MOTION IN A LINE

LEARNING OBJECTIVES :

- Rest and motion, kinds of motion.
- We will investigate the words used to describe the motion of objects. The hope is to gain a comfortable foundation with the language that is used throughout the study of mechanics. We will study the terms such as scalars, vectors, distance, displacement, speed, velocity and acceleration.
- How to describe straight-line motion in terms of average velocity, instantaneous velocity, average acceleration and instantaneous acceleration etc.
- How to solve problems involving straight-line motion with uniform acceleration.
- Usage of equations of motion, vertical projection.
- **Displacement time graphs**
- Velocity-time graphs
- Acceleration-time graphs ۵

Real time application:

- dation Φ What distance must an airliner travel down a runway before reaching takeoff speed? When you throw a baseball straight up in the air, how high does it go? When a glass slips from your hand, how much time do you have to catch it before it hits the floor? This kind of all questions are answered.
- Φ Usefull to sketch the time tables for buses, trains, etc.
- Φ Usefull in Engineering works.
- Φ Usefull in finding height of a building, height of a bridge from water level etc.
- Φ Without motion there will be no vehicle, no river, no wind can flow etc i.e. we can not expect our life without these.
- Φ Useful in understanding nature of motion
- Φ Useful in calculating displacement, velocity and acceleration like quantites
- Φ Useful in predicting arival time of vehicles like bus, train
- Φ Useful in constructing time tables.

Important Formulae: ٨

Speed = Distance travelled. 1.

- Average speed = $\frac{\text{total distance}}{\text{total time.}}$ 2.
- 3. If a body travels first half of the distance with a speed V_1 and second half of the distance

with a speed V₂ then average speed is given by $V_{avg} = \frac{2V_1V_2}{v_1 + v_2}$

4. If v_1 and v_2 are the speeds of a body during the first half and second half times then

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average speed = $\frac{v_1 + v_2}{2}$. 5. If a body travels first 1/3 rd of the distance with a speed V_1 and next 1/3 rd of the distance with a speed V_2 and remaining 1/3 rd of the distance with a speed V_3 then the average speed is given by $V = \frac{3v_1v_2v_3}{v_1v_2 + v_2v_3 + v_3v_1}$ 6. Velocity(\vec{V}) = $\frac{\text{Displacement}}{\text{time}} = \frac{s}{t}$ Average Velocity(V) = $\frac{\text{Total displacement}}{\text{Total time.}}$ 7. 8. If a body covers the first half of the distance with velocity V_1 and the remaining half distance with velocity V₂ then, Average Velocity = $\frac{2V_1V_2}{V_1 + V_2}$ 9. Acceleration $(\vec{a}) = \frac{\vec{v} - \vec{u}}{t} = \frac{change \ in \ velocity}{time.}$ where $u \rightarrow$ Initial Velocity , s = ut+ $\frac{1}{2}$ at² iii) v²- u² = 2as iv) S_n = u+a $\left(n - \frac{1}{2}\right)$ Equation 10. Equations of motion: $a \rightarrow$ uniform acceleration $S \rightarrow Distance travelled$ 11. Equations of motion for a freely falling body: d) Sn = g $(n - \frac{1}{2})$ b) s = $\frac{1}{2}$ gt² c) v ² = 2gs a) v = gt 12. Equations of motion for a body projected vertically upwards: i) u = gt ii) s = ut $-\frac{1}{2}gt^2$ iii) u² = 2gs iv) S_n = u - g $\left(n - \frac{1}{2}\right)$ iii) u² = 2gs iv) S_n = u - g $\left(n - \frac{1}{2}\right)$ 13. H_{max} = $\frac{u^2}{2g}$ 14. $t_a = \frac{u}{g}$ 15. $t_d = \frac{u}{g}$ 16. $t = ta + td = \frac{2u}{g}$ Note: In the presence of air resistance, $t_d > t_a$ 14. When a body projected vertically up form top of tower a) Height of the tower is $h = -ut + \frac{1}{2}gt^2$ b) Time taken by the body to reach the ground t = $\frac{u + \sqrt{u^2 + 2gh}}{dt^2 + 2gh}$ c) The velocity of the body at the foot of the tower v = $\sqrt{u^2 + 2gh}$ IX - CLASS 2 Powered by logicalclass.com

- d) Velocity of the body after 't' sec. is v = u gt
- e) The height of the balloon by the time the body reaches the ground is $\frac{1}{2}gt^2$.
- 15. Slope = length on y-axis / length on x-axis
- 16. For displacement time graphs: Slope = $\frac{y axis}{y axis} = \frac{displacement}{displacement} = velocity.$
- 17. For velocity time graph, slope gives acceleration, area under graph give displacement.
- 18. For acceleratin graph area under graph give increas in velocity.

§§ Introduction

Kinematics is the science of describing the motion of objects using words, diagrams, numbers, graphs, and equations. Kinematics is a branch of mechanics. The goal of any study of kinematics is to develop sophisticated mental models that serve to describe (and ultimately, explain) the motion of real-world objects.

In this lesson, we will investigate the words used to describe the motion of objects. That is, we will focus on the language of kinematics. The hope is to gain a comfortable foundation with the language that is used throughout the study of mechanics. We will study such terms as scalars, vectors, distance, displacement, speed, velocity and acceleration. These words are used with regularity to describe the motion of objects. Your goal should be to become very familiar with their meaning.

<u>§§</u> <u>Mechanics</u> : The branch of physics which deals with the study of force and motion their relatationship is called mechanics. The study of mechanics is divided into three parts.

i) Statics: the branch of mechanics which deals with objects at rest is called statics.

ii) Kinematics : Kinematics which is derived from a Greek word kinema meaning motion, is a branch of physics, the branch of mechanics which deals with the motion of objects only without considering the cause of motion is called kinematics.

iii) dynamics: the branch of mechanics which deals with the cause of motion is called dynamics.

<u>§§</u> *Rest:* A body is said to be at rest if it does not change its position with respect to the reference point. The objects which remain stationary at a place and do not change their position are said to be at rest.

The position of a body with respect to surroundings does not change with time, the body is said to be in the state of rest.

Ex: A chair lying in a room is in the state of rest, because it doesn't change its position with respect to the surroundings of the room. A tree, An electric pole, our house, our school etc.

<u>§§</u> <u>Motion:</u> A body is said to be in motion if it changes its position with respect to the surroundings with the passage of time. All moving things are said to be in motion.All moving

things are said to be in motion.

Ex: A moving car, a moving train, a flying bird ...etc.

<u>§§</u> <u>Rest and motion are relative terms :</u> Rest and motion are relative terms. A body can be at rest as well as in motion at the same time.

For example, when a bus moves on a road, then the bus as well as the passengers sitting in it change their position with respect to a person standing on the road side. So, the bus and the passengers sitting in it are in motion with respect to the person standing on the road side. However, the passengers sitting in the bus do not change their positions with respect to each other. It means, the passengers sitting in a moving bus are not in motion with respect to each other.

Ex : A person sitting in the compartment of a moving train is in the state of rest, with respect to the surroundings of compartment. Yet he is in the state of motion, if he compares himself with surroundings outside the compartment.

§§ Scalars: The physical quantities which have only magnitude but not direction are called scalars.
Ex: Mass, length, distance, time, area, volume, density, work etc.

<u>§§</u> <u>Vectors:</u> The physical quantities which have both magnitude and direction are calle vectors.

Ex: Displacement, velocity, acceleration, force etc.

<u>S</u> <u>Distance</u>. The length of the curve along which the body moves is called a distance. It is scalar quantity.

Units: cm (In C.G.S. System); m(In S.I. System)

<u>§§</u> *Displacement:* The shortest pathlength between the initial and final positions of a body is called displacement. It is a vector quantity.

Examples:

 Suppose a bus starting from station A travels 15000 m to reach stationB then the distance covered by the bus is 15000 m. Now if the bus returns to the station A then distance covered is 15000 m and the total distance covered by the bus during the trip from A to B and then back to A from B is 15000 m + 15000 m = 30000 m.



A bus moving from A to B and again from B to A

But the displacement when the bus moves from A to B and then from B to A is zero

2) Suppose a person moves 3 meters from A to B and 4 meters from B to C as shown in the figure. The total distance traveled by him is 7 meters and he is displaced only by 5 m which is the shortest distance between his initial position and final position.

3) Now let us consider an object changing its position, with respect to a fixed point called

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5.	A car travels 10km towards south and then 24km towards east. Find the displacement of the car.
	A)15m B) 9m C) 34m D) 26m
6.	A train travels 60km towards north and then 80km towards west. Find the
İ	displacement of the car.
	A) 180km B) 100km C) 240km D) 208km
7 .	Statement of a scalar just consists of its magnitude along with a proper algebraic sign.
1	Among the following the quantity which is not a scalar?
İ	A) 20 kg B) 15 m C) 40 s D) 13 m due north
8.	Among the following the quantity which one is a scalar?
 	A) 18m due west B) 20 m due south C) 30 m D) 23 m due north
9. 	Mohini walks 100m towards west then turns and walks back the way she came 20m. What distance she travelled? What is her displacement?
İ	A) 80m, 120m B) 120m, 80m C) 120m,100m D) 100m, 120m
10 . 	An Olympic runner is running totally 1600m circle track during a race. What are the distance and displacement he covered?
	A) 1600m, 0m. B)40m, 1600m C) 6400m,0m D) 1600m,64m
11. 	A shopper walks forward 20 m turns right and walks 5 m then turns left and walks in the original direction 10m there after turns left again for 5m. What is the distance she covered? What is her displacement?
	A) 20m, 10m B) 30m, 20m C) 30m,40m D) 40m, 30m
 12.	Some hikers travel 2 km north turns toward the west and travel 4km turns towards the
İ	south and travel 6 km then finally travel east for 4 km. What is their distance? What is
	their displacement
 m	A) 5m,20m B) 10m, 8m C) 16m, 4km D) 4m, 16m
¦ ")	<u>Multi correct answer questions :</u> This section sections multiple choice questions. Each question has 4 choices (A) (D) (C) (D)
•	This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D),
 13. 	Rakesh drives his bike 7 kilometer north.He stops for lunch and then drives 5 kilometer east. Then choose the correct
İ	a) Totally he covered a distance of 12 km
	b) his displacement is 8.6 km
	c) finally he travelling towards west
	A) Only a, b B) Only b, c C) Onlny a, c D) all a, b, c
14. 	Abdul walks to the pizza place for lunch. He walks 1 km east then 1 km south and then 1 km east again. Then choose the correct
	a) Toally he covered a distance of 3 km
	b) His displacement is $\sqrt{5}$ km
İ	c) his displacement after travelling 1 km south is $\sqrt{2}$ km
1	A) Only a, b B) Only b, c C) Onlny a, c D) all a, b, c
III)	Fill in the blanks
15. 	A person starts from his house to office and is back again to his house. Then the displacement is
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16.	A person moves 3 m due north the displacement of person is	n turns towards east and moves again 4 m.The
 	An object is moving round in a circ back to its starting point. The circumference of the circular path.	ular path. It completes one revolution and goes is zero but the travelled is the
¦ <i>IV</i>)	Match the following.	
◆ 	This section contains Matrix-Match Typ given in two columns which have to be to be matched with statements (p, q, r, have to be appropriately bubbled as il	be questions. Each question contains statements matched. Statements (A, B, C, D) in Column–I have s) in Column–II . The answers to these questions lustrated in the following example.
 	<i>If the correct matches are A-p,A-s,B-r,E matrix should be as follows:</i>	3-r,C-p,C-q and D-s,then the correct bubbled 4*4
18. 	A person is running in the circular pa	ath of radius 'r' then
	a] after one complete revolution	1] distance = $2\pi r$, displacement = 0
ļ	b] after half revolution	2] distance = π r, displacement = 2r
	c) after one fourth revolution	3] distance = π r/2, displacement = $\sqrt{2}$ r
	d)after three by fourth of revolution	4] distance = 3π r/2, displacement = $\sqrt{2}$ r
	A) a-1, b-2, c-3, d-4	B) a-1, b-2, c-4, d-2
	C) a-2, b-1, c-3, d-4	D) a-1, b-3, c-2, d-4
¦ ∨)	Comprehension type questions:	01
¦ ◆ 	This section contains paragraph. Base have to be answered. Each question he ONE i s correct. Choose the correct opt	ed upon each paragraph multiple choice questions as 4 choices (A) , (B) ,(C) and (D) out of which ONLY ion.
19. 	An athlete running in a circular trac placement for	k of radius 70 m.Calculate his distance and dis-
	a) one revolution b) two	revolutions c) half revolution
	d) one fourth revolution e) three	ee by fourth revolution.
 VI)	Solve the following:	
20. 	On his fishing trip Justin takes the b 4km west.He follows a school of fis was his displacement?	oat 12km south.The fish aren't biting so he goes sh 1km north.What distance did he cover?What
21. 	Preston goes on a camel safari in Afric north again.What distance did he cove	ca.He travels 5km north then 3 km east and then 1 km r?What was his displacement?
22.	Naresh travels 8 m east then 4 m r displacement?	north.What distance did he cover?What was his
 VI N	Higher order thinking skills (HOTS)	
23.	Stephen buys a new moped. He trav	els 3 km south and then 4 km east How far does
	he need to go to get back to where	he started in a shortest way?
24 .	A man is facing south.He turns 135° in t	he anti clock wise direcion and then 180° in clock-
	wise direction.Which direction is he	facing now?
25.	An athlete completes one round of a cir	rcular track of radius R in 40 sec.What will
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PHYSICS MOTION IN A LINE A) 1:100 B) 100:1 C) 1:1 D) 50:1 10. A physical quantity which has both magnitude and direction is called B) vector C) both A and B D) none of these A) scale | 11. If the distance covered by a particle is zero, what can you say about its displacement A) It may (or) may not be zero B) It cannot be zero C) It is negative D) It must be zero 12. If the displacement of a particle is zero distance covered by it A) May (or) may not be zero B) Must be zero C) it is negative D) All are true 13. In the following a physical quantity consisting of only magnitude is A) Displacement B) force C) velocity D) Density 14. A scalar consists of A) direction B) magnitude C) direction & magnitude D) None 15. Choose the wrong statement. B) current is a scalar A) temperature is a vector C) electric charge is a scalar D) both B and C 16. Anitha runs 2 m south then turns back and runs 3 m north. Distance and displacement are. A) 2m,3m B) 5m, 1m C) 4m, 1m D) 1m,5m Jayanth runs exactly 2 laps around 400 m track, then distance and displacement are. 17. C) 800 m. zero A) 200m, 0 B) 500m, 0m D) 700m.0m A snail crawls 4 ft south then turns east and crawls 6 ft, then distance and 18. displacement are. B) 10 ft, 7.2 ft C)12 ft, 1ft A) 11ft,2.7ft D) 9ft,2ft 19. Rashmi runs 30 feet north, 30 feet west and then 30 feet south, then distance and displacement are. A) 90ft, 30ft B)80ft,20ft C) 90ft,22ft D) 90 ft, 40 ft 20. David walks 3 km north turns east and walks 4 km distance and displacement are. C) 9km, 11km D) 5km,7km A) 7km,5km B) 10km,5km 21. John flies directly east for 20 km then turns to the north and flies for another 10 km, then distance and displacement are. A) 30 km,22km B) 30 km,22.4 km C) 40 km,22.4 km D) 3.0 km,22.4 km 22. Cameron flies directly west for 13 km then turns to south and flies for another 30 km. He then flies east 13 km before landing at he airport. A) 56 km, 3 km B) 66 km, 30 km C) 56 km, 30 km D)56 km, 3.0 k 23. Meghana runs north for 37 meters then turns east and runs for another 10 meters and then stops then distance and displacement are. A) 47 m, $\sqrt{1496}$ m B) 48 m, $\sqrt{1496}$ m C) 487 m, $\sqrt{1496}$ m D)47m, $\sqrt{1496}$ m ACHIEVERS (Level - II) Solve the following: **1.** A particle moves along a straight line. At some time it is at x = 20 m. After some time it is at x = 35 m. Find the displacement during the interval. IX - CLASS 12 Powered by logicalclass.com

PHYSICS MOTION IN A LINE 2. A body is moving along a circular path of Radius 'R' what will be the distance travelled and displacement of the body when it completes one revolution? 3. A body is moving along a circular path of Radius 'r' what will be the distance travelled and displacement when it completes half a revolution ? 4. If on a round trip you travel 6 km and then arive back home. a) what distance you have travelled ? b) what is your final displacement ? 5. A body thrown vertically upwards reaches a maximum height h. If then returns to the ground. Calculate the distance and the displacement ? 6. A body travels a distance of 15 m. from P to Q and then moves a distance of 20 m. At right angles to P Q. Calculate the total distance travelled and displacement. An ant travels a distance of 4 m from A to B and moves a distance of 3m at right angles to 7. AB. Find its resultant displacement? 8. A particle moves 3m north then 4 m east and finally 6 m south. Calculate its distance travelled and displacement. EXPLORERS (Level - III) 4 **) |** R I) *Multiple option type:* This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D), out of which ONE or MORE is correct. Choose the correct options **1.** The examples for random motion b) the tip of hands of a clock a) marching of soldiers c) movement of people in bazaar d) motion of flies and mosquitoes A) a,b and c B) c and d C) a,c and d D) b and d 2. The distance between Sahithi's home and Anuhya's home is 1425 m. This distance is equal to a) 142.5 km b) 1.425 km c) 1425 x 10² cm d) 14.25 km C) b and c A) a and b B) a and d D) a,b and c 3. If a body completes half revolution in a circular path of radius R then a) distance is $\pi R b$) displacement is 2R c) distance is 2R d) displacement is πR A) a and b B) a and c C) a.c and d D) b and c Fill in the blanks 4. distance is a..... quantity 5. displacement is a.....quantity 6. The SI unit for measuring distance Match the following: This section contains Matrix-Match Type questions. Each question contains statements aiven in two columns which have to be matched. Statements (A, B, C, D) in **Column-I** have to be matched with statements (p, q, r, s) in **Column–II**. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4*4 matrix should be as follows: 7. a) Distance 1) force b) Displacement 2) work 3) shortest path c) vector

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units: CGS Unit : cm/s, SI unit: m/s,

<u>§§</u> *Uniform speed:* If a body travels equal distances in equal intervals of time then it is said to be moving with uniform speed.

Eg: motion of ball on a frictionless plane surface.

<u>§§</u> *Non - uniform speed:* If a body travels unequal distances in equal intervals of time (or)equal distance in unequal intervals of time the body is said to be travelling with non uniform (or) variable speed.

<u>§§</u> Instantaneous speed : The speed of a body at any instant known as the instantaneous speed.speedometer of vehicle measures the instantaneous speed.

§§ Velocity: The rate of displacement (or) displacement per unit time is called velocity.

: Velocity
$$\left(\overrightarrow{v} \right) = \frac{Displacement}{time} = \frac{\overrightarrow{S}}{t}$$

* velocity is a vector quantity.

units: CGS Unit : cm/s, SI unit: m/s,

Note:* The velocity of a body can be zero, negative or positive.

* The numerical value of velocity of a body can be equal to speed only if the body is moving along a straight line in the same direction.

tion

* The velocity of a body can never be greater than the speed of that body.

<u>§§</u> *Uniform velocity:* If a body travels equal displacements in equal intervals of time then the body is said to be travelling with uniform velocity.

<u>§§</u> Non - uniform (or) variable velocity: If a body covers cover unequal displacements in equal intervals of time then it is said to be travelling with variable velocity.

TEACHING TASK

				7
<u>Si</u>	ngle correct ans	wer questions:		
1.	A body moves v	with a speed of 36 kr	n/h. What is its speed	in m/s.
	A) 10 m/s	B) 20 m/s	C) 30 m/s	D) 40 m/s
2.	A man moves w	/ith a speed of 15 m/s	s. Express his speed ii	n km/hr.
	A) 34 km/h	B) 54 km/h	C) 36 km/h	D) 18 km/h
3.	An athlete runs	in a circular path of	radius 14 m, 10 times	in 10 minutes. Calculate the
	speed.			
	A)1.6 m/s	B) 1.26 m/s	C)1.36 m/s	D) 1.46 m/s
4.	The train 'A' trave	elled a distance of 12) km in 3 hours where a	as another train 'B' travelled a
	distance of 180	km in 4 hours. Which	train travelled faster?	
IX	Actrains	B) both trains	1G) train B	Poweeeby logical class.com

 5. Calculate the distance travelled by a car moving with a speed 35 km/h in 12 minutes A) 15 km B) 7 km C) 14 km D) 9km 6. Imagine two boys Ramu and Somu running a 300 m race. Let as imagine that Ramu finishes the race in 15 sec and somu finishes 30sec. Who run faster ? A) Ramu B) somu C)equal speed D) none 10. Multiple option type: This section contains multiple choice questions. Each question has 4 choices (A), (B), (out of which ONE or MORE is correct. Choose the correct options 7. A scooterist covers a distance of 3 kilometers in 5 minutes. This speed equal to a) 1000 cm/s b) 10 m/s c) 36 km/h 	s. <i>C),(D),</i> :t
 A) 15 km B) 7 km C) 14 km D) 9km Imagine two boys Ramu and Somu running a 300 m race. Let as imagine that Ramu finishes the race in 15 sec and somu finishes 30sec. Who run faster ? A) Ramu B) somu C)equal speed D) none <i>Multiple option type:</i> This section contains multiple choice questions. Each question has 4 choices (A), (B), (out of which ONE or MORE is correct. Choose the correct options 7. A scooterist covers a distance of 3 kilometers in 5 minutes. This speed equal to a) 1000 cm/s b) 10 m/s c) 36 km/h 	<i>C),(D),</i> :t
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 II) <u>Multiple option type:</u> This section contains multiple choice questions. Each question has 4 choices (A), (B), (out of which ONE or MORE is correct. Choose the correct options 7. A scooterist covers a distance of 3 kilometers in 5 minutes. This speed equal to a) 1000 cm/s b) 10 m/s c) 36 km/h 	<i>C),(D),</i> :t
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a) 1000 cm/s b) 10 m/s c) 36 km/h	xt
	t
A) a, b only correct B) a, c only correct C) b, c only correct D) all a, b, c correct	-f
8. Ahmed is moving in his car with a velocity of 45 km/h. Then he will cover a distance	OT
a) 45 km in one hour b) 750 m in one minute c) 12.5 m in one sec	
A) a, b only correct B) a, c only correct C) b, c only correct D) all a, b, c correc	xt
Fill in the blanks:	l
9. 1 km/h = m/s.	
10. The speedometer of a vehicle measures	İ
11. 15 m/s = km/h	
12. 1 m/s = cm/s.	
13. 1 km/min = m/s.	
Match the following:	
 This section contains Matrix-Match Type questions. Each question contains statemed given in two columns which have to be matched. Statements (A, B, C, D) in Column-to be matched with statements (p, q, r, s) in Column-II. The answers to these quest have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled matrix should be as follows: 	ents I have stions 4*4
14. A body moving in circular path of radius 7 m completes half rotation in 2 sec, then	its
a) distance traveled 1) 11 m/s	
b) displacement 2) 22m	
c) speed 3) 7 m/s	
d) velcoity 4) 14 m	ĺ
A) a - 1, b - 2, c - 3, d - 4 B) a - 4, b - 3, c - 1, d - 2	
C) a - 1, b - 4, c - 3, d - 2 D) a - 2, b - 4, c - 1, d - 3 Comprehension type:	ļ
 This section contains paragraph. Based upon each paragraph multiple choice queshave to be answered. Each question has 4 choices (A), (B), (C) and (D) out of which ONE is correct. Choose the correct option. 15. In a wall clock length of seconds arm is 7 cm, minutes arm is 5 cm, hours arm is 3 	stions ONLY 5.5 cm
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i) speed of seconds arm	ı is		
A) $\frac{11}{15}$ cm/s	B) $\frac{7}{5}$ cm/s	C) $\frac{10}{7}$ cm/s	D) none
ii) Speed of minutes arm	ı is		
A) $\frac{11}{15}$ cm/s	B) $\frac{11}{378}$ cm/s	C) $\frac{11}{180}$ cm/s	D) none
ii) Speed of hours arm is	5		
A) $\frac{11}{15}$ cm/s	B) $\frac{11}{378}$ cm/s	C) $\frac{11}{21600}$ cm/s	D) none
Columnation	Level - III		
Solve the following:	Il is thrown with a val	acity of 11 E m/a How	long doop it take the
hall to reach the plate th	at is 18 // meters from	ocily of 41.5 m/s, How	long does it take the
17. A bicyclist has an average	at is 10.44 meters no	r How far will she trav	el in 6 hrs?
18. How long will it take you	to complete a 135 m	ile trip if your velocity i	s 45 mph?
	Leve	el - IV	·
Higher order thinking skil	<u>ls (HOTS)</u>	dall	
19. A car covers a distance	of 600 m in 2 minute	s whereas a train cove	ers a distance
of 75 km in 50 minutes.	Find the ratio of their	speed	
A) 1 : 5 B) 5 :	1 C) 1	: 2 D) 2	:1
20. A bus covers a certain di	stance in 60 minutes	if it runs at a speed of	60 km/hr. What must
be the speed of the bus	in order to reduce the	e time of journey by 40	minutes?
A) 90 kmph B) 80	km/h C) 7	0 km/h D) 6	0 km/h
21. A person crosses a 600	cm long bridge in 5cr	nin. What is his speed	in kmph?
A) 7.2 B) 6	C) 5	D) 4	.5
22. How far would you trave	l moving at 12m/s for	3min?	
A) 160 m B) 216	60m C) 6	12 m D) 1	23 m
 ΦΦ TEACHING TASK :	KEY	G	
1) A, 2) B, 3) D,	4) C, 5) B, 6) A	, 7) D, 8) D, 9) 5/	18,
10) instantaneous sp	peed, 11) 54, 1	2) 100, 13) 50/3,	14) D,
15) i) A, ii) B, iii) C,	16) 0.444sec 17)	210km 18) 3hr 1	9) A, 20) A,
21) A, 22) B			
İ			
Ì			
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 		LEAF	RNER'S	TASK	
 	• 1	BEGIN	NERS (Level - I)	 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
 Sin	ngle correct answer qu	estions:			
1.	A speed is				
	A) always +ve B) a	lways -ve	C) mag	y be +ve or -ve	e D) neither +ve nor -ve
2 .	When the distance travel	led by a body is di	irectly pro	portional to time	e the body is said to have
	A) zero velocity B) zero	ero speed	C) unif	orm sped	D) none of these
3.	If the distances covered l	oy an object are ve	ery large t	then speed can	be expressed in
	A) m/s B) c	m/s		C) km/h	D) none
4 .	In 12 minutes a car wh	ose speed is 35	km/h tra	ivels a distanc	ce of
	A) 7 km B) 3	.5 km		C) 14 km	D) 28 km
5 . 	1km/h = m/s	o /=	<u> </u>		
	A) 5/18 B) 18	3/5	C) 9/5		D) 5/9
b .					va D) poither two per va
 7	A) always + ve b) al	is a scalar quan	tity	ve as well as -	-ve D) heither +ve hor -ve
1.	Δ) displacement	B) distance	ury	C) velocity	D) all the above
8	A body starts from rest	then its	200		
0.	A) initial velocity is zero	B) final velocity	/ is zero	C) distance i	s zero D) none
 9.	The S.I unit of velocity		917	.,)
	A) cm/s	B) m/s	6	C) no units	D) cm/s ²
10.	Select the in correct re	lation		-,	
	distance			displac	cement
	A) speed = $\frac{\text{distance}}{\text{time}}$		B) velo	ocity = $\frac{\text{displace}}{\text{distant}}$	
				velocity	
	C) displacement = velo	ocity x time	D) \overline{dis}	<i>placement</i> = t	ime
, 11.	Given the distance bet	ween earth and	sun is 1.	$6\mathrm{x}10^8$ km and	d velocity of light is $4\mathrm{x}10^5$
	km/sec. Find time take	en for sunlight to	reach th	ne earth is	
	A) 400 s	B) 700 s		C) 500 s	D) 600 s
 12.	A bullet is shot from a d	oun with a veloci	tv of 120	m/s. How lon	a will it take the bullet to
İ	strike the target that is	200 meters awa	iy?		0
	A) 2 sec	B) 6.7 sec		C) 5 sec	D)A:1.67sec
 13.	A car covered a distan	ce of 30km in 2.	5 hours.	What is the s	peed of the car?
	A) 12 kmph	b) 30 km/h		C) 2.5 km/h	D) 25 km/h
14.	An aeroplane travels w	ith a speed of 19	95m/s fo	r 5 hours. Wh	at is the total distance
	traveled?				
 	A) 3510 km	B) 1530 km		C) 5103 km	D) 150 km
15.	Ron walks 22.5 km in s	5 hours.Find his	speed		
	A) 5 km/h	B) 22.5 km/h		C) 20 km/h	D) 4.5 km/hr
IX	- CLASS		18		Powered by logicalclass.com

 16. A train covers 168 km in 4 hours. Find its speed A) 4 km/h B) 164 km/h C) 42 km/h D) 24 km/h 17. Mom pushes a stroller up and down the mall with an average speed of 6m/s. How far wishe go in 30 min? A) 1080m B) 2160m C) 612 m D) 123 m 18. If the mom in problem 33 stops to sit on a bench located 20m to the east of her starting place what was her average velocity during her 30min walk? A) 0.90 m/s B) 0.80 m/s C) 0.70 m/s D) 0.011m/s 19. George walks to a friend's house. He walks 750 meters North then realizes he walked too far. He turns around and walks 250 meter towards South. The entire walk takes him 20 seconds. What is his speed? A) 50 m/s B) 80 m/s C) 70 m/s D) 60 m/s Express the same in km/h. Convert 54km/h into m/s A car urns in a race a distance of 22km along a circular path and reaches a diametrically opposite end in 3 minutes 20 seconds. Calculate the velocity of car ? 						
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opposite end in 3 minutes 20 seconds. Calculate the velocity of car ?						
EXPLORERS (Level - III) ALE						
Multiple option type:						
This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D),						
out of which ONE or MORE is correct. Choose the correct options						
1. Two friends Nithin and Jethin want to have a running race. Nithin can run 300 m in 15 sec						
where as Jethin can run 600 m in one minute.						
a) Nithin will win the race b) Jethin will win the race						
c) Nithin will loose the race d) Jethin will loose the race						
A) only a, d are correct B) only b, c are correct						
C) only a, b are correct D) only c, d are correct						
2. Arrange the following speeds in decreasing order.						
a) An athlete running with a speed of 10m/s						
b) A bicycle moving with a speed of 20 m/min						
c) A scooter moving with a speed of 30 km/h						
A a > b > c $B a > b = c$ $C a = b > c$ $D a = b = c$						
3. The information about fastest trains in India is given below. Then choose the correct						
 i) Gatimaan Express (travels between New Delhi-Agra) takes a travel time of 75 minutes to cover 200 km journey. 						
ii) Shatabdi Express (travels between New Delhi- Bhopal) takes a travel time of 60 min to						
L cover 150 km journey.						

PH	IYSICS				MOTION IN A LINE
	iii) Rajdhani E min to cove	xpress (travels b r 280 km journe؛	oetween Mumb /.	ai- New Delhi) ta	kes a travel time of 120
	a) Gatimaan Ex	press is the fast	est compared	to remaining train	IS
ļ	b) Shatabdi exp	oress travels fas	ter than Rajadl	nani express	
	c) Rajdhani exp	oress has least s	peed in the give	ven trains	
	A) only a, b	B) only b, c	C) or	nly a, c	D) all a, b, c
<u>Fil</u>	l in the blanks:				
4.	The rate at which	n the distance co	overed by the b	ody is called	
5. ⁻	The rate of chang	ge of displaceme	ent of body is c	alled	
6.	The SI unit of vel	ocity is			
¦7.	The C.G.S unit o	f speed is			
8.	1m/s=	kmph			
9.	20cm/s=	m/s			
10	. 3m/s =	kmph			ก
11.	. 18kmph =	m/s		. di O	
Ma	atch the followir	<u>ıg:</u>		dau	
 ◆	This section con	tains Matrix-Mate	ch Type question	ns. Each question o	contains statements given
İ	in two columns	which have to be	e matched. Stat	ements (A, B, C, D)) in Column–I have to be
	matched with s	tatements (p, q, r	, s) in Column-	-II . The answers t	o these questions have to
	be appropriatel	y bubbled as illu	strated in the f	ollowing example	
i I	if the correct ma matrix should b	tches are A-p,A-s ve as follows:	<i>6,В-</i> г,В-г,С-р,С-	q ana D-s,then th	e correct bubblea 4*4
12	. Colu	umn A		Column B	
	a) di	istance		1) m²/s	
	b) ve	elocity		2) m	
İ		speed		0 \mathbf{a}^{1}	
	c) _	istance		3) S⁻¹	
	d) ve	elocity x displace	ement	4) m/s	
ļ	A) a - 1, b - 2, c	: - 3, d - 4	B) a - 4, b -3	, c -1, d - 2	
	C) a - 1, b - 4, o	c - 3, d - 2	D) a - 2, b - 4	1, c - 1, d - 3	
<u>Co</u>	omprehension t	<u>ype:</u>			
◆ 	This section c have to be ans ONE i s correc	ontains paragrap swered. Each que t. Choose the co	oh. Based upor estion has 4 cho rrect option.	n each paragraph pices (A) , (B) ,(C) a	multiple choice questions and (D) out of which ONLY
13	. Apara and Prar	nathi start from h	iome at the sai	ne time and trave	el by different routes to
	school. Aparna	's house is at a c	listance of 150	m from the schoo	ol while Pranathi's house
	is at 200 m fror	n the school. Bo	th reach the so	chool at the same	e time.
ļ	i) Who travelled	faster?			
	A) Pranathi	B) apa	arna	C) both equal	D) none
	II) The difference	e of distance be	tween Aparna'	s house to schoo	and Pranathi's house to
I IX	- CLASS		20		Powered by logicalclass.com

MOTION IN A LINE



EXAMPLE

A motor vehicle travelled the first third of a distance 's' at a speed of $\,V_{_{\rm l}}\,{=}\,10$ Example-5: kmph, the second one third at a speed of $V_2 = 20$ kmph and the last one third at a speed of $V_3 = 60$ kmph. Determine the mean speed of the vehicle over the entire distances. Sol: $V_{mean} = \frac{s_1 + s_2 + s_3}{t_1 + t_2 + t_3}$, $V_{mean} = \frac{\frac{s_1 + s_2 + s_3}{3}}{\frac{s_1 + s_2 + s_3}{3v_1 + \frac{s_2}{3v_2} + \frac{s_3}{3v_2}}$ $\therefore t = \frac{s_1}{v_1}$ $=\frac{s}{\frac{s}{3}\left[\frac{1}{10}+\frac{1}{20}+\frac{1}{60}\right]} =\frac{3}{\frac{6+3+1}{60}} =\frac{180}{10}=18 \qquad \therefore V_{mean}=18Kmph$ $\sqrt{}$ Example-6: A motorist drives north for 35.0 minutes at 85.0 Km/h and then stops for 15.0 minutes. He next continues north travelling 130 km in 2hours a) What is his total displacement? b) What is his average velocity? a) Distance travelled in 35min (S₁) = $85 \times \frac{35}{60} = 49.6$ km Sol: Distance travelled in 2 hrs (S_2) = 130km Total displacement = $S_1 + S_2 = 130 + 49.6 = 179.6 \, km$ b) $V_{avg} = \frac{S_1 + S_2}{t_1 + t_2} = \frac{49.6 + 130}{\frac{35}{60} + 2} = 63.4 \, kmph$ Example-7: A particle is at x = +5m at t = 0s, x = -7m at t = 6s and x = +2m at t = -7m10s. Find the average velocity of the particle during the intervals (a) t = 0s to t = 6s(b) t = 6s to t = 10s (c) t = 0s to t = 10s. Sol: From the definition of average velocity $\overline{v} = \frac{\Delta x}{\Delta t} = \frac{x_2 - x_1}{t_2 - t_1}$ the average velocity between the times t = 0 to t = 6sa) $x_1 = +5m$, $t_1 = 0$, $x_2 = -7m$, $t_2 = 6s$ Hence $\overline{v_1} = \frac{x_2 - x_1}{t_2 - t_1} = \frac{-7 - 5}{6 - 0} = -2ms^{-1}$ b) The average velocity between the times $t_2 = 6s$ to $t_3 = 10s$ is $\overline{v_2} = \frac{x_3 - x_2}{t_3 - t_2} = \frac{2 - (-7)}{10 - 6} = \frac{9}{4} = 2.25 m s^{-1}$ The average velocity between times $t_1 = 0$ to $t_3 = 10s$ is c) $\overline{v_3} = \frac{x_3 - x_1}{t_3 - t_1} = \frac{2 - 5}{10 - 0} = -0.3 m s^{-1}$ IX - CLASS Powered by logicalclass.com

 	TEACHING TASK
 Sin	agle correct answer questions:
1.	A car travels first 30 km at a uniform speed of 40 km/h and the next 30 km at a uniform
	speed of 20 km/hr. Find its average speed.
į	A) 25.6 km/h B) 26.2 km/h C) 26.6 km/h D) 22.6 km/h
 2.	A train travels 60 km/h for 0.52 h 30 km/h for the next 0.24 h and finally 70 km/h for the next
İ	0.71 h What is the average speed of the train?
	A)52.9 km/h B) 59.9 km/h C) 55.9 km/h D) 51.9 km/h
3.	A body covers 15 m in first second, 25 m in 2^{nd} second and 35 m in 3^{rd} second .What is
	the average speed of the body ?
	A) 15 m/s B) 35 m/s C) 20 m/s D) 25 m/s
4 .	A train travels the first 100 km at a speed of 50 km/h between Delhi and Agra (the distance
	between Delhi and Agra is 200 km). How much fast must the train travel in the next
	100 km so as to maintain an average speed of 70 km/h for the whole journey ?
	A) 115.6 km/h B) 116.6 km/h C) 106.6 km/h D) 16.6 km/h
5.	A car is moving along a circular track covering its one complete round of 225 m in 5 sec.
	Its average velocity is
	A) 15m/s B) 0 m/s C) 10 m/s D) 15 km/s
6.	If a car covers first $\frac{2}{5}^{-1}$ of the total distance with a speed v_1 and the remaining $\frac{3}{5}^{-1}$ of the
	total distance with a speed v_2 then its average speed is $5v_1$ $5v_2$ $5v_2v_2$ $5v_2v_2$ $5v_2v_2$
	A) $\frac{3v_1 + 2v_2}{3v_1 + 2v_2}$ B) $\frac{3v_1 + 2v_2}{2v_1 + 3v_2}$ C) $\frac{3v_1 + 2v_2}{3v_1 + 2v_2}$ D) $\frac{3v_1 + 2v_2}{3v_1 + 2v_2}$
7 .	A particle is moving along its straight line with different velocities 20 kmph in 5 sec,
 	40 kmph in 10 sec, 60 kmph in 15 sec. Find its average velocity will be
İ.	A) 46.6 kmph B) 36.6 kmph C)48.6 kmph D) 52.5 kmph
II) _▲	<u>Multiple option type:</u> This section contains multiple choice questions. Each question has 4 choices (A), (P), (C), (D).
	out of which ONE or MORE is correct. Choose the correct options
 8.	A car travels a distance of 200km from Delhi to Ambla towards North in 5 hours, returns
	to Delhi in same time.Then choose the correct
	a) average speed of car is 40 km/h
	b) total time taken to return back to Delhi is 10 hours
	c) average velocity of the car is zero
ĺ	A) only a, b B) only a, c C) only a, c D) all a, b, c
<i>)</i>	Fill in the blanks:
9.	If a body travels first half of the distance with a speed v_1 and second half of the distance with

a speed v_2 then average speed =

- **10.** If a body travels first half of the total time with a speed v_1 and second half of the time with a speed v_2 then average speed =
- 11. Average velocity of earth in completing one rotation around sun is

IV) Match the following:

This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in Column–I have to be matched with statements (p, q, r, s) in Column–II. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4*4 matrix should be as follows:

12. If a body covers the first x % of the total distance with velocity v_1 and the remaining

(100 - x) % of the distance with velocity v_2 then



- V) <u>Comprehension type:</u>
- This section contains paragraph. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct. Choose the correct option.

13. A person is moving along a circular path of radius r with uniform speed as shown in the figure. He completes one revolution in four seconds.

i) Average speed along AB is



III) <u>Solve the following:</u>						
14. A car is moving with initial velocity of 20 m/s and it reaches its destiny at 50 m/s. Calculate						
its average velocity.						
15. In 1988 Summer Olympic Games, Florence Griffith-Joyner set the women's world record						
in the 100 meter dash. She completed the race in 10.48 seconds. What was her average						
velocity?						
16. How far will you travel if you walk for 6 hrs at an average velocity of 4 km/hr?						
IV) <u>Higher order thinking skills (HOTS)</u>						
17. A person runs 4.0 km in 32 minutes then 2.0 km in 22 minutes and finally 1.0 km in 16						
minutes. Find average speed of him in km per minute?						
A) 36 B) 18 C) 0.1 D) 10						
18. A train travels 120 km in 2 hours and 30 minutes. What is its average speed?						
A) 36 km/h B) 48 km/h C) 56 km/h D) 84 km/h						
19. A plane's average speed between two cities is 600 km/hr. If the trip takes 2.5 hrs. how far						
does the plane fly?						
A) 1500km B) 600km C) 2500km D) 3000km						
P KEY						
KEY O						
$\Phi\Phi$ TEACHING TASK						
1) C, 2) B, 3) D, 4) B, 5) B, 6) A, 7) A, 8) D, 9) $(2v_1v_2)/(v_1+v_2)$,						
10) $(V_1 + V_2)/2$, 11) zero, 12) C, 13) I) D, II) B, III) B, 14) 35 m/s, 15) 9.54m/s, 16) 24km, 17) C, 18) B, 10) A						
LEARNER'S TASK						
◆ IFI ◆ BEGINNERS (Level - I) ◆ IFI ◆						
Choose the correct option:						
ا 1. The numerical ratio of average velocity and average speed.						
A) always less than one B) always equal to one						
C) always more than one D) equal or less than one						
2. An ant covers 2cm, 1.5cm, 2.5cm, 3cm in one second each.Find average speed of it						
A) 3m/s B) 2.5 m/s C) 1.5m/s D) none						
3. A car covers 40km in 1 hr and then 10 km in 15min then car moving with						
A) variable speed B) uniform speed C) average speed D) none						
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PHYSICS **MOTION IN A LINE 4.** 36kmph =..... m/min C) 600 A) 10 B) 129.6 D) 100 5. A cyclist moving in circular path of radius 200m covers half revolution in 5min. its average speed is.....m/s A) 44/21 B) 4/3 C) 88/7 D) 2/3 6. The magnitude of average velocity is equal to average speed when a particle moves A) in a curved path B) in the same direction C) with constant speed D) with constant speed 7. A car completes one lap around a circular track of radius 50 meters. The time it takes to complete the lap is 1.2 minutes. What is the total distance covered? A) 4.66m/s B) 4.26m/s C) 4.36m/s D)3.36m/s 8. In the above question what is the average speed of the car in meters per second? A) 0.694 D)0.88 B) 0.56 C) 0.51 **9.** A family leaves from New York City and is flying to Los Angles which is 2800 miles away. It takes 3.25 hours to fly from New York to O'Hare International Airport in Chicago IL. There they have a one hour layover and fly to Los Angles in 2.75 hours. What is the average speed of the whole travel? B) 40 mph C) 50 mph A) 30 mph D) 60 mph **10.** A car travels 300.0 m East then 400.0 m West. If it takes 18.0 seconds to do this.what is the car's average speed and average velocity? A) 38.18 m/s, 5.55m/s B) 38.88 m/s, 5.55m/s C) 38.88 m/s, 5.05m/s D) 30.88 m/s, 5.55m/s **11.** A runner runs for 1.00 hour at an average speed of 2.00 m/s. How far does she run during this time? A) 120m B) 12m C) 1.20m D) Both a&c 12. A car travels a distance of 30 miles for 2 hrs and 45 miles for next 3 hrs.Calculate its average speed. A) 15mph B) 1.5mph C) 5mph D) 10mph **13.** A body moves 30 m at a uniform speed of 20 m/s and next 30 m at a uniform speed of 12 m/s. Calculate its average speed. A) 15 m/s B) 12 m/s C) 10 m/s D) 20m/s 14. A car covers 30 km at a uniform speed of 60 km/h and the next 30 km at a uniform speed of 40 km/h. Find the total time taken and the average speed? A) 70 minutes, 48 km/h B) 75 minutes, 48 km/h IX - CLASS 26 Powered by logicalclass.com

PH	YSICS			MOTION IN A LINE
	C) 75 minutes, 4	0 km/h D)	25 minutes, 48 km/h	
15.	A train travels so	ome distance with a s	speed of 30 km/h and	returns with a speed of
	45 km/h.Calcula	ite the average spe	ed of the train.	
	A) 36 km/h	B) 18 km/h	C) 56 km/h	D) 24 km/h
16.	Sam is driving a	long the highway tow	vards Saint John. He t	ravels 150km in 3.00hrs. What
	is his average s	peed for his trip?		
	A) 50 km/h	B) 18 km/h	C) 56 km/h	D) 24 km/h
17.	A vehicle travels	s 2345 m [W] in 315	s towards the evening	g sun. What is its average
	velocity?			
	A) 8m/s	B) 7.4 m/s	C) 8m/s	D) 6m/s
		ACHIEV	ERS(Level - II)	* 1+1 *
<i> </i>) 4	Solve the follo	wing:		
1.	1/2 hour be run	g for a running race.	For 1st 1/2 hour he r	uns 0.25 miles and for the next
2.	A car moves from	om A to B at a speed	of 50 km/hr and com	es back from B to A at a speed
	of 30 km/hr. Fin	id its average speed	during the journey.	·
3.	A car covers a	distance of 60 km in	3 hours. However, for	r the first 40 km it travels
	16 km/hr. At what	at speed must it trave	el for the rest of the di	stance in order to complete the
4.	Calculate the av	erage velocity at a p	articular time interval	of a particle if it is moves 5 m at
	2 s and 15 m at	4s along x-axis?		
		◆∎-∎ ≇ <u>EXPLOF</u>	<u>RERS (Level - III)</u>	< ₩ 8
Ŋ	Multiple optior	<u>ı type:</u>		
*	This section con out of which ON	tains multiple choice o E or MORE is correct	questions. Each quest . Choose the correct o	ion has 4 choices (A), (B), (C),(D), ptions.
1.	Consider the mo	otion of the tip of the	minute hand of a cloo	ck. In one hour
	a) The displace	ment is zero	b) The di	stance covered is zero
	c) average spee	ed is zero	d) averaç	ge velocity is zero.
	A) only a,b corre	ect	B) only a,c corre	ect
	C) only a, d cor	rect	D) all a, b, c, d a	re correct
2.	When a body co	ompletes certain jour	rney, then choose the	correct
	a) its distance o	an be zero	b) its displaceme	ent can be zero
	c) its average s	peed can be zero	d) its average ve	elocity can be zero
	A) only a, b	B) only a, c	C) only b, c	D) only b, d
3. IV	When a body m	oves form one place	e to another place, ch	oose the correct
IA	- CLASS		21	Powered by logicalclass.com

PH	YSICS				MOTION IN A LINE	
 	a) its distance can be e	equal to or gr	eater than d	isplaceme	nt	
İ	b) its average speed can be equal to or greater than average velocity					
	A) only a B) or	nly b	C) both	ו a, b	D) both are wrong	
<i>)</i>	Fill in the blanks:					
4 .	Car moving on circular	track its aver	rage velocity	/ after one	round	
5.	The ratio of total displa	acement to th	e total inter	val of time	of a body iscalled	
6 .	The ratio of the total dis	stance travell	ed to the tot	al time of t	ravel is called	
7.	SI unit of average spee	ed or average	e velocity is .			
8.	If average speed is zer	o then averag	ge velocity is			
<u>Ma</u>	<u>tch the following:</u>					
↓ 	This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in Column–I have to be matched with statements (p, q, r, s) in Column–II . The answers to these questions have to be appropriately bubbled as illustrated in the following example.					
	If the correct matches matrix should be as f	are A-p,A-s,E ollows:	з-r,В-r,С-р,С	-q ana D-s,	inen ine correct bubblea 4*4	
 9. 	A car is running in a circular track of radius R, and takes a time T to complete each 1/4 th of the distance. a) after one rotation average speed is 1) zero					
	b) after one rotation av	erage velocit	y is	2)	π R / 2T	
	c) after half rotation av	erage velocity	y is	3)	$\sqrt{2}$ R / T	
	d) after 1/4 th rotation a	verage veloc	city is	4)	R/T	
	A) a-2, b-1, c-4, d-3	B)	a-1, b-2, c-	3, d-4		
	C) a-4, b-3, c-2, d-1	D)	a-2, b-3, c-	4, d-1		
10 .	If a body covers the firs	t x % of the to	otal time with	velocity v ₁	and the remaining $(100 - x) \%$	
	of the time with velocity	v v _{2,} then				
 	a] If x = 20	1] $V_{avg} = \frac{1}{2}$	$\frac{v_1 + v_2}{2}$			
 	b] If x = 30	2] $V_{avg} = -$	$\frac{4v_1 + 6v_2}{10}$			
	c] If x = 40	3] $V_{avg} = \frac{2}{3}$	$\frac{3v_1 + 7v_2}{10}$			
 	d] If x = 50	4] $V_{avg} = -\frac{2}{3}$	$\frac{2v_1 + 8v_2}{10}$			
İ	A) a-1, b-2, c-3, d-4	B)	a-2, b-1, c-	4, d-3		
	C) a-4, b-3, c-2, d-1	D)	a-4, b-3, c-	1, d- 2		
į						
	- CLASS		28		Powered by logicalclass.com	

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Comprehension type:						
 This section contains paragraph. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct. Choose the correct option. 						
11. If a particle m	ioves along a strai	ght line distance	e of 29 m in tin	ne of 5 sec and	a distance	
55m in time c	of 14 sec.Then					
i) Total distan	ce traveled by the	particle				
A) 29 m	B) 55	m	C) 84 m	D) 14	m	
ii) Total time t	aken by the particl	e is				
A) 5 sec	B) 14	sec	C) 19 sec	D) 29	sec.	
iii) The avera	ge velocity of a par	ticle is				
A) 2.89 m/se	c B) 4.4	2 m/s	C) 9.82 m/s	D) zei	ro	
12. Mr.Bean trave	elled 240 km in 4 h	ours by train an	d then travelle	d 120 km in 3 h	ours by car	
and 3 km in 1	/2 hour by cycle. T	hen	dall			
i) Speed of tra	ain is			D) 00	1	
A) 20 kmpn	B) 40	kmpn	C) 60 kmpn	D) 80	ктрп	
A) 20 kmph	B) 40 kmph	C) 60 J	mph	D) 80 kmph		
iii) Speed of b	bicycle is	02	, iipii	b) oo kinpi		
A) 6 kmph	B) 8 kmph	C) 10 I	kmph	D) 12 kmph		
iv) Total dista	nce travelled by Mi	r. Bean is				
A) 240 km	B) 120 km	C) 3 kr	n	D) 363 km		
v) Mr.Bean tra	avelled for a total ti	me of				
A) 3.5 hr	B) 5.5 hr	C) 7.5	hr	D) 9.5 hr		
vi) Average s	beed of Mr.Been fo	or the total trip is		_ `		
A) 48.4 km/hr	• B) 52.3 km/h	C) 56.7	7 km/h	D) zero		
KEY						
$\Phi \Phi$ LEARNER'STASK :						
1) D, 2), 12)A, 13	A, 3) B, 4) C,)A, 14) B, 15) A.	5)A, 6)B, 16)A, 17)B	7)C, 8)A,	9) B, 10) B,	11) D,	
	1) 0.45mph,	2) 37.5 km/hr	3) 40	km/hr	4) 5 m/s	
	:1) C, 2) D,	3) C, 4) zero	o, 5) ave	erage velocity,		
6) average	e speed, 7) m/s	s, 8) zero,	9) A, 10) C	, 11) i) C, ii) C,	iii) B,	
$\frac{12) \text{ C, ii}}{12 \text{ C, ii}}$	3, III) A, IV) D, V) C,	VI) A, 29		Powered by Iog	icalclass.com	

<u>&</u> <u>Acceleration</u>: The change in velocity per unit time (OR) The rate of change of velocity of a body is called Acceleration.

Acceleration $= \frac{change \ velocity}{time}$

Units: m/s² (S.I system), cm/s² (C.G.S system)

The velocity of the car increases continuously with respect to time says that the car accelerates. The increase in velocity per unit time is called acceleration. The velocity of the car decreases continuously with respect to time says that the car decelerates or retards. The decrease in velocity per unit time is called deceleration or retardation. Negative acceleration is called Retardation or Deceleration.

§§ Accelerations are of two types:

i) Positive acceleration: If body's velocity increases gradually then it said to possesses positive acceleration.

Example: A freely falling body.

ii) Negative acceleration (or) Deceleration (or) Retardation:

If body's velocity decreases gradually then it said to possesses retardation.

Ex: A vertically projected body.

§§ Equations of motion:

The relation between v, u,a and s for a body moving with uniform acceleration in a straight path are well known to us. Equations which relate these quantities are known as equations of motion.

The equations of motion are

i)
$$V = u+at$$
 where $u \rightarrow \text{Initial Velocity}$
ii) $s = ut + \frac{1}{2}at^2$ $v \rightarrow \text{Final Velocity}$
iii) $v^2 - u^2 = 2as$ $t \rightarrow time$
 $a \rightarrow uniform acceleration$
 $S \rightarrow \text{Distance travelled}$
EXAMPLE
Example-8: If a sports car at rest accelerates uniformly to a speed of 144 km h⁻¹
in 5 s then find distance travelled by it ?
Sol: $u = 0, v = 144km h^{-1} = 144 \times \frac{5}{18}m s^{-1} = 40m s^{-1}, t = 5 s$
 $a = \frac{v - u}{t} = \frac{40}{5} = 8m s^{-2}, s = \frac{1}{2} \times 8 \times (5)^2 = 100 m$

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Example-9:The driver of a car moving with a velocity of 54 km h⁻¹ applies brakes to decrease its velocity to 36 km h⁻¹. If the retardation produced by the brakes is 2m s⁻², arange the following steps in a sequential order to calculate the distance travelled by the car. **Sol:** $u = 54 \, km \, h^{-1} = 54 \times \frac{5}{18} = 15m \, s^{-1}, v = 36 \, km \, h^{-1} = 36 \times \frac{5}{18} = 10 \, m \, s^{-1}, a = -2.0 \, m \, s^{-1}$ $U\sin g v^{2} - u^{2} = 2as(a) \Longrightarrow s = \frac{v^{2} - u^{2}}{-2a}(c) \Longrightarrow s = \frac{100 - 225}{-2a}(c)$ \Rightarrow s = 125 / 4 = 31.25m(d) **Example-10:** A bike starting from rest picks up a velocity of 72 km h⁻¹ over a distance of 40m.Calculate its acceleration. **Sol** : Given, u = 0, v = 72 km h⁻¹ = $72 \times \frac{5}{18} = 20 m s^{-1}$, s = 40m using v² - u² = 2as \Rightarrow (20)² - 0 = 2a x 40 \Rightarrow $a = \frac{400}{2 \times 40} = 5 m s^{-2}$ **Example-11:** A car moving along a straight road with a speed of 72 km h⁻¹ is brought to rest within 3 s after the application of brakes. Calculate the deceleration produced by the brakes. **Sol:** Initial velocity 'u' =72 km h⁻¹ = $72 \times \frac{5}{18} = 20 ms^{-1}$ Final velocity, v=0 m s^{-1,} $\frac{v-u}{t} = a \Rightarrow \frac{0-20}{3} = a \Rightarrow deceleration = 6.67 ms^{-2}$ **TEACHING TASK** Choose the correct answer: 1. A train starting initially with a speed of 36 km/h picks up a velocity of 108 km/h in half minute. Calculate its acceleration in m/s². A) 0.66 m/s² B) 0.76 m/s² C) 0.86 m/s² D) 0.96 m/s² 2. A motor cyclist has 8sec to stop his motor cycle which is travelling at 50 km/h.What is his retardation? A) 1.4 m/s² B) 1.74 m/s² C) 1.04 m/s² D) 2.74 m/s² 3. A scooter acquires a velocity of 36 km/h in 10seconds just after the start. Calculate the acceleration of the scooter. D) 1m/s² A) 7m/s² B) 4m/s² C) 3m/s² A bus increases its speed from 36km/h to 72km/h in 10seconds. Calculate its acceleration. B) 4m/s² C) 3m/s² A) 7m/s² D) 1m/s² IX - CLASS 31 Powered by logicalclass.com

5 .	If a Ferrari with an initial velocity of 10 m/s accelerates at a rate of 50 ms ⁻² for 3 s, what will be its final velocity?						
	A) 150m/s	B) 100 m/s	C) 120 m/s	D) 160 m/s			
6. 	Josh rolled a bowling ball down a lane in 2.5 s. The ball traveled at a constant acceleration of 1.8 m/s^2 down the lane and was traveling at a speed of 7.6 m/s by the time it reached the pins at the end of the lane. How fast was the ball going when it left Tim's hand?						
İ	A) 1.2 m/s	B) 3 m/s	C) 3.1 m/s	D) 4.1 m/s			
7 .	An aeroplane a the ground	accelerates down on . Determine the dista	a runway at 3.20 m/s nce traveled before ta	² for 32.8 s until is finally lifts off keoff.			
	A) 1720m	B) 1270m	C) 1050	m D) 1500m			
8. 	A car starts fro tance of 11	om rest and accelera 0 m. Determine the a	tes uniformly over a acceleration of the ca	time of 5.21 seconds for a dis- [.]			
Ì	A) 6.4m/s ²	B) 7.1m/s ²	C) 8.1 m/s ²	D) 7.4m/s ²			
9 . 	A race car acc the acceler	elerates uniformly fro ation of the car and t	om 18.5 m/s to 46.1 r he distance traveled.	n/s in 2.47 seconds. Determine			
l I	A) 73.8m	B) 79.8m	C) 98.7n	n D) 89.7m			
10. 	Rocket-powere powered sl acceleratio	ed sleds are used to ed is accelerated to a n and distance that th	test the human respo a speed of 444 m/s in ne sled travel?	nse to acceleration. If a rocket- 1.83 seconds then what is the			
İ	A) 406m	B) 306m	C) 206m	D) 604m			
II)	Multiple optic	on type:	26				
 ◆	This section co out of which Ol	ntains multiple choice NE or MORE is correc	questions. Each ques t. Choose the correct o	tion has 4 choices (A), (B), (C),(D), options			
11 .	A body starting the correct	g from rest and movi	ng with uniform accel	eration of 5 m/s². Then choose			
	a) its initial velocity is zero						
İ	b) its velocity will increase with time						
	c) its velocity at the end of 5 sec is 25 m/s						
1	d) its velocity a	at the end of 10 sec is	s 250 m/s				
i	A) only a, b, c	B) only b, c, d	C) only a, c, d	D) all a, b, c, d			
12.	A person runn	ing at 20 m/s speeds	up to 60 m/s in 4 sec	onds. Then choose the correct			
	a) his initial ve	locity is 20 m/s b)	his final velocity is 60) m/s			
į	c) his accelera	ation is 10 m/s ² d)	his velocity will be 12	20 km/h in next 6 sec			
	A) only a, b, c	B) only b, c, d	C) only a, c, d	D) all a, b, c, d			
<u>Fill</u>	Fill in the blanks:						
13.	13. The velocity of the body decreasing gradually is said to be in						
14.	The S.I unit of	deceleration is					
¦ 15.	15. Another name for deceleration is						
Match the following:							
• This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in Column-I have to be							
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matched with statements (p, q, r, s) in Column–II . The answers to these questions have to be appropriately bubbled as illustrated in the following example.						
If the correct matches are A matrix should be as follou	If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4*4 matrix should be as follows:					
 16. Column A		Column B				
a. u = 10m/s, v = 0	m/s, t =1s	1.	a = 2m/s ² .			
b. u = 5m/s, v = 5r	n/s, t =5s	2.	a = -10m/s²			
c. u = 0m/s, v = 10)m/s, t=5s	3.	a = -0.5m/s ²			
d. u = 2m/s, v = 1r	n/s, t=2s	4.	a = 0m/s²			
A. a-2, b-4, c-1, d-3	В. а	1-2, b-3, c-4, d-1				
C. a-3, b-2, c-1, d-4	D. a	a-3, b-4, c-1, d-2				
Comprehension type:						
 This section contains para 	graph. Based up	on each paragraph	n multiple choice questions			
 nave to be answered. Each ONE is correct. Choose the 	i question nas 4 c e correct option.	noices(A),(B),(C)	(ana (D) out of which ONLY			
17. Acceleration is ratio betwee	n change in velo	city and time	η			
i) The velocity of car changes	from 18 km/h to 7	2 km/h in 30 s the a	acceleration in km/h² is			
A) 648 B) 6480	C) 6	64800	D) 648000			
ii) The change in velocity of m A) 324 B) 3240	otor bike is 54 km/ C) 3	h in one minute the 32400	acceleration in km/h² is D) 324000			
iii) A speeding car changes its	velocity from 108	km/h to 36 km/h in	4s the deceleration in m/s ^{2.}			
A) 6 B) 5 C) 4 D) 3						
Solve the following:	201					
18. A bullet is moving at a speed of 367 m/s when it embeds into a lump of moist clay. The						
bullet penetrates for a d	bullet penetrates for a distance of 0.0621 m. Determine the acceleration of the bullet					
while moving into the cla	ay. (Assume a un	iform acceleratior	ı.)			
19 . A stone is dropped into a dee	19 . A stone is dropped into a deep well and is heard to hit the water 3.41 s after being dropped.					
Determine the depth of t	he well.					
 20 . A plane has a takeoff speed	of 88.3 m/s and	requires 1365 m t	o reach that speed. Deter-			
mine the acceleration of	the plane and th	e time required to	reach this speed.			
IV) Higher order thinking skills (HOTS)						
21 A bike geoderates uniformly	v from root to o o	need of 7.10 m/s	over a distance of 25.4 m			
Determine the appelerat	y nom lest to a s	peed of 7.10 m/s	over a distance of 55.4 m.			
	ion of the bike.					
I A) 0.8m/s² B) I) 7.1m/s²	C) 0.712 m/s ²	² D) 7.4m/s ²			
22. An engineer is designing the	e runway for an a	irport. Of the plan	es that will use the airport,			
the lowest acceleration rate is likely to be 3 m/s ² . The takeoff speed for this plane will						
be 65 m/s. Assuming th	be 65 m/s. Assuming this minimum acceleration and what is the minimum allowed					
length for the runway?						
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	A) 738m	B) 798m	C) 987m	D) 704m				
		KEY						
 	1) A, 2) B, 3 12) D, 13)Acce ii) B iii) B,	3) D, 4) D, 5)D, 6) eleration, 14)ms ⁻² , 18) -1.08x10 ⁶ m /s ^{2 ,} 19	C, 7) A, 8)C, 9)I 15) retardation, 9) 57 m , 20) 30.8 s	B, 10) A , 11)C 16) A, 17) i)B 5, 21)C, 22)D				
 	LEARNER'S TASK							
	* 1	BEGINNERS (Level-I) • II •					
 <u>Sir</u>	ngle correct answe	r questions:						
1.	Relation between o	change in velocity, accel	eration and time is					
	A) v = u - at	B) v - u = at	C) v = at - u	D) v - at = 0				
2 .	The S.I unit of dece	eleration	noa					
	A) m/min ²	B) m/s²	C) cm/s ²	D) ft/s ²				
 3.	The rate of change	of velocity is known as	02					
į	A) speed	B) displacement	C) acceleration	D) none of these				
 4.	The value of g is	INE OOK						
İ	A) 980 m/s ²	B) 9.8 m/s ²	C) 980 cm/s ²	D) 0.98 m/s ²				
5.	A body moves with	a uniform velocity. Amo	ong the following the co	prrect statement is				
İ	A) Its velocity is ze	ro	B) Its speed is ze	ro				
	C) Its acceleration	is zero	D) Both 1 & 2 are	e correct				
6 .	If a particle is in uniform motion along its straight line then its acceleration is							
ļ	A) zero	B) increases	C) decreases	D) constant				
7.	Unit of acceleration	n is		,				
	A) N/S ²	B) CM/S ²	C) m/s D)	cm/s				
0. 	A) a body having constant speed can have varving velocity							
į	B) a body can posses zero acceleration with non-zero velocity							
	C) If velocity is constant, acceleration is uniform and motion is non-uniform.							
	D) If velocity is not	constant,acceleration ar	nd motion are non-unife	orm.				
9. 	Acceleration of a b	ody can be due to itude of velocity of the br	adv					
	B) change in direct	ion of velocity of the bod	Ju ju ju ju ju ju ju ju ju ju ju ju ju ju					
	C) change in magr	nitude of velocity but not	, in direction					
	D) change in direct	ion of velocity but not in	magnitude					
10.	What is the relatio	n between S.I and C.G.	S units of acceleration	?				
1A	- CLASS	54	PO	wered by logicalclass.com				

PH	YSICS			MOTION IN A LINE		
	A) 1:100	B) 100:1	C) 200:1	D)1:200		
11.	Find the ratio between C.G.S and S.I units of speed ?					
	A) 1:100	B) 100:1	C) 200:1	D)1:200		
12.	A car traveling at 22.4 m	/s skids to a stop in	2.55 s. Determine th	e skidding distance of the		
	car (assume uniforr	n acceleration).				
į	A) 40.6m	B) 30.6m	C) 20.6m	D) 28.6m		
13. 	A kangaroo is capable of jumping to a height of 2.62 m. Determine the takeoff speed of the kangaroo.					
	A) 1.2 m/s	B) 7.17 m/s	C) 3.1 m/s	D) 4.1 m/s		
 	•H•	ACHIEVERS (Level - II) 🔹 🖿	•		
<u>So</u>	lve the following:					
 1.	How far does a plane fl	y in 15 s while its v	elocity is changing fr	om 145 m/s to 75 m/s at		
İ	a uniform rate of accele	ration?	dau			
2.	A skater is moving at 1	.6m/s and then acc	elerates at 4m/s² for	4 sec. How far did he		
į	travel during that motion	1?				
 3.	A car is moving 12 m/s	and coasts up a hill	with a uniform accel	eration of –1.0 m/s². How		
İ	far has it traveled after	6.0 s?				
 4.	A plane travels 500 m while being accelerated uniformly from rest at the rate of 5.0 m/s ² .					
	What final velocity does	it attain?				
5.	A race car can be slowed with a constant acceleration of $-11 \text{ m/s}2$. If the car is going 55					
	m/s, how many meters	will it take to stop?				
6.	The observation deck of	f tall skyscraper 37	0 m above the stree	t. Determine the time		
	required for a penny to	free fall from the de	ck to the street belo	W.		
	◆}∦ ∦≯	EXPLORERS	<u>(Level - III)</u>	< B # # *		
<u>Mu</u>	ltiple option type:					
♦ 	This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D), out of which ONE or MORE is correct. Choose the correct options					
 1.	Acceleration of a body	can be				
	a) positive b) ne	gative c)	zero			
	A) only a, b correct	B) only a	, c correct			
 	C) only b, c correct	D) all a, b	o, c are correct			
	- CLASS	35		Powered by logicalclass com		

2. A train strating from rest, attains a velocity of 75 km/h in 5 minutes. Assuming that the acceleration is uniform, Choose the correct option a) The acceleration of the train is 5/72 ms⁻² b) The distance travelled by the train while it attained the velocity is 25/4km c) The acceleration of the train is 1/20 ms⁻² d) The distance travelled by the train while it attained the velocity is 2 km A)a,b C)b,c B)a,d D)none Fill in the blanks: 3. Velocity is a quantity Speed in a given direction is called 4. 5. and are relative terms Acceleration of a body moving with increasing velocity is 6. Acceleration of a body moving with decreasing velocity is 7. Initial velocity of a body starting from rest is 8. 9. Final velocity of a body coming to rest is Match the following: This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in Column-I have to be matched with statements (p, q, r, s) in **Column-II**. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4*4 matrix should be as follows: 10. a) distance 1) m b) speed 2) s c) acceleration 3) m/s 4) m/s² d) time A) a - 1, b - 2, c - 3, d - 4 B) a - 1, b - 3, c - 4, d - 2 D) a - 2, b - 1, c - 4, d - 3 C) a - 1, b - 4, c - 3, d - 2 STotal 11. a) velocity 2) $\frac{v - u}{t}$ b) speed 3) $\frac{\overline{S}}{t}$ c) acceleration 4) $\frac{S}{t}$ d) average velocity B) a - 2, b - 3, c - 1, d - 4 A) a - 1, b - 2, c - 3, d - 4 C) a - 3, b - 4, c - 2, d - 1 D) a - 4, b - 3, c - 1, d - 2

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MOTION IN A LINE

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PHYSICS
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<u>Co</u>	Comprehension type:						
◆ 	 This section contains paragraph. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct. Choose the correct option. 						
12	. A train starts from rest and m	oves with a constant accele	eration of 2.0 m/s² for half a				
	minute.The breakes are the	en applied and the train come	es to rest in one minute.				
	i) Find the total distance moved	l by the train.					
	A) 2.7 km B) 2.2 km	C) 4.1 km	D) 1.7 km				
	ii) Find the maximum speed att	ained by the train.					
	A) 60 m/s B) 80 m/s	C) 50 m/s	D) 30 m/s				
ļ	iii) Find the position(s) of the tra	ain at half the maximum spe	ed.				
 	A) 225m B) 200 m	C) 250 m	D) 180 m				
13. 	A cyclist who starts from the top foot with a velocity of 54 km	p of a hill accelerates uniforr ph.	nly with 0.5 m/s² to reach the				
	i) He reaches the foot of the hill	ins.					
	A) 30s B) 20)s C) 10s	D) 15s				
	ii) Find the velocities of the cycl	list at the end of 5 s					
	A) 1.5m/s B) 2.1	5m/s C) 3m/s	D) 5m/s				
	iii) Find the ratio of velocities of	f cyclist at the end of the 21s	ts and 7 th s.				
	A) 3:2 B) 1:3	3 C) 3:1	D) 2:3				
İ	iv) Find the ratio of velocities of	cyclist 6 s after the start to the	nat of 6 s before reaching the				
 	foot of the hill.		0				
ļ	A) 1:1 B) 1:2	2 C) 1:3	D) 1:4				
 	, ,	•	, 				
į	<∎∎∎> <u>Res</u>	EARCHERS (Level - IV) <₽₩₩≻				
 <u>Siı</u>	ngle correct answer questions	<u>:</u>					
1.	What statement best describes	the given figure ?	[NSO-2011]				
 	A) The earth is rotating around	the sun B) The sun is rota	ating around the Earth				
į	C) The Earth is revolving aroun	nd the sun D) The sun is rev	olving around the Earth				
2 .	In circular motion the,		[NSO-2014]				
İ	A) direction of motion is fixed	B) direction of motion cha	nges continuously				
	C) velocity constant	D) none					
¦ 3.	Consider the motion of the tip of	of the minute hand of clock. I	n on hour. [NSO - 2014]				
	A) The distance covered zero	B) the displacement is ze	ro				
	C) the average speed is zero	C) none					
	- CLASS	37	Powered by logicalclass.com				

PH	YSICS			MOTION IN A LINE
4.	Which of the foll	lowing is example of vib	ratory motion ?	[NSO - 2009]
	A) a car moving	along a circular track	B) a freely falling sto	ne
	B) motion of the	string of violin	D) motion of the plar	net around the sun
5.	Which of the foll	lowing is example of pe	riodic motion?	[NSO - 2008]
ĺ	A) A car taking a	a turn on a curved road	B) A crane fling over	r a water pond
 	C) A lift moving of	down	D) march past of so	ldiers
6 . 	A passenger in a same train.	a moving train is at	w.r.t ground and is at	with other passenger in [NSO - 2009]
	A) Motion, motion	n B)rest,rest	C) motion, rest	D) rest, motion
7 . 	If a body travels average velo	s half the distance with ocity will be given by.	velocity v_1 and the n	ext half with velocity v ₂ .ts [NSO - 2008]
8. / 	An artificial satelli revolve arou	te is moving in circular nd the earth.	orbit of 4225.km.find i	ts speed if it takes 24hr to [NSO - 2012]
İ	A) 30.7km/s	B) 5.67km/s	C) 6.14km/s	D)1.57km/s
9 .	The length of a s	square field is 6 <i>m</i> . Paru	ul ran 6 rounds around	the field. The total
	distance that sh	e covered, is	0 ⁴	[NSO - 2008]
	A) 216 <i>m</i>	B) 144 <i>m</i>	C) 176 <i>m</i>	D) 186 <i>m</i>
10. 	Two simple pene completes 3	dulums P and Q are giv 0 oscillations in 45 sec.	en. P completes 20 of Which pendulum is fa	scillations in 32 sec and Q aster ? [NSO - 2008]
	A) P B) Q	C) both have	same time period	D) data insufficiently
11. 	Two boys P and Q catches u constant spe	Q are running along the p with P. after running { eed. What is the ratio of	same path. P is 10 m a 50 m. Assuming that t the speeds of P and t	head of Q initialy.However, both boys are running at a Q ? [NSO - 2014]
	A) 6 : 5	B) 5 : 6 C) 4 :	1 D) 4 :	5
12. 	Sonic vibrations sea. If the sp	were sent down from a beed of sound in water i	return after 2 second is 1.5 kms ^{.1} ?	s. What is the depth of the [NSO - 2012]
 	A) 150 m	B) 3 m	C) 1.5 m	D) 750 m
13. 	A car driver took of half an hou average spe	a total of two hours to r ur and spend a quarter o ed during the journey ?	make a journey of 75 k of an hour stationary in	m. He had a coffee break a traffic jam. What was his [NSO - 2012]
	A) 38 kms ⁻¹	B) 50 kms ⁻¹	C) 60 kms ⁻¹	^{D)} 75 kms ⁻¹
14. 	Talking one light speed of light	year equal to 9.4 X 10 ¹⁸ It in light year per day if	⁵ m and one day equal ⁵ the speed of light in n	to 86400 s, what will be the ns ⁻¹ is 3 X 10 ⁸ ?
	A) 2.75 X 10 ⁻³ ly	day⁻¹	B) 3.75 X 10 ⁻³ ly day	[NSO - 2012]
	C) 2.75 X 10 ³ ly	day⁻¹	D) 3.75 X 10 ⁻³ ly day	-1
 15 .	The ultrasonic w	vaves take 4 second to	travel from the ship to	the bottom of the sea and
	back to the s	hip (in the form of an ec	cho). What is the depth	n of the sea)?[NSO - 2009] Powered by logical class.com





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 	$\Rightarrow H = \frac{1}{2} \times 9.8 \times (4.2)^2 \Rightarrow H = 86.44 m$
√	Ex 3: How long does it take a brick to reach the ground if dropped from a height of
	65 m? What will be its velocity just before it reaches the ground?
Sol:	Height = 65m, Initial velocity u = 0
	Time = $\sqrt{\frac{2H}{g}} = \sqrt{\frac{2 \times 65}{9.8}}$ =3.64 sec
	velocity v = $\sqrt{2gH}$ \Rightarrow v = $\sqrt{2 \times 9.8 \times 65}$ \Rightarrow v = 35.6 m/sec.
√ 	Ex 4: A ball is thrown vertically up with a velocity of 39.2 ms ⁻¹ Calculate its maximum height.
Sol:	Initial velocity of the body (u) = 39.2 ms^{-1}
 	Maximum height (H) = $\frac{u^2}{2g} = \frac{39.2 \times 39.2}{2 \times 9.8} = 78.4 \text{ m}$
i√ I	Ex 5: If the times of fall of two bodies are in the ratio 1:2. What is the ratio of the heights from whcih they fall?
 Sol: 	The ratio of the times $\mathbf{t}_1 : \mathbf{t}_2 = 1:2$, $h \propto t^2 \Rightarrow \frac{h_1}{h_2} = \left(\frac{t_1}{t_2}\right)^2 \Rightarrow \left(\frac{1}{2}\right)^2 = 1/4$
√ 	Ex 6: A ball is dropped freely from a height. Find the distance travelled in the sixth second.($g = 9.8 \text{ ms}^{-2}$)
Sol:	Given that initial velocity (u) = 0
	Distance travelled by the body in the nth second
	$(\mathbf{s}_n) = u + a \left(n - \frac{1}{2} \right) \Rightarrow \Rightarrow s_6 = 0 + 9.8 \left(6 - \frac{1}{2} \right) = 53.9 \text{ m}$
	TEACHING TASK
Singl	e correct answer questions
1. A	ball dropped freely takes 0.2s to cross the last 6m distance before hitting the ground. Total time of fall is $(g = 10 \text{ m/s}^2)$
j A)	2.9 s B) 3.1 s C) 2.7 s D) 0.2 s
2. AI	body thrown up with a velocity reaches a maximum height of 100 m. Another body withe
	double the mass is thrown up with double the velocity of the first one, maximum height
	reached by the second body is
A) 	400 m B) 200 m C) 100 m D) 25 m
3 . A IX - C	body is dropped from a height of 300 m. Exactly at the same instant another body is CLASS 41 Powered by logicalclass.com

PE	IYSICS			MOTION IN A LINE	
	projected fror	n the ground vertical	ly up with a velocity of	150 m/s. They will meet, from	
	top at a heigh	t of			
ļ	A) 19.6 m	B) 16.9 m	C) 69.1 m	D) 96.1 m	
 4 .	One body is drop	ped while a second b	odv is thrown down w	ard with an initial velocity of 1	
i	m/s simultane	eously. The separation	on between these is 1	8 m after a time.	
ļ	A) 18 sec	B) 9 sec	C) 4.5 sec	D) 36 sec	
 <i> </i>)	More than one o	orrect answers	-,	_,	
	This section conto	ains multiple choice q	uestions. Each questio	n has 4 choices (A), (B), (C),(D),	
i_	Augusta and the set	or more is correct.			
5 .	Average value of $a_1 a_2 ft/a_2$	b) 08 m/c ²	c $0.8 m/c^2$	d) 080 cm/c^2	
Ì	A) a b c correct	B) b c d correct	C) a c d correct	D) all correct	
Fil	I in the blanks :	D) D,C,C Correct		D) all correct	
<u></u> 6.	At a point where t	he final velocity of a	vertically projected bo	dy becomes zero is called as	
			· · · · · · · · · · · · · · · · · · ·	101	
7.	Equation for time	e of flight			
8.	Units for acclerati	ion due to gravity in S	SI and CGS system ar	e	
9.	value of 'g' in SI s	system	G.OV		
<u>As</u>	sertion - A and R	<u>eason - R:</u>	11		
 ↓ 	This section contains certain number of questions. Each question contains Statement – 1 (Assertion) and Statement – 2 (Reason). Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct Choose the correct option.				
i	A) Both A and R	are true and R is co	orrect explanation of A	A	
	B) Both A and R	are true and R is no	t correct explanation of	of A	
1	C) A is true but	R is false.			
İ	D) A is false but F	R is true.			
10	A : The direction is	reversed at maximum	height in the case of a v	vertically projected body	
	R: Acceleration du	e to gravity acts as cor	nstant in the case of a ve	ertically projected body	
11 .	A: At maximum f	inal height velocity of	a vertically projected	body is zero.	
	R: At maximum r	neight acceleration d	ue to gravity is never a	Zero.	
12	A: The displacement	ent of a freely failing bo	ay in successive second	as is in the ratio 1:3:5:	
 Ma	R . Decause it is		rvelocity		
	This section cor	<u>I-</u> Dtains Matrix-Match T	une questions Fach a	restion contains statements	
• 	given in two colu to be matched ı have to be appr	umns which have to b vith statements (p, q, opriately bubbled as	e matched. Statements r, s) in Column–II . Th illustrated in the follo	s (A, B, C, D) in Column–I have e answers to these questions wing example.	
 	If the correct ma matrix should b	utches are A-p,A-s,B-r pe as follows:	;B-r,C-p,C-q and D-s,ti	hen the correct bubbled 4*4	
	- CLASS		42	Powered by logicalclass.com	

13.	a) Maximum height (H)	1) 2u/	g	
	b) Time of ascent (t _a)	2) u/g		
	c) Time of descent (t_d)	3) u²/2	2g	
	d) Time of flight (T)	4) $\sqrt{2h/g}$		
 	A) a-3, b-2, c-4, d-1	B) a-3, b-2, c	-1, d-4	
	C) a-2, b-3, c-4, d-1	D) a-3, b-4, c	-2, d-1	
	P	VEV		
, 				
<u>φΦ</u> <u>Τ</u>	EACHING TASK :			
	1) B, 2) A, 3) A, $(2^{3})^{2}$	4) A, 5) C, 0) 0.8 m/a^2	6)Maximum height ,	7) 2u/g,
	o)iii/s-, ciii/ s-	9) 9.011/5-	10)A, 11)A,	12) C, 13) A.
 		LEARNER'S T	ASK	
 	• + + • <u>BE</u>	GINNERS (Le	vel - 1) + 1 - 1 +	
l) <u>Si</u>	ngle correct option question	ons:		
1.	A body falls freely from re	st. If the veloc	city acquired is numer	ically equal to the
İ	A) 9.8 m/s B) 19	0.6 m/s	C) 29.4 m/s	D) 39.2 m/s
2.	A body dropped from the top	of a tower reach	nes the ground in 4s. H	eight of the tower is
İ	A) 39.2 m B) 44	.1 m	C) 58.8 m	D) 78.4 m
3 . 	A boy throws a ball in air and	d in such a way t	hat when the ball is at i	ts maximum height
ļ	he throws another ball. If the	e balls are throw	n with a time difference	e of 1 sec. What will
 	A) 10.6 m B) 0	8 m	C) 4.9 m	D) 2.45 m
	A) 19.0 m D) 9.	top of a tower	C) 4.3 III	akes 't' seconds to
 	reach the ground. Where is	the ball at the t	ime t/2 sec.	akes i seconds to
İ	A) at $h/2$ meters from the qu	round	B) at h/4 meters fron	n the around
 	C) depends upon the mass	of the body	D) at 3h/4 meters fro	om the ground.
5.	At a place the acceleration	due to gravity is)	5
	A) zero B) constant	C) vai	ries D) we	can't define
6.	Average value of accelerati	on due to gravity	/ of earth is	
	A) 32 m/s ² B) 98 m/s ²	C) 9.8	3 m/s ² D) 98	0 m/s²
7.	If two stones of different siz	es are dropped	simultaneously from th	ne top of a building
 	in vacuum, then			
 	A) smaller stone reaches the	e ground first	B) larger stone reach	es the ground first
 	C) both reach the ground si	multaneously	D) it depends upon n	naterial of stone
IX - C	LASS	43	Powere	ed by logicalclass.com

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8. 	A motor car moving with a uniform velocity of 20 m/s, comes to a stop, on the applica- tion of the brakes, after travelling a distance of 10 m. Its acceleration is				
	A) 20 m/s ²	B) - 20 m/s ²	C) - 40 m/s ²	D) 2 m/s ²	
 9. 	A stone releat the tower is a	sed freely from the to about (g = 10 m/s ²)	op of a tower reaches	the ground in 4 s. The height of $ $	
İ	A) 20 m	B) 40 m	C) 80 m	D) 160 m	
 10.	If a body trav	els 30 m in an interv	al of 2 s, and 50 m in	next interval of 2 s, the	
İ	acceleration	of the body is			
	A) 10 m/s²	B) 5 m/s²	C) 20 m/s ²	D) 2.5 m/s²	
11.	A particle is t	ravelling with uniforn	n acceleration. Its ve	locities after 1 s, 5 s are	
	respectively	2 cm/s and 10 cm/s.	The distance travelle	ed in the 3 rd second is	
	A) 7 cm	B) 5 cm	C) 4 cm	D) 14 cm	
12.	The ratio of the	e distance travelled by a	a freely falling body in th	ne 1st, 2nd, 3rd seconds of its fall is	
	A) 1 : 2 : 3	B) 1 : 3 : 5	C) 1 : 4 :	9 D) none of the above	
13.	A body is pro	jected vertically upwa	ards. Maximum heigh	t reached by it is equal to accel-	
	eration due t	o gravity in magnitud	le. Initial velocity of th	ne body is (g = 10 m/s ²)	
	A) 19.6 m/s	B) 14.14 m/s	C) 10 m/s	D) 10.02 m/s	
14.	A stone is thr	own upwards from th	ne surface of earth wi	th a initial velocity of 5 m/s. The	
İ	stone comes	to rest at a height o	of (assume $g = 10 \text{ m/}$	(S ²)	
	A) 1.25 m	B) 12.5 M	C) 0.125	m D) 1250 m $ $	
15.	in approxima	rojected vertically up $a = 10$	mards with a velocity (m/s ²)	or 100 m/s. It strikes the ground	
	A) 10 sec	B) 15 sec	C) 20 se	c D) 5 sec I	
16.	A stone is dr	opped freely from th	ne top of a tower rea	ches the around in 4 sec. The	
	height of the tower is about (assume $g = 10 \text{ m/s}^2$)				
ĺ	A) 20 m	B) 40 m	C) 80 m	D) 160 m	
17.	A body is pro	jected vertically upw	ards from bottom of	a tower. The body crosses an	
	observer on	the top of the tower v	vith a velocity of 2 m/s	s in 2 sec.Height of the tower is	
	A) 23.6 m	B) 20 m	C) 4 m	D) 15.6 m	
18. 	If a body trav acceleration	els 30 m in an interva of the body is	al of 2 sec, and 50 m	in the next interval of 2 sec, the	
	A) 10 m/s ²	B) 5 m/s²	C) 20 m/	/s ² D) 2.5 m/s ²	
19.	How far will a	a freely falling body t	ravels in first 5 secor	nds. (assume g = 10 m/s²)	
	A) 125 m	B) 250 m	C) 50 m	D) 225 m	
20.	The distance	travelled by a freely	falling stone in its 3r	d second of its travel is	
į	A) 9.8 m	B) 19.6 m	C) 24.5 r	n D) 39.2 m	
IX - C	CLASS		44	Powered by logicalclass.com	

 21. 	A ball is throw with which ba	vn vertically upwards all was thrown is	returns to its starting	g point in 4 s. The initial velocity
ļ	A) 12 m	B) 9.8 m	C) 19.6	m D) 392 m
22 . 	The accelera up straight o throw the sto	tion due to gravity on n the earth, how hig ne on the moon.	moon is g/6 m/s². If h should the boy w	a boy can thrown a stone 12 m ith same initial velocity able to
	A) 50 m	B) 60 m	C) 140 n	n D) 72 m
23. 	Three blocks Ones block is reach the gro	of identical dimensior s made of lead one c ound first is	ns are dropped simul of brass and the oth	taneously from the same height. er of aluminium. The block that
	A) The lead b	block B) the brass b	lock C) the alumini	um block D) all simultaneously
24. 	Two bodies fro released simu	om the top of a mount ultaneously to fall unde	ain cliff with one held er gravity. After 2 sec	l directly above 1 m the other are their relative separation will be
ļ	A) 1 m	B) 2 m	C) 3 m	D) 4 m
25. 	A body of ma journey, its s	ass 3 kg is thrown ve beed in m/s at the sta	ertically up with a sp arting point will be	beed of 100 m/s. On the return
İ	A) 10000	B) 1000	C) 100	D) 9.8
26.	A ball release	ed from a height falls	5 m in first second.	In 4 s it falls through a height of
	A) 20 m	B) 1.25 m	C) 40 m	D) 80 m
27.	Two bodies of and u ₂ . The r	of masses m ₁ and m ₂ atio of their times of	, are projected vertion flights is	cally upwards with velocities u ₁
 	A) $\frac{m_1}{u_1}:\frac{m_2}{u_2}$	B) $\frac{u_1}{m_1}:\frac{u_2}{m_2}$	C) <i>u</i> ₁ : <i>u</i> ₂	D) $\frac{1}{u_1}:\frac{1}{u_2}$
28. 	A freely falling the height from	g body travels a dista om which its is falling	nce of 2450 cm in the	e last second of its journey. Find
	A) 980 cm	B) 1960 cm	C) 2940 cm	D) 4410 cm
29. 	A ball is drop projected ver much time th	ped from the top of a rtically upwards from ey will meet	a tower 400 m high a n the ground with a	at the same time another ball is velocity of 100 m/s. After how
ļ	A) 2 s	B) 8 s	C) 6 s	D) 4 s
 30. 	A stone falls its motion eq stone remain	freely from rest and t uals the distance cov is in air for	he total distance co vered by it in the first	vered by it in the last second of five seconds of its motion. The
 	A) 17 s	B) 11 s	C) 7	D) 13 s
- 				
 IX - C	CLASS		45	Powered by logicalclass.com

◆ ₽-∎ ◆ ACHIEVERS (Level - II) ◆ ₽-∎ ◆

Solve the following:

- **1.** A ball is thrown vertically down from a building top with a velocity equal in magnitude to that of acceleration due to gravity. If it reaches the ground with double the velocity, height of building in meters is
- **2.** A ball is thrown vertically down with a velocity of 20.6 m/s from a height of 105.9 m. The velocity with which the ball hits the ground is
- A stone is dropped from the top of a tower 200 metres in height and at the same instant another is projected vertically upwards from the ground with a velocity of 50m/s. Find when and where the stones will meet.
- 4.Find the ratio of distances travelled by freely falling body. In the first second to next
second and next second.
- 5. A body moving from rest with uniform acceleration travels a distance S_1 in the first 2 seconds and travels a distance S_2 with uniform velocity in the next 4 seconds. Then show that $S_2 = 4S_1$.
- 6. A stone is dropped down vertically from a height of 490m displaces, how much in its last second of its travel ?
- **7.** A body released from the top of a tower of height h takes time 't' to reach the ground. What is its height from the ground after time t/2 ?
- **8.** Show that for a freely falling body if displacement in 1^{st} , 2^{nd} , 3^{rd} Seconds are S_1, S_2, S_3 then $S_2 S_1 = S_3 S_2 = S_4 S_3 = = g$.
- **9.** Show that the distances travelled by a freely falling body in succesive seconds in the ratio 1 : 3 : 5 :
- **10.** Show that for a freely falling body, travels a distance x in n^{th} second, distance travelled by in the next $(n+1)^{th}$ second is x+g.
- **11.** Show that for a freely falling body, travels a distance x in n th second, distance travelled by it before one second [(n-1) th second] is x g

EXPLORERS (Level - III)

More than one correct option questions:

This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D), out of which ONE or MORE is correct. Choose the correct options

1. In the case of a vertically projected body which of the following are wrong

a) at maximum height v = 0, g = 0	b) at maximum height v = 0, g = constant
-----------------------------------	--

c) at maximum height $v \neq 0$, g = 0 d) at maximum height $v \neq 0$, g = constant

A) a,b,c B)b,c,d C) a,c,d D)none

Fill in the blanks :

2. At maximum height the final velocity of a vertically projected body becomes ------

3.	Time taken by th	e body to rach the ground is called	
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4. Average value of the earth is -----5. For a freely falling body initial velocity is ------

Assertion - A and Reason - R:

- ◆ This section contains certain number of questions. Each question contains Statement 1 (Assertion) and Statement – 2 (Reason). Each question has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct Choose the correct option.
 - A) Both A and R are true and R is correct explanation of A
 - B) Both A and R are true and R is not correct explanation of A
 - C) A is true but R is false. D) A is false but R is true.
- **6. A** : A metal ball and a wooden ball of some radius are dropped from the same height in vacuum reach the ground same time.
 - **R**: In vacuum all the bodies dropped from same height take same time to reach the ground.
- **7. A** : If a bird starts from its nest in the morning for food, and returns to his nest in the evening, its average velocity is zero
 - R: The ratio between total displacement to total time taken is called as average velocity
- **8. A** : In the case of a vertically projected body its acceleration remains constant through out the journey.
 - R: Earth attracts all the bodies towards its centre.
- **9. A** : Any freely falling body moves an extra distance 'g' in every second compared to that in the previous second.
 - **R**: Any freely falling body moves with an acceleration 'g'.

Match the following.

This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in Column–I have to be matched with statements (p, q, r, s) in Column–II. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

*If the correct matches are A-p,A-s,B-r,C-p,C-q and D-s,then the correct bubbled 4*4 matrix should be as follows:*

- **10.** a) starting from rest 1) u = 0
 - b) freely falling2) v = 0c) vertically projected up3) a = g
 - d) comes to rest 4) a = g

A) a-1, b-3, c-4, d-2 B) a-2, b-1, c-4, d-3 C) a-1, b-3, c-2, d-4 D) a-1, b-3, c-4, d-2

Comprehension Type questions:

- This section contains paragraph. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct. Choose the correct option.
- **11.** When a body is projected vertically upwards, its velocity decreases since its motion is against gravity,hence g is taken as -ve:

i) A ball is projected upward with velocity of 100ms⁻¹. It will strike the ground in nearly

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A body projected vertically up from a tower of height 'h' with a velocity 'u' (or) a body dropped from a rising balloon (or) a body dropped from an helicopter rising up vertically with constant velocity 'u' reaches the ground exactly below the point of projection after a time 't'. Then

a) Height of the tower is $h = -ut + \frac{1}{2}gt^2$

b)Time taken by the body to reach the ground t = $\frac{u + \sqrt{u^2 + 2gh}}{g}$

c)The velocity of the body at the foot of the tower v = $\sqrt{u^2 + 2gh}$

d) Velocity of the body after 't' sec. is v = u - gt

e)The height of the balloon by the time the body reaches the ground is $\frac{1}{2}gt^2$.

A body projected vertically down from a tower with a velocity 'u' reaches the foot of the tower after a time 't₁' with a velocity 'v₁'. Another body projected vertically up from the tower with same velocity reaches the foot of the tower after a time 't₂' with a velocity 'v₂'. A freely dropped body reaches the foot of the tower after a time 't' with a velocity 'v', then

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(a)
$$t = \sqrt{t_1 t_2}$$
 (b) $h = \frac{1}{2}gt_1 t_2$ (c) $u = \frac{1}{2}g(t_1 - t_2)$
(d) $v_1 = v_2 = \sqrt{u^2 + 2gh}$ (e) $v = \sqrt{2gh}$
EXAMPLE
4 Ex1: A helicopter is ascending vertically with a speed of 8.0 ms⁻¹. At a height of 120 m above the earth, a package is dropped from a window. How much time does it take for the package to reach the ground?
Sol: Initial velocity $u = 8$ m/sec, Height H= 65m, H=-ut $+\frac{1}{2}gt^2$, Time (t) = ?
 $65 = -8t + \frac{1}{2} \times 9.8 \times t^2$, By solving $t = 5.83$ sec.
4 Ex2: A stone is thrown vertically upward with a speed of 10.0 ms⁻¹ from the edge of a cliff 65m high. How much later will it reach the bottom of the cliff? What will be its speed just before hitting the bottom.
Sol: Initial velocity of stone $u = 10m/sec$, Height of the cliff H = 65m
i) Time taken to reach the bottom of the cliff t = ?
 $H = \frac{1}{2}gt^2 - \mu d$
 $\Rightarrow -65 = \frac{1}{2} \times 9.8 \times t^2 - 10t$
 $\Rightarrow 4.9t^2 - 10t - 65 = 0$
By solving it we get $t = 4.79$ sec.
i) Speed of the stone just before hitting the bottom $v = ?$
 $v = \sqrt{2gh}$ $\Rightarrow v = \sqrt{2 \times 9.8 \times 65} \Rightarrow v = 37.14$ m/sec
4 Ex3: From the top of the tower of height 39.2m, a stone is thrown vertically up with a velocity of 9.8 ms⁻¹. Find out the time taken by it to reach the ground (g=9.8 m/s⁻²)
Sol: Given that Height of the out the time taken by it to reach the ground ($g=9.8 \text{ m/s}^2$)
Sol: Given that Height of the tower (h)= 39.2 m, Velocity of the body (u) = 9.8 ms⁻¹. Time taken by the body to reach the ground
 $(t) = = \frac{u + \sqrt{u^2 + 2gh}}{2} = \frac{9.8 + \sqrt{9.8 \times 9.8 + 2 \times 9.8 \times 39.2}}{2} = 19.6$ sec.

	TEACHING TASK			
Choo	se the correct option:			
1.	A food packet is released from a helicopter which is rising at 2 m/s. The velocity of the			
	food packet after 2 seconds is			
	A) 17.6 m/s up words B) 21.6 m/s down words			
	C) 17.6 m/s down words D) 21.6 m/s down words			
2.	A stone is dropped from a rising balloon at a height of 300m above the ground and it reaches the ground in 10s. The velocity of the balloon when it was dropped is			
	A) 19 m/s B) 19.6 m/s C) 29 m/s D) 0 m/s			
3.	A body thrown vertically up with a velocity 'u' reaches the maximum height 'h'after'T' second. Correct statement among the following is			
	A) at a height h/2 from the ground its velocity is u/2			
	B) at a time 'T' its velocity is 'u'			
	C) at a time '2T' its velocity is '-u' D) at a time '2T' its velocity is '-6u'			
4.	A stone is thrown vertically up with a speed of 4.9 m/s from a bridge. It fell down in water after 2 sec. The height of the bridge is			
	A) 9.8 m B) 19.8 m C) 14.7 m D) 19.5 m			
5	A balloon starts rising from the ground with an acceleration of 1.25 ms ⁻² , After 8			
	seconds, a stone is released from the balloon, The stone will $(g=10 \text{ ms}^2)$			
	A) cover a distance of 40 m B) having a displacement of 50 m			
6	A ball is thrown straight upward with a speed v from a point h meters above the			
0.	ground. The time taken for the ball to strike the grounds is			
	A) $\frac{v}{g} \left[1 + \sqrt{1 + \frac{2hg}{v^2}} \right]$ B) $\frac{v}{g} \left[1 - \sqrt{1 - \frac{2hg}{v^2}} \right]$ C) $\frac{v}{g} \left[1 - \sqrt{1 + \frac{2hg}{v^2}} \right]$ D) $\frac{v}{g} \left[2 + \frac{2hg}{v^2} \right]$			
7.	A body thrown up with a velocity of 98 m/s reaches a point 'P' in its path 7 second after projection. Since its projection it comes back to the same position after			
	A) 13s B) 14s C) 6s D) 22s			
8.	A stone projected vertically up from the top of a cliff reaches the foot of the cliff in 8s. If it is projected vertically downwards with the same speed, it reaches the foot of the cliff in 2s. Then its time of free fall from the cliff is			
	A) 16s B) 8s C) 2s D) 4s			
9.	A stone projected vertically up from the ground reaches a height y in its path at t_1			
	seconds and after further t_2 seconds reaches the ground. The height y is equal to $ $			
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	A) $\frac{1}{2}g(t_1 + t_2)$	B) $\frac{1}{2}g(t_1+t_2)^2$	C) $\frac{1}{2}g t_1 t_2$	D) g t ₁ t ₂				
<u>Ass</u>	ssertion A and Reason R:							
*	This section contains certain number of questions. Each question contains Statement – 1 (Assertion) and Statement – 2 (Reason). Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct Choose the correct option.							
	A) Both 'A' and 'R' are	true and 'R' is the co	orrect explanation of '	Ą' ا				
	B) Both 'A' and 'R' are	true and 'R' is not co	orrect explanation of '	A'				
	C)'A' is true and 'R' is	false D) 'A' is false and 'R' is	true				
10.	A:Time taken by the height of aeroplane	bomb to reach the g only.	ground from amoving	aeroplane depends on 				
	R: horizontal compon nent of bomb chan	ent of velocity of the ges due to gravity.	e bomb remains cons	tant and vertical compo-				
11.	A : A body thrown up same point strike the	from the top of a to he ground with the s	wer and another bod ame velocity.	y thrown down from the				
	R : Initial velocity and	acceleration are cor	nmon for both.	ļ				
Mul	tiple option type:		inu					
•	This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D), out of which ONE or MORE is correct. Choose the correct options							
12.	A stone is vertically projected with velocity U from the top of a tower then							
	a) Total displacement is zero but distance is not zero							
	b) Total displacement	is +Ve		l				
	c) The average velocity	of the stone from its	maximum height to the	top of the tower is U/2				
	d) The total displacem	nent is - Ve						
	A) only c, d are correc	ct B) only a	, d are correct	l				
	C) only a, c, d are cor	rect D) all are	correct					
<u>Fill</u>	<u>in the blanks :</u>			ļ				
13.	A stone is vertically p maximum height th	projected with veloci nen final velocity is	ty 'u' from the top of t	tower and it reaches the 				
14.	Equation for height of	the tower is						
15.	Equation for the veloc	city of the body at the	e foot of the tower v =					
16.	Equation for time take	en by the body to rea	ich the ground t =					
Mat	tch the following:							
•	This section contains given in two columns to be matched with so have to be appropriat	Matrix-Match Type q which have to be mai tatements (p, q, r, s) i tely bubbled as illusi	uestions. Each questio tched. Statements (A, H n Column–II . The ans trated in the following	on contains statements B, C, D) in Column–I have swers to these questions example.				
	If the correct matches matrix should be as j	s are A-p,A-s,B-r,B-r,(follows:	C-p,C-q and D-s,then ti	he correct bubbled 4*4				
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PHY	YSICS]	MOTION IN A LINE
	reach the ground	l, the time gap is		
	A) 0 s	B) 2 s	C) 4 s	D) 6 s
11. 	A stone is dropped velocity of 5m/s reach the ground	l from a balloon at an a and descends with a l in the two cases resp	Ititude of 280m. If the b velocity of 5 m/s, times pectively are (g=10m/s²)	balloon ascends with a taken by the stone to
	A) 8 s and 9 s	B) 9 s and 8 s	C) 3 s and 4 s	D) 8 s and 7 s
12. 	A ball is thrown ver height and anothe The time differen	rtically upwards with a er is thrown vertically do nee between them on r	speed of 10 m/s from th ownwards with the same eaching the ground is	e top of a tower 200m speed simultaneously.
İ	A) 12s	B) 6s	C) 2s D)	1s (g=10m/s ²)
13. 	A balloon is rising v is a height of 39.2	vertically with a velocity 2 m. Time taken by the	of 9.8 m/s. A packet is o packet to reach the gro	dropped from it when it ound is
ļ	A) 1s	B) 2s	C) 3s	D) 4s
14. 	A body projected ve by it in the next t	ertically up travels a hei wo seconds is	ght 'h' in the nth second.	The distance travelled
	A) h + 2g	B) 2h + g	C) 2h + 2g	D)2h + 3g
 	A ball is thrown ve bottom of a tower	ertically upwards with ⁻ 200 m high. Another i	a speed of $10~{ m ms}^{-1}$ frs dropped vertically dow	om the ground at the nward simultaneously,
	from the top of a	tower. If $g = 10 \text{ms}^{-2}$ t	ne time interval after wh	ich the projected body
	will be at the sam	ne level as the droppe	d body is	
	A) 20 s	B) 25 s	C) $2\sqrt{10}$ s	D) 5 s
 	A body is thrown v from the time of p ing(in seconds)	rertically up to reach it projection to reach a po is	s maximum height in se pint at half of its maximu	econds. The total time Im height while return-
 	A) $\sqrt{2} t$	$B)\left(1\!+\!\frac{1}{\sqrt{2}}\right)t$	C) $\frac{3t}{2}$	D) $\frac{t}{\sqrt{2}}$
17. 	A body is projected at a height ' <i>h</i> ' tw	l vertically upwards witl vice , just after 1 and 7	h a velocity ' $_{\mathcal{U}}$ ' . It cross seconds .	es a point in its journey
İ	The value of u in b	$ms^{-1}is(g=10ms^{-2})$		
	A) 50	B) 40	C) 30	D) 20
18. 	A body projected v after t_1 and t_2 se	rertically upwards cros econds. Maximum heię	ses a point twice its jour ght reached by the body	rney at a height ' <i>h</i> ' just ' is
 	$A)\;\frac{g}{4}(t_1+t_2)^2$	$B) \ \mathscr{G}\left(\frac{t_1 + t_2}{4}\right)^2$	$C) \ 2g\left(\frac{t_1+t_2}{4}\right)^2$	D) $\frac{g}{4}(t_1t_2)$
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Solve the following :

- Two stones are located at the same height above the ground at a horizontal distance of 20 m. One of them is projected vertically upward at 20 m/s and the other dropped from rest at the same moment. Find the distance between them one second later. (Assume acceleration due to gravity is 10 ms⁻²)
- 2. A body is thrown up from a certain height and another thrown down from the same point with the same speed at the same time. If they hit the ground with a time gap of 4 s, the speed of projection is
- 3. A body is dropped from a height of 20 m above the ground. If gravity disappears 1 second after it starts falling, the time it takes to hit the ground is (Assume acceleration due to gravity = 10 ms⁻²)

EXPLORERS (Level - III)

More than one option is correct:

- This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D), out of which ONE or MORE is correct. Choose the correct options
- **1.** Height of the body from the ground can be calculated by using the formula $h = -ut + (1/2)gt^2$ in
 - a) A body projected vertically with velocity 'u' from the top of tower, reaches the ground in 't' sec.
 - b) A body dropped from a balloon moving up with uniform velocity, reaches the ground in 't' sec
 - c) A body dropped from a helicaptor moving up with uniform velocity, reaches the ground in 't' sec
 - d) A body projected vertically from the ground reaches the ground in 't' sec.
 - A) a, b and c are correct B) a, b, c and d are correct
 - C) a is only correct D) b and d are correct
- 2. A balloon from rest accelerates uniformly upward with 'a' ms⁻², for t seconds of time. A stone is released from the balloon. Now, read the following statements to pick the right ones.
 - a)The stone's initial velocity is zero, relative to balloon
 - b)The stone's initial velocity is non-zero, relative to earth
 - c)The time taken to reach the ground from the balloon's frame of reference is inversely proportional to $\sqrt{(\mathbf{a}+\mathbf{g})}$.
 - d)The time take to reach the ground from earth's frame of reference is directly proportional to $\sqrt{(a+g)}$.
 - A) a, b, c B) a, c, d C) a, b, d D) a, c

<u>Fill in the blanks :</u>

- **3.** The direction is ------ at maximum height in the case of a vertically projected body.
- 4. Any body projected vertically moves with ------
- 5. A body can have ----- even if its velocity zero at a given instant of time.
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6. Velocity and acceleration can be ----- each other for a vertically projected body.

Assertion - A and Reason - R :

 This section contains certain number of questions. Each question contains Statement – 1 (Assertion) and Statement – 2 (Reason). Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct Choose the correct option.

Options:A) Both A & R are true and R is correct explanation of A

- B) Both A & R are true and R is not correct explanation of A
- C) A is true but R is false.
- D) Both A & R are false.
- 7. A: The direction is reversed at maximum height in the case of a vertically projected body
 - **R** : Acceleration due to gravity acts as constant in the case of a vertically projected body
- 8. A : A body can have acceleration even if its velocity is zero at a given instant of time.
 - R: A body is momentarily at rest when it reverses its direction of motion
- 9. A: Velocity and acceleration can be opposite to each other
 - **R** : Any body projected vertically moves with deceleration.

Match the following

. This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in **Column-I** have to be matched with statements (p, q, r, s) in **Column-II**. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4*4 matrix should be as follows: **10.** a. When body projected up 1) a = +g b. When body falling down 2) a = -g c. Time of ascent 3) u/g d. Velocity at maximum height 4) v = 02A) a-2, b-1, c-3, d-4 B) a-1, b-2, c-3, d-4 C) a-2, b-1, c-4, d-3 D) a-4, b-1, c-3, d-2 **11.** Study the following. List - I List - II a) Constant speed and varying velocity I) At height point of body projected vertically up b) Zero displacement and finite distance II) Uniform circular motion c)Zero velocity and finite acceleration III) At any intermediate point of freely falling body. d)Non-zero velocity and non-zero IV) Body on reaching point of projection acceleration. IX - CLASS 56 Powered by logicalclass.com

PH	YSICS	IVI.	OTION IN A LINE
	A) a-IV,b-II, c-III, d-I	B) a-II, b-IV, c-I, d-III	
	C) a-III, b-I, c-IV, d-II	D) a-I, b-III, c-II, d-IV	
<u>Co</u>	mprehension type questions:		
•	This section contains paragraph. Bas have to be answered. Each question h ONE i s correct. Choose the correct op	ed upon each paragraph multi nas 4 choices (A) , (B) ,(C) and (I otion.	ple choice questions D) out of which ONLY
12.	A body is allowed to fall freely from ce	ertain height	
	i) Ratio of distances covered in the s	successive seconds is	
	A) 1 : 2 : 3 : B) 1 : 3 : 5 :	C) 2 : 4 : 6 : D) no	one
	ii) If it travels a distance x in n th seco	ond, the distance it can travel i	n the next sec is
	A) x B) x+g	C) x - g D) g	
	iii) if it travels a distance x in n th sec	ond, the distance it covered in	the previous sec is
	A) x B) x+g	C) x - g D) g	
		40	
	<₽₽₽► <u>RESEARC</u>	CHERS (Level - IV)	1#∥≯
Ch	oose the correct option:	inde	
1.	What statement best describes the givent the givent the givent the given the given the givent the given the given the given the given the given the given the given the given the given the given the givent the given the given the givent the given the given the g	ven figure ?	[NSO-2011]
	A) The earth is rotating around the sur	B) The sun is rotating arou	und the Earth
	C) The Earth is revolving around the s	un D) The sun is revolving are	ound the Earth
2.	In circular motion the,	16	[NSO-2014]
	A) direction of motion is fixed B) di	rection of motion changes cor	itinuously
	C) velocity constant D) no	one	
3.	Consider the motion of the tip of the m	inute hand of clock. In on hou	r.[NSO - 2014]
	A) The distance covered zero B) th	e displacement is zero	
	C) the average speed is zero C) no	one	
4.	Which of the following is example of vi	ibratory motion ?	[NSO - 2009]
	A) a car moving along a circular track	B) a freely falling stone	
	B) motion of the string of violin	D) motion of the planet arou	und the sun
5.	Which of the following is example of p	eriodic motion?	[NSO - 2008]
	A) A car taking a turn on a curved road	B) A crane fling over a wate	er pond
	C) A lift moving down	D) march past of soldiers	
6.	A passenger in a moving train is at same train.	w.r.t ground and is at with	n other passenger in [NSO - 2009]
	a) Motion, motion B) rest, rest	C) motion, rest D) re	est, motion
7.	If a body travels half the distance with average velocity will be given by.	h velocity v_1 and the next half	with velocity v ₂ .ts [NSO - 2008]
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8. 	An artificial sate revolve arou	llite is moving in a nd the earth.	circular orbi	t of 4225.km.find	l its spee	ed if it takes 24hr to [NSO - 2012]
İ	A) 30.7km/s	B) 5.67	′km/s	C) 6.14km/s		D)1.57km/s
9.	The length of a	square field is 6 <i>i</i>	<i>n</i> . Parul ran	6 rounds around	d the field	d. The total
	distance that sh	e covered, is				[NSO - 2008]
	A) 216 <i>m</i>	B) 144	т	C) 176 <i>m</i>		D) 186 <i>m</i>
 10. 	Two simple pen completes 3	dulums P and Q 0 oscillations in 4	are given. F I5 sec. Whie	completes 20 o	oscillation	ns in 32 sec and Q [NSO - 2008]
	A) P B) Q	C) both	have same	time period	D) dat	a insufficient
11. 	. Two boys P and Q are running along the same path. P is 10 m ahead of Q initialy.However, Q catches up with P. after running 50 m. Assuming that both boys are running at a constant speed. What is the ratio of the speeds of P and Q ?					
İ	A) 6 : 5	B) 5 : 6	C) 4 : 1	D) 4	: 5	[NSO - 2014]
12. 	Sonic vibrations sea. If the sp	were sent down beed of sound in	from a retu water is 1.5	rn after 2 second kms ⁻¹ ?	ds. What	is the depth of the [NSO - 2012]
İ	A) 150 m	B) 3 m	C) 1	.5 m	D) 750) m
13. 	A car driver took half an hour average spe A) 38 kms ⁻¹	a total of two hou and spend a qua ed during the jou B) 50 kms ⁻¹	urs to make a arter of an h rney ? C) 60 kms ⁻	a journey of 75 ki our stationary in	m. He ha a traffic kms ⁻¹	d a coffee break of jam. What was his [NSO - 2012]
14. 	Talking one light speed of ligh	year equal to 9.4 It in light year pe	X 10¹⁵m ar day if the s	nd one day equa peed of light in r	l to 86400 ms⁻¹ is 3	0 s, what will be the K 10 ⁸ ?
	A) 2.75 X 10 ⁻³ ly	day-1		B) 3.75 X 10	⁻³ ly day ⁻¹	[NSO - 2012]
	C) 2.75 X 10 ³ ly	day-1		D) 3.75 X 10)-3 ly day-	1
15. 	The ultrasonic v back to the s	vaves take 4 sec ship (in the form o	ond to trave of an echo).	l from the ship to What is the dep	o the bot th of the	tom of the sea and sea ?
	A) 3000 m	B) 2000 m	C) 1	000 m	D) 500	0 m[NSO - 2009]
16. 	A taxi driver note the journey. What is the a	ed reading on the After 30 minutes average speed of	odometer f drive, he no f the taxi ?	itted in vehicle a ted that the odor	s 1050 ki neter rea	m, when he started ading was1086 km. [NSO - 2009]
	A) 20 m/s	B) 25 m/s	C) 3	30 m/s	D) 40	
17.	How long does	t take for the ear	th to rotate o	on its axis seven	times ?	[NSO - 2010]
	A) One day	B) One week	C) (One month	D) On	e year
⊥II) <u>/</u> ⊿	Additional work	-sheet for prac	<u>tice-l</u> thout movie	a any direction	thon dist	anoo and diaplace
1. 	ment are	a ound 5 limes Wi	ulout movin	y any unection,		ance and displace-
	A) 5,5	B) 10,10	C) 1	,1	D)zero	o, zero
2 .	Kanchana walk	s 1 m north then	turns west a	nd walks 2 m, tl	nen dista	nce and
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	displacement are					
l	A $3m$ $25m$ R 3	m 2 24m	(_) 3 m	224 m D) 2	24m 3m	
3	Teia walks 2 m nort	h from his hor	ne to nark	then returns t	to home ther	distance and
•.	displacement are.		ne to park,			
İ	A) 4 m, zero B) 1	0 m, 7.m	C) ft		D) 0m,0m	
4.	Sandhya runs 8 blo	cks north, and	then 2 blo	cks south bacl	k towards her	starting point,
	then distance and o	displacement a	are.			
1	A) 20 blocks, 9 blocks	3	B) 10 b	locks, 6 blocks		
i_	C)11 blocks, 6 blocks	;	D) 10 b	locks, 5 blocks		
5.	Naveen swim 3 co	mplete laps in	a 50 m p	ool. (One lap	is one length	of the poll in
	Λ 150 m 50 m	B) 15 m 5(1 splaceme	m 70 m	D) 10 m 5	0 m
6	A runner does a 10	K (10 kilomete	rs in one	hour What is	bis speed in l	$\sqrt{h^2 m/s^2}$
		B) 2.8 10		C) 15 7		10 5
 7	A hall rolls 8m in 2	sec. What is th	ne hall's sr	eed?	0)	10,0
<i>'</i> .	A) 10 m/s	B) (2 8m/s	C) 4r	n/s	D) 5m/s
8.	A cyclist travels 4kr	n in 15min. W	hat is her s	speed in m/s?		2) 011/0
	A) 4.4m/s	B) 2	2.8m/s	C) 4r	n/s	D) 5m/s
9.	A runner circles the	track <i>exactly</i>	2 times for	distance of 8	00m. It takes	, 4.0min. What
	is her average spee	∋d in m/s? Wh	at is her av	verage velocit	y?	
İ	A) 3m/s ,25m/s	B) 3.3 m/s	,0 m/s	C) 0m/s ,3.3	m/s D) 🤅	3m/s ,0 m/s
10.	A car averaged 20n	n/s on a road tr	rip to a city	400km away.	How long did	I the trip take?
	A) 20,000sec	B) 5.5 hr	12	C) both A and	dBD)	none
¦11.	A tortoise can craw	11.0m in 6 sec	. What is	his speed?		
İ	A) 4.4m/s	B) 2.8m/s		C) 0.4m/s	D)	0.167m/s
12.	A hare (rabbit) can	run 2.5 m/s. If	he runs fo	r 36 sec, how	far did he rur	1?
	A) 150 m	B) 9	90m	C) 15	50 m D) '	10 m
¦13.	The tortoise and the hare were racing a distance of 100m. The hare stopped to take				pped to take a	
ļ		B) 5 5 br	ended up i	C) 0 min 20 c	. HOW IONY W	as his hap ?
 14	A) 20,000sec	indes from 32	m/s to 96	m/s in an 8 Ω_{-}	ec s period Wh	at is its
• • •	acceleration?		11/3 10 50	n/5 m an 0.0		
İ	A) 8 m/s ²	B) 2	2.8 m/s ²	C) 4	m/s²	D) 5 m/s ²
15.	Rocket-powered sl	eds are used t	o test the	esponses of	humans to ac	celeration.
	Starting from rest, o	one sled can re	each a spe	ed of 244 m/s	s in 1.80 s. W	hat is its
	acceleration?		•			
İ	A) 84 m/s²	B) 136 m/s	2	C) 48 m/s ²	D)	56 m/s²
16.	A car with a velocity	of 22 m/s is a	ccelerated	uniformly at t	he rate of 1.5	m/s² for 6.0 s.
	What is its final velo	ocity?				
	A) 10 m/s	B) 3	31 m/s	C) 4r	n/s	D) 5m/s
17.	A supersonic jet fly	ing at 150 m/s	s is accele	rated uniform	ly at the rate	of 22 m/s ² for
	20.0 S. What is its it	B) 255 m/s		C) 500m/c	יח	225m/c
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PHYSICS MOTION IN A LINE 18. Determine the displacement of a plane that is uniformly accelerated from 66 m/s to 88 m/s in 12 s. A) 924 m/s B) 355 m/s C) 590m/s D) 225m/s III) Additional problems for practice-II 1. The time of ascent of a body thrown vertically up is A) t = u/aB) t = a/uC) t = uaD) t = u + g 2. In the case of bodies moving up under gravity, the acceleration is A)g B) 0 C) - g D) not constant 3. While the body is falling freely, the acceleration is A) + Ve B) - ve D) none of these C) $\pm g$ 4. The body left freely from the height 'h' will strike the ground with a velocity of D) $\sqrt{2gh}$ B) 1/2gh C) gh^2 A) gh 5. The height from which the body is falling freely when it strikes the ground in 't' secs is C) - at² A) at B) vg D) (1/2) gt² 6. Maximum height attained by a body projected up vertically with a velocity 'u' is given by C) 2u²g A) u²/2g B) u^2 D) $\frac{1}{2}gu$ 7. Maximum height attained by a body projected vertically up is directly proportional to D) \sqrt{u} B) u² C) u³ A) u 8. Time taken by a body to reach maximum is called D) time of flight A) time of decent B) time of ascent C) time period 9. Time taken by a body to fall on to ground from maximum height is called B) time of ascent A) time of decent C) time period D) time of flight 10. At maximum height, the B) acceleration act vertically down wards A) velocity is zero C) direction is reversed D) all the above 11. Time of ascent depends upon A) initial velocity of projection B) nature of the body C) place of projection D) atmosphere 12. The time for which the projected body remains in the air is equal to A) time of descent B) time of ascent C) time of flight D) time period 13. A paper weight is dropped from the roof of a block of multistorey flats each storey being 3 meters high. It passes the ceiling of the 20th storey at 30m/s. If (g = 10 m/s^2), how many storey does the flat have? A) 25 B) 30 C) 35 D) 40 14. A ball of mass 100 gm is projected vertically upwards from the ground with a velocity of 49 m/s. At the same time another identical ball is dropped from a height of 98 m. After some time the two bodies collide. When they collide, their velocities are 1) 29.4 m/s upwards; 29.4 m/s downwards 2) 29.4 m/s upwards; 19.6 m/s downwards. 3) 19.6 m/s upwards; 19.6 m/s downwards 4) None IX - CLASS 60 Powered by logicalclass.com

15. 	A stone is dro the ground time.	pped from a height h. S which reaches the heigl	imultaneously anot ht 4h. The two ston	her stone is thrown up from es cross each other after a		
 	1) $\sqrt{\frac{h}{2g}}$	2) $\sqrt{\frac{h}{8g}}$	3) $\sqrt{8}hg$	4) $\sqrt{2}hg$		
16. 	An objective falls from a bridge that is 45 m above the water. It falls directly into a small row-boat moving with constant velocity that was 12m from the point of impact when the object was released. The speed of the boat is					
	1) 3 <i>ms</i> ⁻¹	2) 4 $_{MS}^{-1}$	3) 5 _{<i>ms</i>⁻¹}	4) 6 <i>ms</i> ⁻¹		
17. 	A body is throv in 6s. The ra second is	wn vertically upwards wit tio of the distance travel	ly upwards with an initial velocity 'u' reaches a maximum height listance travelled by the body in the first second to the seventh 			
i	1) 1:1	2) 11:1	3) 1:2	4) 1:11		
18. 	A stone is dropped from the top of a tower of height 49m. Another stone is thrown up vertically with velocity of 24.5 m/s from the foot of the tower at the same instant. They will meet in a time of					
İ	1) 1s	2) 2s	3) 0.5s	4) 0.25s		
19. 	A ball is dropp of 20 m/s fro the tower is	ed from the top of a towe m the ground level at the	r. Another ball throw same instant meets	n up vertically with a velocity the first after 1.5s. Height of		
i	1) 20m	2) 30m	3) 40m	4) 50m		
20 . 	A ball is dropp of a window the top edge	ed from the top of a build some distance from the t e of the window is (g = 10	ling. The ball takes (top of the building. S 0ms ⁻²)	0.2s to fall past the 3m length peed of the ball as it crosses		
	1) 3.5 m/s	2) 8.5 m/s	3) 5 m/s	4) 14 m/s		
21. 	A ball is projec ball is projec they meet, ti	ted vertically upwards wi ted vertically upwards fro ime taken by the first ba	th a velocity of 100 n om the same point w Il to meet the secon	n/s. After 2 second, a second rith a velocity 110 m/s. When d one is (g =10ms ⁻²)		
İ	1) 6s	2) 8s	3) 10s	4) 12s		
22. 	Two bodies are with a time g	e projected vertically upw ap of 2s. After the projec	ards with a velocity of tion of the first body,	of 49 m/s. They are projected they will meet in a time of		
İ	A) 5s	B) 3s	C) 6s	D) 7s		
23. 	A loose nut fro s falls freely from the bot	om a bolt on the bottom o . The nut strikes the bot tom of the shaft when th	f an elevator which i ttom of the shaft in e nut fell off is	s moving up the shaft at 3m/ 2s. Distance of the elevator		
1	A) 19.6m	B) 13.6m	C) 9.8m	D) 3.8m		
24 . 	A ball is throw height 49m. time that ela the tower is	wn vertically up with a v On its return, it misses apsed from the instant t	velocity of 14.7 m/s s the tower and fina the ball was thrown	from the top of a tower of ally strikes the ground. The until it passes the edge of		
	A) 1.5s	B) 3s	C) 6s	D) 0.5s		
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PHYSICS MOTION IN A LINE A) a, b only B) b, c only C) a, c only D) all a, b, c Match the following: This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in **Column-I** have to be matched with statements (p, q, r, s) in **Column-II**. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4*4 matrix should be as follows: Б a) acem acem acem acen acen 10. time time 🗳 1) Body is being at rest at certain distance from the observer 2) Body approaching observer with uniform velocity 3) Body moving away from observer with uniform velocity 4) Body moved away from observer and stoppd A) a-1, b-3, c-4, d-2 B) a-1, b-2, c-3, d-4 D) a-1, b-4, c-3, d-2 C) a-4, b-3, c-2, d-1 Comprehention type: This section contains paragraph. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D) out of which ONLY **ONE** *i*s correct. Choose the correct option. 11. The following graph shows the motion of a particle along a striaght line. Displacement in cm is on y-axis and time in sec on x-axis. 12 8 5 10 15 i) The average velocity of the particle during the intervals A to E A) 0.86 cms⁻¹ B) 1cms⁻¹ C) 0cms⁻¹ D) 6 cms⁻¹ ii) The average velocity of the particle during the intervals B to E B) 0.86 cms⁻¹ A) 1cms⁻¹ C) -1 cm s⁻¹ D) 0.4 cms⁻¹ iii) The average velocity of the particle during the intervals C to E A) 0cms⁻¹ B) -0.4 cms^{-1} C) 0.4 cms⁻¹ D) 0.86 cms⁻¹ iv) The average velocity of the particle during the intervals D to E A) 6cms^{-1} B) –1 cms⁻¹ C) 1 cms⁻¹ D) 0 cms⁻¹ v) The average velocity of the particle during the intervals C to D B) 0 cms⁻¹ A) 0.4 cms⁻¹ C) 0.86 cms⁻¹ D) –0.4 cms⁻¹

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MOTION IN A LINE



	(a) Calculate the velocity for each section i.e. 0-3s, 3-5s, 5-9s (b) What distance has been travelled in 9 s?				
	<₽₽₽₽ <u>EXPLORERS (Level - III)</u> <₽₽₽₽				
Mul	tiple option type:				
*	This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D),out of which ONE or MORE is correct. Choose the correct options				
1. 2.	 In the case of distance time graph a) If the graph is parallel to time axis, then body is stationery. b) If graph is a straight line but not parallel to any axis, then it is moving with uniform velocity c) The velocity can be found out by finding slope. d) The graph can never be parallel to displacement axis. A) only a, b, c are correct B) only b, c, d are correct C) only a, c, d are correct D) all a, b, c, d are correct 				
 3. 	i) velocity between 0 - 4s is 2 m/s ii) velocity between 4s - 6s is zero iii) velocity between 6s - 9s is 2 m/s A) only i, ii are correct B) only ii, iii are correct In the above average velocity between a) 0 - 4s is 2 m/s A) only a, b are correct B) only b, c are correct C) only i, iii are correct B) only b, c are correct C) only a, b are correct B) only b, c are correct C) only a, b are correct B) only b, c are correct C) only a, b are correct B) only b, c are correct C) only a, b are correct B) only b, c are correct C) only a, b are correct B) only b, c are correct C) only a, b are correct B) only b, c are correct C) only a, b are correct B) only b, c are correct				
	C) only a, c are correct D) all a, b, c are correct				
<u>Fill</u> 4. 	in the blanks If S-T graph is a curve, it means the body is moving with and may have some acceleration				
5. 6. 7.	If S-T graph is, it means the body is moving uniform velocity. Slope of the S-T graph at any point gives itsat that point Slope in S-T graph=				
Ass	ertion A and Reason R:				
 ↓ 	This section contains certain number of questions. Each question contains Statement – 1 (Assertion) and Statement – 2 (Reason). Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct Choose the correct option.				
Opt 	ions:A) Both A & R are true and R is correct explanation of A B) Both A & R are true and R is not correct explanation of A C) A is true but R is false. D) Both A & R are false				
8. 9.	 A : Time displacement graph never be parallel to displacement axis R : At a given time a body can never have different displacements. A : The displacement time graph of a body moving with uniform velocity is a straight line. 				
İ	R : The displacement is proportional to time.				
<u>Mat</u>	Match the following:				
◆ 	This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in Column–I have to be matched with statements (p, q, r, s) in Column–II . The answers to these questions have to be appropriately bubbled as illustrated in the following example.				
	If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s, then the correct bubbled $4*4$				
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	C) only a c d are correct D) all a b c d are correct
a	If velocity - time graph is straight-line but moving away from velocity- time axis
.	a) Body is moving with variable velocity (or) constant acceleration
1	b) The slope of the graph gives its acceleration
İ	c) Area under the curve gives displacement
Ì	d) If slope is positive the body is in acceleration, slope is pegative it is in deceleration
	A) only a b c are correct B) only b c d are correct
	C) only a, b, c are correct D all a b, c, d are correct
1	A cyclist is cycling. The velocity time graph of the
	a cyclist is cycling. The velocity time graph of the
	a) distance covered with uniform velocity is 64m
	a) distance covered with dimont velocity is 04m
1	c) total distance covered is 104m
1	d) the cycle is starting from rest
i	$ \begin{array}{c} \textbf{a} \end{pmatrix} \text{ only } \textbf{b} \textbf{c} \text{ are correct} \\ \textbf{b} \end{pmatrix} \text{ only } \textbf{b} \textbf{c} \text{ data correct} \\ \textbf{c} \end{array} $
	A) only a, b, c are correct D only b, c, d are correct
 11	The given graph is representing the motion of a bedy
11. 	a) The body is starting from rest
Ì	
İ	b) the body started with acceleration 2m/s ² Velocity
	c) maximum velocity of the body is 10m/s
1	d) the body is stopped after 20 seconds. $5 \text{ time in seconds} \xrightarrow{20}$
1	A) only a, b, c are correct B) only b, c, d are correct
i	C) only a, c, d are correct D) all a, b, c, d are correct
Mate	ch the following:
♦	This section contains Matrix-Match Type questions. Each question contains statements
	given in two columns which have to be matched. Statements (A, B, C, D) in Column-I have to be matched with statements (n, a, r, s) in Column-II . The answers to these questions
İ	have to be appropriately bubbled as illustrated in the following example.
l	If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4*4
	matrix should be as follows:
12.	Velocity time graph explanation
	a] parallel to time axis 1] gives acceleration
İ	c] straight line with -ve slope 3] moving with uniform deceleration
	d] magnitude of slope 4] moving with uniform acceleration
	A) a-2, b-4, c-3, d-1 B) a-1, b-2, c-3, d-4
	C) a-2, b-1, c-4, d-3 D) a-4, b-1, c-3, d-2
Comprenention type: This postion contains paragraph Pased upon each paragraph multiple choice superiors	
	have to be answered. Each question has 4 choices (A). (B).(C) and (D) out of which ONLY
	ONE is correct. Choose the correct option.
13.	Observe the velocity time graph given along side
İ	i) acceleration in the region AB is
l	A) 1.16 m/s ² B) 2 m/s ²
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MOTION IN A LINE







KEY $\Phi\Phi$ LEARNER'STASK : **BEGINNERS** : 1-D, 2-B, 3-C, 4-D, 5-D, 6-A, 7-A, 8-A. 9-C 10-D, 11-C, 12-D. **ACHIEVERS** : 1) 260 m 2) 20m 3)ii) 0.2m/s² iii) 64m iv) 40m v) 5.77m 4) i) - 10m/s², ii) 10m/s², iii) 90m, iv) 15m/s 6)(i) 1 m/s², (ii) 108 m, 7) (i) 1.33 m/s² (ii) from 5 sec to 6 sec 105 m 8)55 m 10) (i) Zero (ii) 22.05m (iii) 9.8 m/s² 9) 36m 2) displacement, **EXPLORERS**: 1) a curve 3) deceleration, 4) Acceleration 6) A, 7) B, 8) A, 9) C, 10) A, 11) D, 12) A, 13) i) A, 5) A, ii) B, iii) C, v) D, 14) i) A, ii) B, iii) C **RESEARCHERS** : **I**) 1, 4, II)2) a, 3) d, 4) a **II)** 1) a, 2) b, 3) a, L IX - CLASS 86 Powered by logicalclass.com