Loyola

EC SCIENCE

7

TERM - I, II, III

INCLUDE - MIND MAP

This special guide is prepared on the basis of New Syllabus

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லொயோலா பப்ளிகேஷன்

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Preface

1. விடைகள் மிக எளிமையாகவும், மாணவ மாணவிகள் எளிதில் புரியும் வண்ணம் 10, 11 மற்றும் 12ம் வகுப்பு அரசுத் தேர்வில் விடைத்தாள் மதிப்பீடு செய்வது போல் அதன் (Key) அடிப்படையில் தயாரிக்கப்பட்டுள்ளது.

2. 2 மற்றும் 5 மதிப்பெண் விடைகள் சற்று விரிவாக கொடுக்கப்பட்டுள்ளது.

3. தேவைக்கேற்ப கூடுதல் வினாக்கள் கொடுக்கப்பட்டுள்ளது.

4. 6ம் வகுப்பு முதல் 9ம் வகுப்பு வரை அனைத்து நூல்களும் அரசுத்தேர்வை நோக்கியே எழுதப்பட்டுள்ளது.

குறிப்பு: Loyola EC புத்தகங்களை 10, 11 மற்றும் 12ம் வகுப்பு மாணவ மாணவிகள் வாங்கிப் பயின்றால், அரசுத் தேர்வில் அதிக மதிப்பெண் பெற்று உச்சத்தை தொடலாம் என்பதை மகிழ்ச்சியுடன் தெரிவித்துக் கொள்கிறோம்.

வாழ்த்துக்கள்

அன்புடன்

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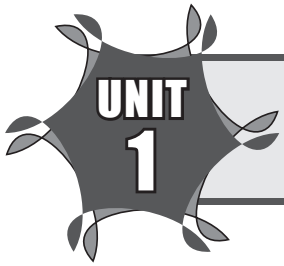


MEASUREMENT

PART I - TEXTBOOK EVALUATION

I. Choose the appropriate answer

1. Which of the following is a derived quantity?
a) mass b) time c) area d) length **Ans: c) area**

2. Which of the following is correct?
a) 1L=1cc b) 1L=10cc c) 1L=100cc d) 1L=1000cc **Ans: d)1L = 1000cc**

3. SI unit of density is
a) kg/m^2 b) kg/m^3 c) kg/m d) g/m^3 **Ans: b)kg/m^3**

4. Two spheres have mass and volume in the ratio. 2:1.The ratio of their density is
a) 1:2 b) 2:1 c) 4:1 d) 1:4 **Ans: a) 1 : 2**

5. Light year is the unit of
a) Distance b) time c) density d) both length and time
Ans: a) Distance

II. Fill in the blanks

1. Volume of irregularly shaped objects are measured using the law of __. **Ans: Archimedes**
2. One cubic metre is equal to _____ cubic centimetre. **Ans: 1,000,000**
3. Density of mercury is _____ **Ans: 13,600kg/m^2**
4. One astronomical unit is equal to _____. **Ans: 1.496x10^{11}m**
5. The area of a leaf can be measured using a _____. **Ans: Graph Sheet**

III. State true or false. If false, Correct the statement

1. The region covered by the boundary of the plane figure is called its **volume.**
Ans: False - The region covered by the boundary of the plane figure is called its **area**
2. Volume of liquids can be found using measuring containers **Ans: True**
3. Water is denser than kerosene. **Ans: True**
4. A ball of iron floats in mercury. **Ans: True**
5. A substance which contains less number of molecules per unit volume is said to be **denser.**
Ans: False - A substance which contains less number of molecules per unit volume is said to be **lighter**

IV. Match the following items

I.	Column -I	Column - II		Answers	
i	Area	a	light year	**c**	**m^2**
ii	Distance	b	m^3	**a**	**light year**
iii	Density	c	m^2	**e**	**kg/m^3**
iv	Volume	d	kg	**b**	**m^3**
v	Mass	e	kg/m^3	**d**	**kg**

II.	Column -I	Column - II		Answers	
i	Area	a	g/cm^3	**e**	**plane figures**
ii	Length	b	measuring jar	**d**	**rope**
iii	Density	c	amount of a substance	**a**	**g/cm^3**
iv	Volume	d	rope	**b**	**measuring jar**
v	Mass	e	plane figures	**c**	**amount of a subtance**

V. Arrange the following in correct sequence

1. 1L,100cc,10 L,10 cc **Ans: 10cc,100cc,1L,10L**

2. Copper, Aluminium, Gold, Iron **Ans : Aluminium, Iron, Copper, Gold**

VI. Use the analogy to fill in the blank

1. Area: m^2 :: Volume :_____. **Ans: m^3**

2. Liquid : Litre :: Soild :_____. **Ans: kilogram**

3. Water : kerosene :: _____ : Aluminium **Ans: Iron**

VII. Consider the following statements and choose the correct option

1. Assertion : Volume of a stone is found using a measuring cylinder.
Reason : Stone is an irregulary shaped object.

a) Both assertion and reason are true and reason is the correct explanation of assertion.
b) Both assertion and reason are true, but reason is not the correct explanation of assertion.
c) Assertion is true but reason is false.
d) Assertion is false but reason is true.

Ans : a) Both assertion and reason are true and reason is the correct explanation of assertion.

2. Assertion : Wood floats in water.
Reason : Water is a transparent liquid.
a) Both assertion and reason are true and reason is the correct explanation of assertion.
b) Both assertion and reason are true, but reason is not the correct explanation of assertion.
c) Assertion is true but reason is false.
d) Assertion is false but reason is true.

Ans : b) Both assertion and reason are true, but reason is not the correct explanation of assertion.

3. Assertion : Iron ball sinks in water.
Reason : water is denser than iron.
a) Both assertion and reason are true and reason is the correct explanation of assertion.
b) Both assertion and reason are true, but reason is not the correct explanation of assertion.
c) Assertion is true but reason is false.
d) Assertion is false but reason is true.

Ans : c) Assertion is true but reason is false

VIII. Answer very briefly

1. Name some of the derived quantities.

- Area
- Volume
- Speed
- Eleetric charge
- Density

2. Give the value of one light year.

- Light year = 9.46×10^{15}m.

3. Write down the formula used to find the volume of a cylinder.

- Volume of a cylinder $=\pi r^2 h$

4. Give the formula to find the density of objects.

- $\text{Density(D)} = \frac{\text{Mass(M)}}{\text{Volume(v)}}$

$D = \frac{M}{V}$

5. Name the liquid in which iron ball sinks.

- The Iron ball sinks in water.

6. Name the units used to measure the distance between celestial objects.

- Astronomical unit.
- Light year.

7. What is the density of gold?

- Density of gold = 19,300 kg/m^3.

IX. Answer briefly

1. What are derived quantities?

- The physical quantities which can be obtained by mathematically combining (i.e., multiplying and dividing) the fundamental quantities are known as " Derived quantities".
- Their corresponding units called Derived Units.

2. Distinguish between the volume of liquid and capacity of a container.

	Volume of liquid	Capacity of a container
1	Volume is the amount of space taken up by a liquid	Capacity is the measure of an objects ability to hold a substance like solid, liquid or gas
2	It is measured in cubic units	It is measured in litres, gallons, pounds, etc.
3	It is calculated by multiplying the length, width and height of an object	It's measurement is cc or ml.

3. Define the density of objects.

Density of a substance is defined as the mass of the substance contained in unit volume ($1m^3$).

4. What is one light year?

- One light year is defined as the distance travelled by light in vacum during the period of one year.
- 1 Light year = 9.46×10^{15}m.

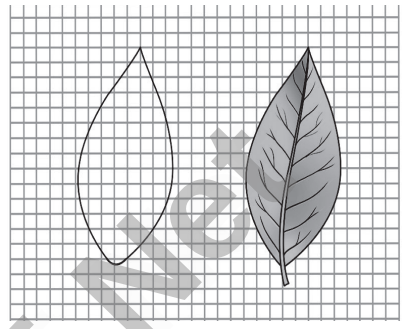
5. Define - Astronomical unit?

- One astronomical unit is defined as the average distance between the earth and sun. = 149.6 million km.
- 1 AU = 149.6×10^6km=1.496×10^{11}m.

X. Answer in detail

1. Describe the graphical method to find the area of an irregularly shaped plane figure.

Take a leaf from any one of the trees in your neighbour hood . Place the leaf on a graph sheet and draw the outline of the leaf with a pencil. Remove the leaf. You can see the outline of the leaf on the graph sheet.



Area of an irregularly shaped plane figure

i. Now, count the number of whole squares enclosed within the outline of the leaf. Take it to be M.

ii. Then, count the number of squares that are more than half. Take it as N.

iii. Next, count the number of squares which are half of a whole square. Note it to be P.

iv. Finally, count the number of squares that are less than half. Let it be a Q.

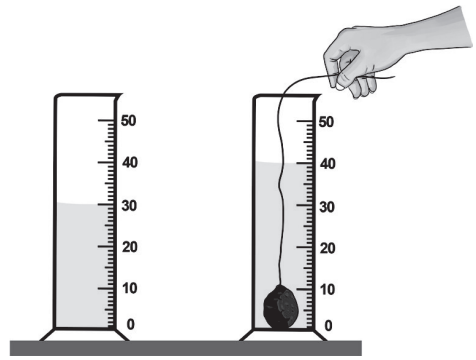
v. Now, the approximate area of the leaf can be calculated using the following formula.

Approximate area of the leaf = M + (3/4) N + (1/2) P + (1/4) Q

This formula can be used to calculate the area of any irregularly shaped plane figures.

2. How will you determine the density of a stone using a measuring jar?

- Take a measuring cylinder and pour some water into it.
- Note down the volume of water from the readings of the measuring cylinder.
  - Take it as V_1, Now take a small stone and tie it with a thread.
  - Immerse the stone inside the water by holding the thread.
  - This has to be done such that stone does not touch the walls of the measuring cylinder.



- Now the level of water has raised.
- Note down the volume of water and Take it to be V_2
- The volume of the stone is equal to the raise in the volume of water.
- V_1 =30m^3; V_2=40 m^3

Volume of stone = $V_2 - V_1$ **= 10 m^3**

XI. Questions based on Higher Order Thinking skills

1. There are three spheres A,B,C as shown below:

A B C

Sphere A and B are made of the same material. Sphere C is made of a different material. Spheres A and C have equal radii. The radius of sphere B is half that of A. Density of A is double that of C. Now answer the following questions:

1. **Find the ratio of masses of spheres A and B.**
2. **Find the ratio of volumes of spheres A and B.**
3. **Find the ratio of masses of spheres A and C.**

A and B are same C is different

RA = RC

RB = ½ RA

i) $\rho A = 2\rho C$

$$\text{Density } \rho = \frac{\text{Mass}}{\text{Volume}}$$

$$\rho_A = \frac{M_A}{\frac{4}{3}\pi R_A^3} \qquad \rho_B = \frac{M_B}{\frac{4}{3}\pi R_B^3}$$

$$\frac{MA}{MB} = \frac{R_A^3}{R_B^3} = \frac{(2RB)^3}{R_B^3} = \frac{8}{1} = \boxed{8:1}$$

ii) Volume of the sphere

$$A = \frac{4}{3}\pi r^3$$

Volume of the sphere

$$B = \frac{4}{3}\pi\left(\frac{r}{2}\right)^3$$

$$\frac{A}{B} = \frac{4}{3}\rho r^3 \times \frac{3 \times 8}{4\rho r^3}$$

$$\frac{A}{B} = \frac{8}{1}$$

AB=8:1

iii) mass of the sphere A = 2dv

mass of the sphere C = dv

$$\frac{A}{C} = \frac{2dv}{dv} = 2;1$$

A : C : 2:1

XII . Numerical Problems

1. **A circular disc has a radius 10cm. Find the area of the disc in m^2. (Use $\pi = 3.14$).**

Given : Radius = 10 Cm (or) 0.1m

Solution :

Formula: area of the disc = πr^2

$= 3.14 \times 0.1 \times 0.1$

$= 0.0314 m^2$

2. **The dimension of a school playground is 800 m × 500 m. Find the area of the ground.**

Given : The dimension of a school Playground = $l \times b$ = 800m × 500m

Formula : Area of the ground A = $l \times b$

$= 800 \times 500$

$= 4,00,000$

$A = 4,00,000\ m^2$

3. **Two spheres of same size are made from copper and iron respectively. Find the ratio between their masses. Density of copper 8,900 kg/m^3 and iron 7,800 kg/m^3.**

Given : Density of copper = 8,900 kg/m^3

Density of iron = 7,800 kg/m^3

Solution :

Formula :

$$\text{density} = \frac{\text{mass}}{\text{Volume}}$$

$$d_c = \frac{m_c}{V}, \qquad d_1 = \frac{m_I}{V}$$

$$\frac{m_I}{V} = \frac{d_c}{d_1} = \frac{8900}{7800} = \frac{1.14}{1}$$

$$\boxed{M_C : M_1 = 1.14 : 1}$$

4. A Liquid having a mass of 250g fills a space of 1000cc. Find the density of the liquid.

Given : Mass of a liquid M = 250g

Volume V = 1000cc

Density of the liquid D = ?

Solution :

Formula :

$$\text{Density D} = \frac{\text{Mass } (m)}{\text{Volume } (v)}$$

$$= \frac{250}{1000}$$

$$= 0.25 \text{ g/cc}$$

Density of the liquid = 0.25 Kg / m^3

5. A sphere of radius 1 cm is made from silver. If the mass of the sphere is 33g, find the density of silver. (Take π= 3.14)

Given : radius of a sphere r = 1cm

Volume of the sphere V = ?

Mass of the sphere M = 33g

Density of silver D = ?

Solution :

Formula :

$$\text{Density D} = \frac{\text{Mass of the sphere } (M)}{\text{Volume of the sphere } (V)}$$

Mass of the sphere (M) = 33g

Volume of the sphere (V)

$$= \frac{4}{3}\pi r^3 = \frac{4}{3} \times 3.14 \times 1 \times 1 \times 1 = 4.187 (\text{cm}^3)$$

$$D = \frac{33}{4.187} = 7.889 \text{ g/cc}$$

Density of silver sphere = 7.889 kg/m^3

XIII . Cross word puzzle

	(1) K	E	L	(a) V	I	N					
				E							
	(d) L			L		(b) C					(c) M
	I		(2) V	O	L	U	M	E			E
	G			C		B					R
	H			I		I					C
	T			T		C					U
	Y			Y		M					R
	E				(3) D	E	N	S	I	T	Y
(4) C	A	P	A	C	I	T	Y				
	R					R					
						E					

CLUES - ACROSS		CLUES - DOWN	
1	SI unit of temperature	a	A derived quantity
2	A derived quantity	b	SI unit of volume
3	Mass per unit volume	c	A liquid denser than iron
4	Maximum volume of liquid a container can hold	d	A unit of length used to measure very long distances

Answers			
1. Kelvin	2. Volume	3. Density	4. Capacity
a. Velocity	b. Cubic metre	c. Mercury	d. Lightyear

PART II - ADDITIONAL QUESTIONS

I. Choose the appropriate answer

1. The _____is a measure of how much space there is on a flat surface.
a) Fundamental quantities b) Derived quantities
c) Area d) Volume **Ans: c) Area**

2. The SI unit of volume is
a) Cubic metre b) Square meter
c) Coulomb (c) d) Kg $m^{-3.}$ **Ans: a) Cubic metre**

3. If the density of copper is
a) 7800 Kg/m^3 b) 8900Kg/m^3
c) 10.500Kg/m^3 d) 2700Kg/m^3 **Ans: b) 8900Kg/m^3**

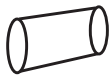
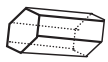
4. _____ has more density oils like cooking oil and castor oil.
a) Kerosene b) Water c) Mercury d) Iron **Ans: b) Water.**

5. The distance between the earth and sun is about _____.
a) 145.1 million kilometer b) 143.1 million kilometer.
c) 147.1 million kilometer d) 148.1 million kilometer
Ans: c) 147.1 million kilometer

II. Fill in the blanks	Answers
1. A value and unit are used to express the magnitude of a _____.	**Physical quantity**
2. One square metre is the area enclosed inside a square of side ___ .	**1 metre**
3. The materials with lower density are called _____ .	**Rarer**
4. The average distance between the earth and the sun is about _____.	**149.6 million kilometer**
5. We have learnt that the speed of light in vacuum is _____.	**$3x10^8$ m/s**

III. State True or False

1. All other physical quantities which can be obtained by mathematically combing the fundamental quantities are known as derived quantities. **Ans: True**
2. A volume of 1000cc is termed as **two litre (*l*).** **Ans: False**
Correct Ans : A volume of 1000 cc is termed as **one litre (*l*)**
3. The volume of the stone is equal to the **decrease** in the volume of water. **Ans: False**
Correct Ans : The volume of the stone is equal to the **raise** in the volume of water.
4. SI unit of density is kg/m^3. The CGS unit of density is g/cm^3. **Ans: True**
5. Density of castor oil is **961 kg/m^2.** **Ans: False**
Correct Ans : Density of castor oil is **961 kg/m^3**.

IV. Match the following					Answers	
1.	a		i	Hexagonal prism	**iii**	**Cylinder**
	b		ii	Cone	**iv**	**Cube**
	c		iii	Cylinder	**ii**	**Cone**
	d		iv	Cube	**i**	**Hexagonal prism**

2.

Match the following				Answers	
a	Square	i	πr^2	**iv**	**$a \times a = a^2$**
b	Rectangle	ii	$\frac{1}{2} \times b \times h$	**iii**	**$l \times b = lb$**
c	Circle	iii	$l \times b = lb$	**i**	**πr^2**
d	Triangle	iv	$a \times a = a^2$	**ii**	**$\frac{1}{2} \times b \times h$**

3.

Materials		Density		Answers	
a	Kerosene	i	7,800	**iii**	**800**
b	Wood	ii	19,300	**iv**	**770**
c	Iron	iii	800	**i**	**7,800**
d	Gold	iv	770	**ii**	**19,300**

V. Arrange the following in correct sequence

1. Kerosene, Wood, Mercury, Water. **Ans: Wood, Kerosene, Water, Mercury.**
   Reason: Density (kg/m^3)
   Wood, 770, kerosene 800, Water 1000, mercury 13,600.

2. 1000ml, 250ml, 100ml, 500ml **Ans: 100ml, 250ml, 500ml, 1000ml.**

VI. Analogy

1. Time ; Second : : Temperature ; _____. **Ans: Kelvin (k)**
2. Amount of substance ; mole : : Luminous intensity ; _____. **Ans: Candela**

VII. Assertion and reason

1. Assertion : The area of the plot of hand derived by multiplying the length and breadth.
Reason : The Unit of the area is = Surface area × height
Ans: Assertion is true but reason is false

2. Assertion : Neptune is 40AU away from the sun.
Reason : One astronomical Unit is defined as the average distance between the earth and sun.
Ans: Assertion is false but reason is true

VIII. Give very short answer

1. Name some of the physical quantities.
- Mass
- distance
- temperature
- volume

2. Write another units to measure the volume of liquids.
- Gallon (1 gallon = 3785ml)
- Ounce (1 ounce = 30ml)
- quart (1 quart = 1 litre)

3. What is denser?
- The materials with higher density.

4. How do relationship between mass, density and volume.
- Density = mass/ volume
- Mass = Density x volume
- Volume = Mass/ Density

IX. Give short answer

1. What is Fundamental quantities?

A set of physical quantities which cannot be expressed in terms of any other quantities are known as Fundamental quantities.

2. Name of the volume of some regularly shaped figures.
- Cube $a \times a \times a = a^3$
- Cuboid $l \times b \times h = lbh$
- Sphere $4/3\pi r^3$
- Cylinder $\pi r^2 h$

3. What is capacity of the container?

The maximum volume of that a container can hold is known as the capacity of the container.

4. Definition of density with formula.
- Density of a substance is defined as the mass of the substance contained in unit volume ($1m^3$)
- Density (D) $= \frac{\text{mass(m)}}{\text{volume(v)}}$

5. How do heavy objects sink in water and lighter objects floats is water?
- If the density of a solid is higher than that of a liquid, it sinks in that liquid.
- If the density of a solid is lower than that of a liquid, it floats in that liquid.

X. Answer in detail

1. Write the notes on physical quantities and its types.
- Quantities such as mass, weight, distance, temperature, volume are called physical quantity.

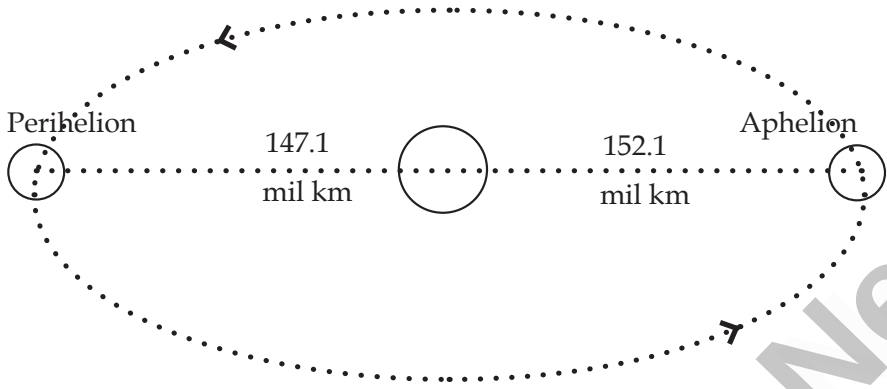
There are two types.
- Fundamental quantities
- Derived quantities

Fundamental.
- A set of physical quantities which cannot be expressed in terms of any other quantities are known as Fundamental quantities.
- Corresponding units are called Fundamental units.

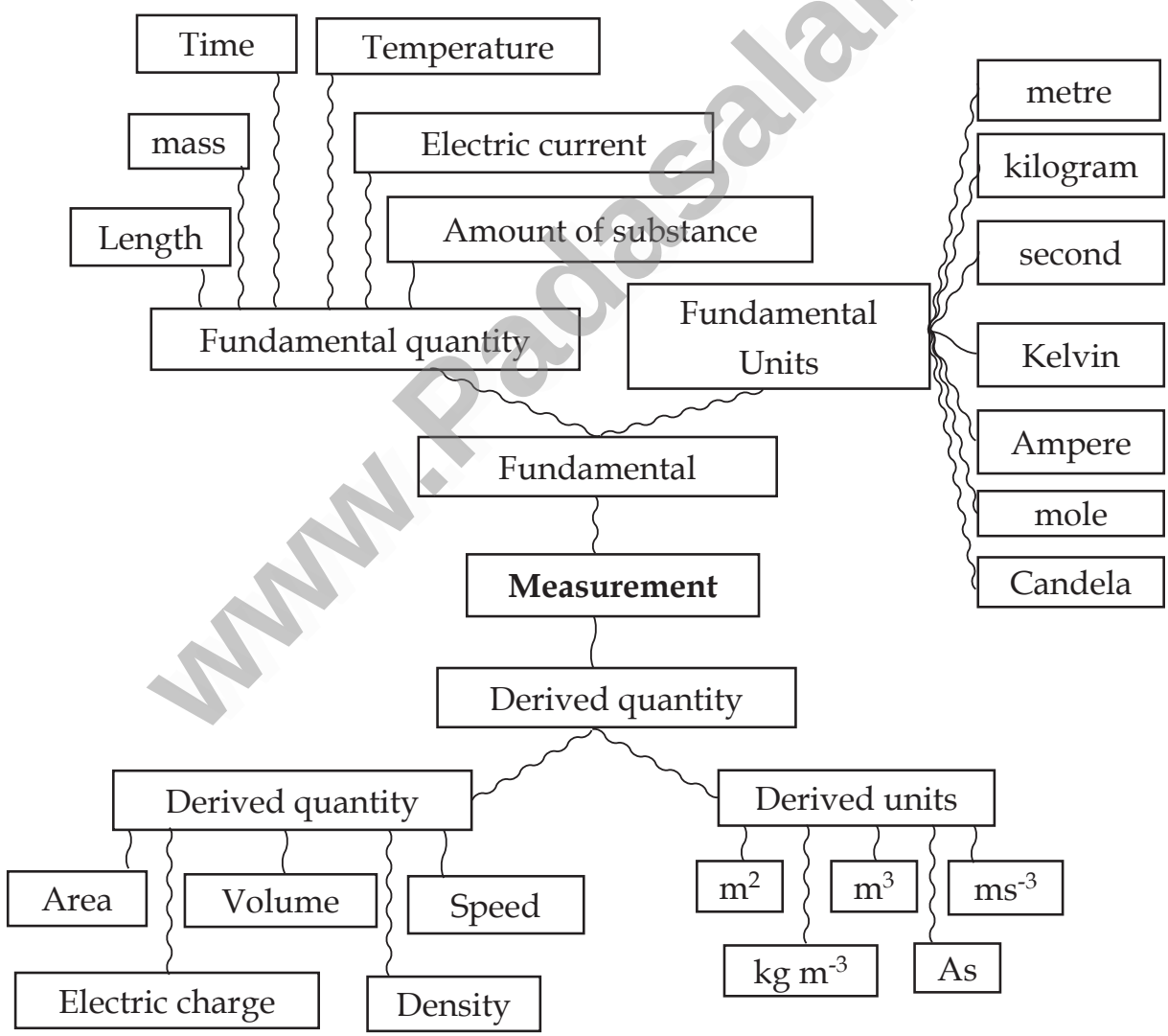
Derived quantities.
- All other physical quantities which can be obtained by multiplying, dividing (or) by mathematically combining the Fundamental quantities know as derived quantities.
- The corresponding units are called Derived quantities.
- **Example :** Area, Volume, Speed, Electric change, Density.

2. Write the notes on Astronomical Unit.
- We all know that the earth revolves around the sun in an elliptical orbit.
- Hence the distance between the sun and the earth varies every day.
- When the earth is in its perihelion position the distance between the earth and the sun is about 147.1 million kilometre.
- When the earth is in its farthest position that is when the distance between earth and sun is the largest (called aphelion position) the distance is 152.1 million kilometer.

- The average distance between the earth and sun is about 149.6 million kilometer.
- This average distance is taken as one astronomical Unit.
- Neptune is 30 AU away from the sun. It means it is thirty times farther than the earth.
- One astronomical unit is defined as the average distance between the earth and sun.
- 1AV = 149.6 million km = 149.6 x 10^6 km = 1.496 x 10^{11} m.



MIND MAP



UNIT 2

FORCE AND MOTION

PART I - TEXTBOOK EVALUATION

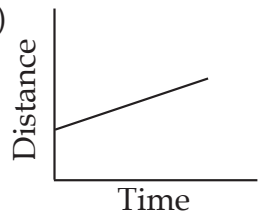
I. Choose the best answer

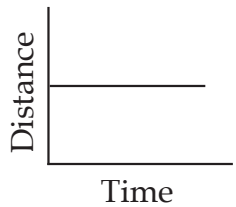
1. A Particle is moving in a circular path of radius *r*. The displacement after half a circle would be

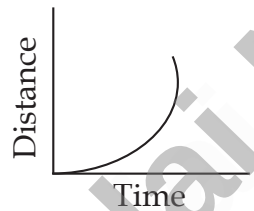
a) Zero b) R c) $2r$ d) $r/2$

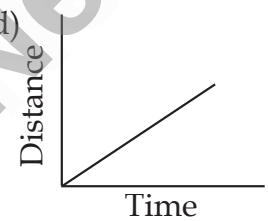
Ans: c) $2r$

2. Which of the following figures represent uniform motion of a moving object correctly?

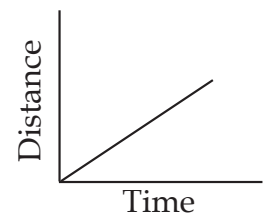
a) 

b) 

c) 

d) 

Ans: d)

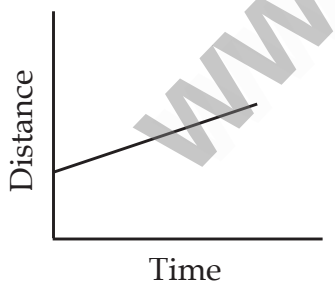


3. Suppose a boy is enjoying a ride on a merry go round which is moving with a constant speed of 10 m/s. It implies that the boy is

a) at rest b) moving with no acceleration
c) in accelerated motion d) moving with uniform velocity

Ans: c) in accelerated motion

4. From the given v-t graph it can be inferred that an object is



a) in uniform motion
b) at rest
c) in non uniform motion
d) moving with uniform acceleration.

Ans: d) Moving with uniform acceleration

5. How can we increase the stability of an object?

a) lowering the centre of gravity b) raising the centre of gravity
c) increasing the height of the object d) shortening the base of the object.

Ans: a) Lowering the centre of gravity

II. Fill in the blanks		Answers
1	The shortest distance between the two places is _____.	**displacement**
2.	The rate of change of velocity is _____.	**Acceleration**
3.	If the velocity of an object increases with respect to time, then the object is said to be in _____ acceleration.	**positive (or) just**
4.	The slope of the speed - time graph gives _____.	**Acceleration**
5.	In _____ equilibrium, the centre of gravity remains at the same height when it is displaced.	**Neutral**

III. Match the following				Answers	
1	Displacement	a	Knot	**c**	**Metre**
2	Light travelling through vacuum	b	Geometric centre	**e**	**Uniform velocity**
3	Speed of ship	c	Metre	**a**	**Knot**
4	Centre of gravity of the geometrical shaped objects	d	Larger base area	**b**	**Geometric centre**
5	Stability	e	Uniform velocity	**d**	**Larger base area**

IV. Analogy

1. velocity : metre/second :: acceleration: _____ **Ans: m/s^2**

2. length of scale : metre : : speed of aeroplane: _____ **Ans: Knot**

3. displacement / time : velocity :: speed/time: _____ **Ans: Distance**

V. Give very short answer

1. All objects having uniform speed need not have uniform velocity. Give reason.

- All objects having uniform speed need not have uniform velocity because the direction may change while the speed is constant.
- Ex. A car moving with constant speed in a circular path.

2. A girl moves at a constant speed in the same direction. Rephrase the same sentence in fewer words using concepts related to motion.

- She moves with constant velocity.

3. Correct your friend who says " The acceleration gives the idea of how fast the position changes".

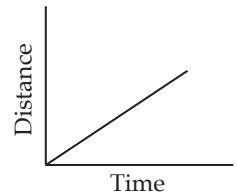
- Acceleration gives an idea of how fast the velocity changes.
- Velocity gives an idea of how fast the position changes.

VI. Give short answer

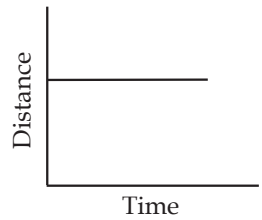
1. Show the shape of the distance - time graph for the motion in the following cases.

a. A bus moving with a constant speed. b. A car parked on a road side.

a. A bus moving with a constant speed covers equal distance in equal intervals of time. Such motion of car is represented in the given distance time graph.



b) The distance - time graph of a car parked on a road side is such that with the increase in time, there is no change in distance, as shown in the given figure.



2. Distinguish between speed and velocity

SPEED	VELOCITY
➢ Speed is the rate of change of distance	Velocity is the rate of change in displacement
➢ Speed = distance/time	Velocity = displacement / time
➢ Unit is = metre/ second	SI unit = meter/second
➢ Types: i) Uniform speed ii) Non- uniform speed	Types: i) Uniform Velocity ii) Non uniform velocity

3. What do you mean by constant acceleration?

Constant acceleration is a change in velocity that doesn't vary over a given length of time.

4. What is centre of gravity?

The centre of gravity of an object is the point through which the entire weight of the object appears to act.

VII. Answer in detail

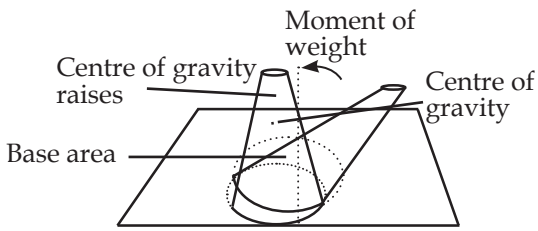
1. Explain the types of stability with suitable examples.

The are three types of stability.

1) Stable equilibrium, ii) Unstable equilibrium, iii) Neutral Equilibrium:

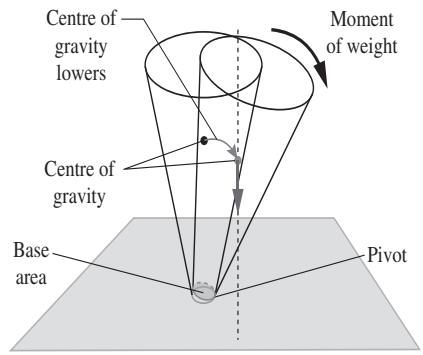
1) Stable equilibrium:

- The frustum can be fitted through quite a big angle without toppling.
- Its centre of gravity is raised when it is displaced.
- The vertical line through its centre of gravity still falls within its base.
- So it can return to its original position.



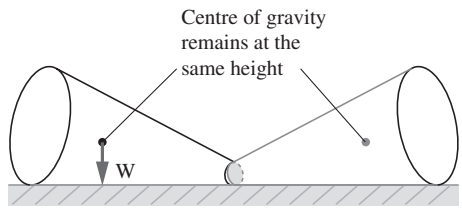
ii) Unstable equilibrium:

- The frustum will topple with the slightest tilting.
- Its centre of gravity is lowered when it is displaced.
- The vertical line through its centre of gravity falls outside its base.



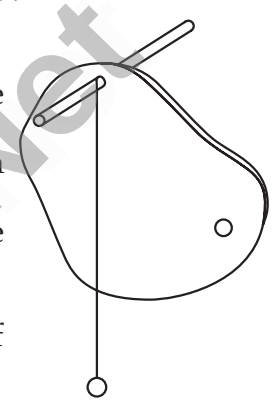
iii) Neutral Equilibrium:

- It causes frustum to topple.
- The frustum will roll about but does not topple
- Its centre of gravity remains at the same height when it is displaced.
- The body will stay in any position to which it has been displaced.



2. Write about the experiment to find the centre of gravity of the irregularly shaped plate.

- **Apparatus:** Irregularly shaped card, string, pendulum bob, stand.
- **Procedure:**
  1. Make three holes in the lamina.
  2. Suspend the lamina from the optical pin through one of the holes as shown.
  3. Suspend the plumbline from the pain and mark the position of the plumbline on the lamina.
  4. Draw lines on the lamina representing the positions of the plumbline.
  5. Repeat the above steps for the holes.
  6. Label the intersection of the three lines as x the position of the centre of gravity of the lamina.



Metre Rule:

- The ruler is in equilibrium when supported at its centre of gravity.
- For a regular object such as a uniform metre rule, the centre of gravity is at the centre of the object.
- When the object is supported at that point it will be balanced.
- If it is supported at any other point it will topple.

VIII. Numerical Problems

1. Geetha takes 15 minutes from her house to reach her school on a bicyle. If the bicycle has a speed of 2 m/s, calculate the distance between her house and the school.

Given :

Speed of the bicycle = 2 m/s

Time takes by Geetha to reach school from the house = 15 minute = 15x60 s =900s

Speed = distance/ time

Hence Distance = speedx time

= 2m/s x900 sec

= 1800 m

Distance between Geetha house and school = 1800 m

2. A car started from rest and travelling with velocity of 20 m/s in 10 s. What is its acceleration?

Given : Velocity = 20 m/s, Time = 10 s

Solution :

Initial Velocity U = 0 m/s

Final Velocity (v) = 20 m/s

Time taken (t) = 10 s

acceleration (a) = (V-U)/t

= (20-0)/10

= $2 m/s^2$

3. A bus can accelerate with an acceleration 1 m/s^2.Find the minimum time for the bus to reach the speed of 100 km/s from 50 km/s.

a = $1ms^2$; V = 100; U = 50

$$a = \frac{v-u}{t}; \quad 1 = \frac{100-50}{t}; \quad \boxed{t = 50s}$$

IX. Fill in the boxes

S. No	First Move	Second Move	Distance (m)	Displacement
1	Move 4 meters east	Move 2 meters west	6	2 m east
2	Move 4 meters north	Move 2 meters south	6	2 m north
3	Move 2 meters east	Move 4 meters west	6	4 m east
4	Move 5 meters east	Move 5 meters west	10	5 m east
5	Move 5 meters south	Move 2 meters north	7	2 m south
6	Move 10 meters west	Move 3 meters east	13	3 m west

PART II - ADDITIONAL QUESTIONS

I. Choose the best answer

1. The SI unit of both the distance and displacement

a) meter/second b) meter
c) m/s^2 d) all the above

Ans: b) meter

2. One nautical mile is _____

a) 1.952 km b) 1.752 km
c) 1.852 km d) 1.652 km

Ans: c)1.852 km

3. A train starting and moving out of the season

a) Uniform Velocity
b) Uniform Speed
c) Non- Uniform Velocity
d) Non - Uniform speed

Ans: c) Non-Uniform Velocity

4. The body will stay in any positioto which it has been displaaced.

a) Unstable equilibrium
b) Neutral Equilibrium
c) Stable equilibrium
d) all the above

Ans: b) Neutral Equilibrium

5. Usain Bolt covers 100 m distance in

a) 10.58 seconds b) 9.58 seconds
c) 9.78 seconds d) 10.78 seconds

Ans: b) 9.58 seconds

II. Fill in the blanks

1. The _____ path is the shortest distance between two points. **Ans : straight line**
2. _____ is the unit for measuring the distance in the field of aviation and sea transportation. **Ans :Nautical mile.**
3. ___ is the rate of change in displacement **Ans :Velocity**
4. Generally the centre of gravity of the geometrical shaped object lie on the of the object _____. **Ans :Geometric centre**
5. The _____ and the total weight of the doll is concentrated at its bottom most point, generating a dance -like continuous movement with slow oscillations. **Ans :Centre of gravity**

III. State True (or) False

1. One knot is the speed taken to travel one nautical mile in hour. **Ans : True**
2. If a body in motion covers equal distances in equal intervals of time, than the body is said to be in uniform speed. **Ans : True**
3. Speed is the rate of change of **displacement** **Ans : False**
   Correct Ans : Speed is the rate of change of **distance.**
4. An object undergoes non uniform acceleration if the change in its velocity for every unit of time is **the same. Ans : False**
   Correct Ans : An object undergoes non uniform acceleration if the change in its. Velocity for every unit of time is **not same.**
5. The ruler is in equilibrium when supported at its centre of gravity. **Ans : True**

IV. Match the following question

1.

I		II		Answers	
1	Tortoise	a	20-25 km/h	**d**	**0.1 m/s**
2	Cat running	b	180 m/s	**e**	**14 m/s**
3	Cycling	c	80-90 m/s	**a**	**20-25 km/h**
4	Passenger jet	d	0.1 m/s	**b**	**180 m/s**
5	Badminton smash	e	14 m/s	**c**	**80-90 m/s**

2.

I		II		Answers	
1	Speed	a	change in Velocity / Time	**d**	**Distance / Time**
2	Velocity	b	centre of gravity	**e**	**Displacement / Time**
3	Acceleration	c	start and end	**a**	**change in Velocity /Time**
4	Distance	d	Distance/ Time	**c**	**Start and end**
5	Thanjavur Doll	e	Displacement/time	**b**	**Centre of gravity**

V. Arrange the following in correct sequence

1. **20-20, 60-20, 100-20, 40-20, 80-20.**
   Deceleration : 100-20, 80-20, 60-20, 40-20, 20-20

2. **Falling raindrop, Bowling speed, cheetah running, person walking.**
   Person walking, Falling raindrop, cheetah running, Bowling speed.

VI. Analogy

1. Average speed : total distance travelled / time taken to travel the distance
   Average Velocity : _____ **Ans : Total displacement/ total time taken**
2. Car at rest: The distance is a constant for every second
   Car travelling at uniform speed ; ____ **Ans : The distance increase 10m every second.**

VII. Assertion and reason

1. **Assertion** : Let us consider a bus travelling from Thanjavur to Trichy
   Reason : The speed and time are recorded and a graph is plotted using the data.
   Ans: If both assertion and reason are true and reason is the correct explanation of assertion

2. **Assertion** : The speed of the bus is not measured for every second
   Reason : Racing cars are built low and broad for stability.
   Ans: Assertion is false but reason is true.

VIII. Give very short answer

1. **An object has moved through a distance can it have Zero displacement? If yes support your answer with an example?**
   - Yes, the object instead of moving through a distance can have zero displacement.
   - Example: If an object travels from point A and reaches to the same point A then its displacement is zero.

2. What does the path of an object look like when it is in uniform motion?

- It is a straight line.

3. What is the nature of the distance time graphs for uniform and non-uniform motion of an object?

- For uniform motion of an object. Its distance-time graph is straight line with constant slope.
- For non - uniform motion of an object. Its distance time graph is a curved line with increasing or decreasing slope.

IX. Give short answer

1. Dintinguish between Distance and Displacement.

Distance	Displacement
The total length of a path taken by an object to reach one place from the other is called distance	The shortest distance from the initial to the final position of an object.

2. What are help to triangle method?

The triangle method can help to you to recall relationship between velocity (v) displacement (d), and time (t) V=d/t, t=d/v, d=vxt

3. What is Negative acceleration?

If the velocity of an object decrease with respect to time, then the object is said to be in negative acceleration (or) deceleration (or) retardation.

4. What are comparisons between distance - time and speed - time graphs.

- Speed - time graph and Distance - time graphs look very similar.
- But they give different information.

5. What is stability ?

Stability is a measure of the body's ability to maintain its original position.

X. Answer in detail

1. Explain the velocity and types of velocity with suitable example.

- Velocity is the rate of change in displacement.
- Velocity (v) = displacement \ time
- SI Unit - meter\ second

Types

- Uniform Velocity
- Non uniform Velocity
- **Uniform Velocity**
  - A body has Uniform velocity, if it covers equal displacement in the same direction in equal intervals of time.
  - E.g Light travels through vacuum.
- **Non-Uniform Velocity**
  - If either speed (or) direction changes the velocity is non uniform.
  - E.g A train starting and moving out of the station.

2. Explain the types of acceleration?

There are Two types

- Uniform acceleration
- Non uniform acceleration

- **Uniform acceleration**
  - An object undergoes uniform acceleration when the change in its velocity for every unit of time is the same.
- **Non-Uniform acceleration**
  - An object undergoes non uniform acceleration if the change in its velocity for every unit of time is not the same.

MIND MAP