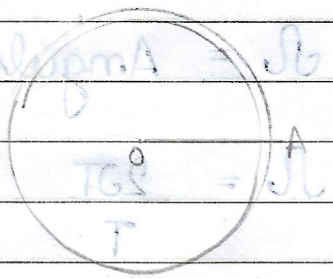
S.T. = seconds

D.F. $[M^0L^0T^1]$





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Q.32 What do you mean by centripetal & Centrifugal force? Also give their life example.

Q.33 Derive the Derivation of Centrifugal force Or Centripetal force.

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Ans 82 Centripetal force.

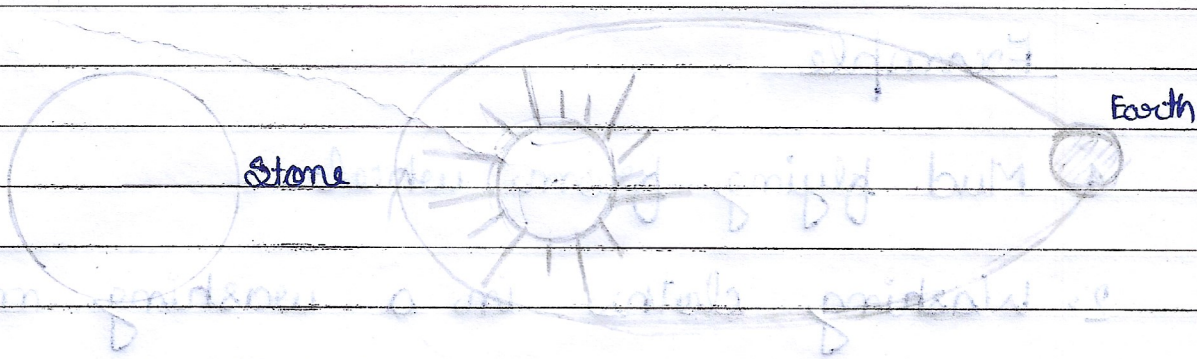
Any Object moving in a circular track, then object experience a force that is towards the centre, collect centripetal force.

Example

1. Stone tied with string and moving in a circular track.
2. Earth moving around sun in a circular track.
3. Electrons moving around nucleous.

Formula :

$$F = \frac{mv^2}{r}$$



Gravitational Force

$$F = \frac{g\ Me\ Ms}{r^2}$$

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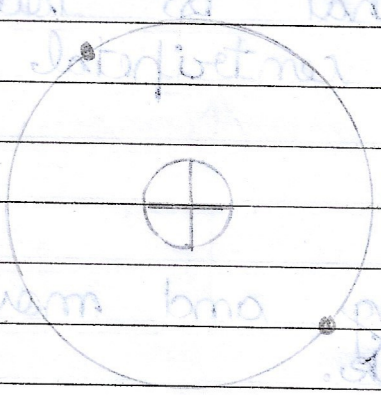
$$F = \frac{Kg\ q_2}{r^2}$$



Electrolysis force

2. Centrifugal force

Amy Object moving in a circular track then Object experience a force that is outward from ~~centre~~ center that is called Centrifugal force.

Example

1 Mud flying from wheel

2. Washing clothes in a washing machine

3. When ~~care~~ car is moving on a circular track then centrifugal force apply on passenger

14 Dec 2022

4. Roller Coaster.

$$F = \frac{-mv^2}{r}$$