1. Area under acceleration – time graph gives

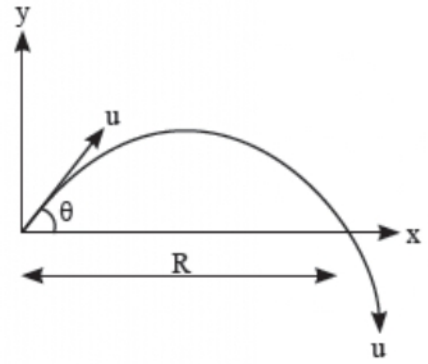
2. Area under Velocity – time graph gives

3. Area under acceleration – displacement graph gives

4. Which is true for oblique projectile motion

   (i) $\vec{a} \times \vec{u} = 0$ or (ii) $\vec{a} \times \vec{u} \neq 0$

5. Oblique Projectile:



Time of flight (i) in terms of θ

(ii) in terms of u_y

Horizontal range (i) in terms of θ

(ii) in terms of u_x and u_y

Maximum height (i) in terms of θ

(ii) in terms of u_y

(iii) in terms of T

Equation of path / trajectory (i) in terms of g

(ii) in terms of R

For maximum range θ =

Maximum range

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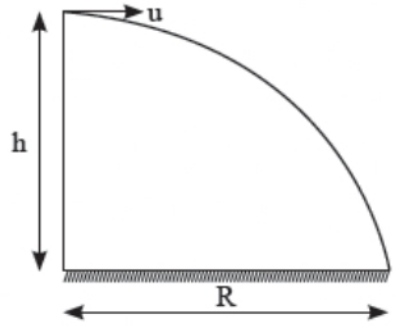
Relation between maximum height (H) and R (horizontal Range) for oblique projectile

Range is same for angles (i) (ii)

6. . Horizontal projectile



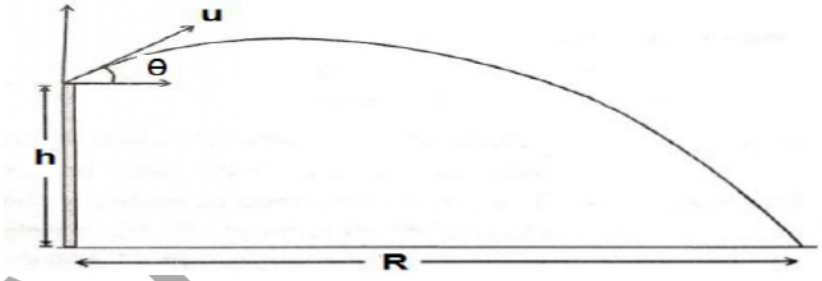
Time of flight

Horizontal range

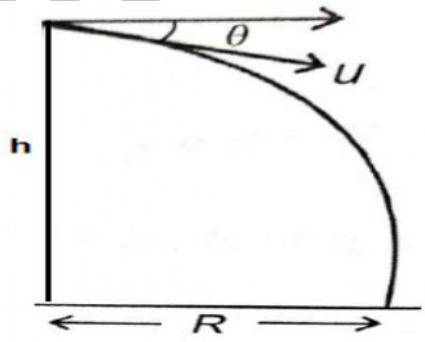
Speed with projectile hit the ground after time t direction:

Trajectory equation

7. The speed with which it strikes the ground (in terms of h) for the below situations



8. The speed with which it strikes the ground (in terms of h) for the below situations



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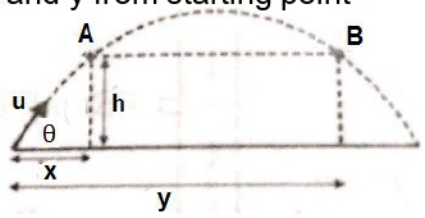
9. A body crosses two points at same height in time t_1 and t_2, the two points are at distance x and y from starting point



x + y = (in terms of R),

$t_1 + t_2$ = (in terms of T)

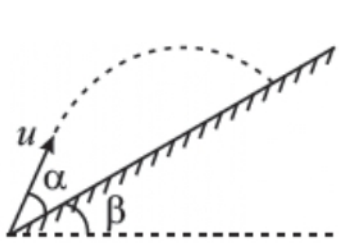
u = (in terms of t_1,t_2)

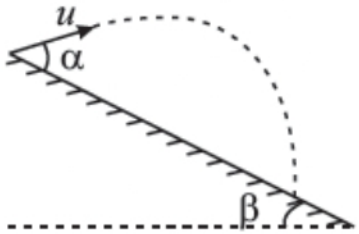
h = (in terms of t_1,t_2)

Average Velocity from A to B =

10 If a person can throw a ball to a maximum distance **x** then the maximum height to which he can throw the ball will be

11. Projection on an inclined plane





	Particle is projected up the incline	Particle is projected down the incline
Time of flight		
Maximum range		
Maximum height from inclined surface		

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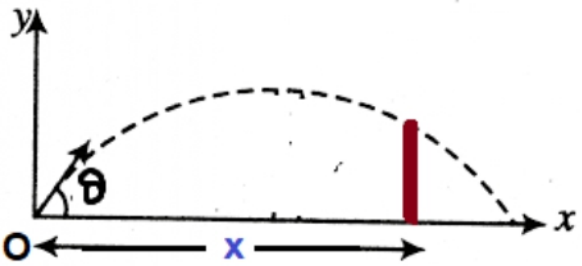
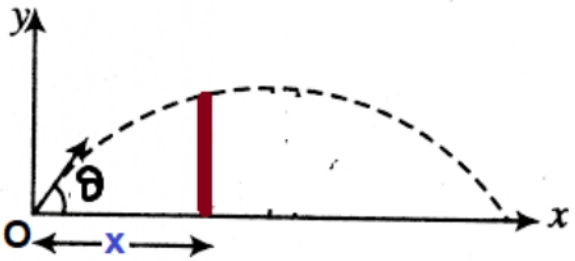
12. Elastic collision of a projectile with smooth wall: suppose a projectile is projected with speed u at an angle θ from point O on the ground. Range of the projectile is R. if a wall is present in the path of the projectile at a distance x from the point O.

Case I : if x > R / 2



Projectile falls at a distance from point of projection O. (show in diagram also)

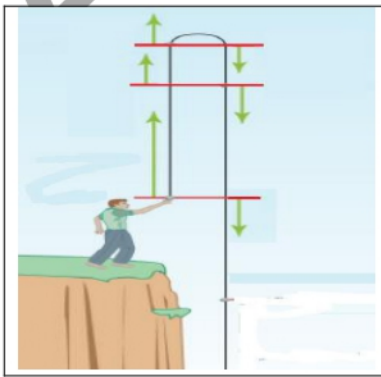
Case II : if x < R / 2



projectile falls at a distance from point of projection O. (show in diagram also)

13 Galileo's law of odd numbers for a freely falling body from rest

14

	At any point on its path, the body will have same / different speed for upward journey and down ward journey.

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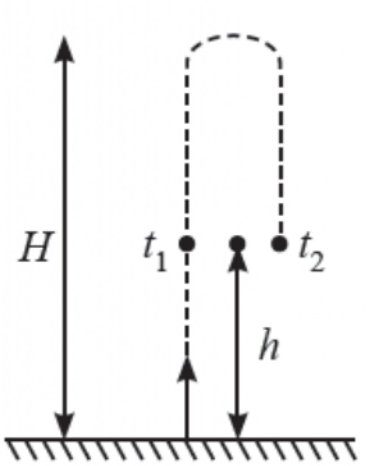
15

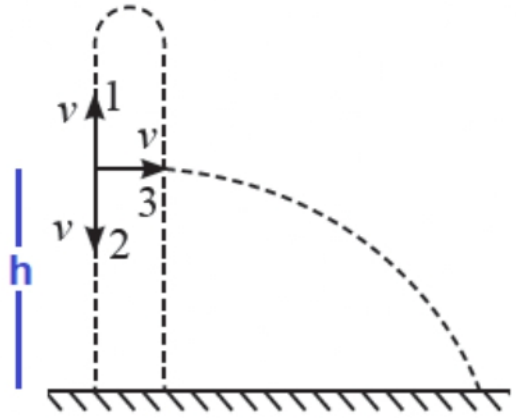


If a body thrown upwards crosses a point in time t_1 and t_2 respectively, then
(i) Speed of projection of ball is

(ii) Height of point (**h**), in terms of time t_1 and t_2

(iii) Maximum height (**H**) in terms of time t_1 and t_2

16



A body is thrown upward, downward and horizontally with same speed, takes time t_1,t_2 and t_3, respectively to reach the ground

(i) t_3 (in terms of t_1 and t_2) =

(ii) Height (h) (in terms of t_1 and t_2) from where the particle was thrown is =

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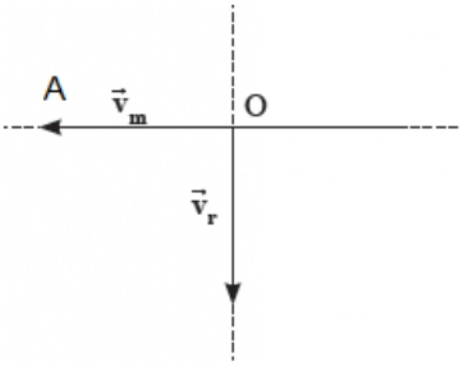
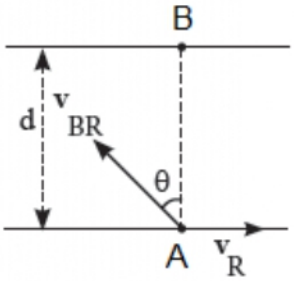
17 **Relative Velocity of Rain w.r.t. the Moving Man**

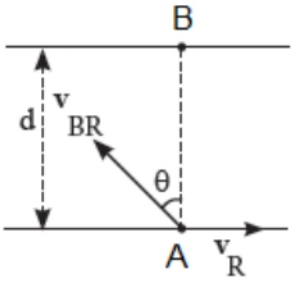
A man walking west with velocity V_m , represented by OA. Let the rain be falling vertically downwards with velocity V_r .



Magnitude and direction of relative velocity of rain wrt man

18 **River-boat**





V_{BR} is velocity of boat wrt water or velocity of man wrt water, V_R is velocity of river.

Case 1 : Minimum distance / shortest path / Opposite point reach	Case 2: Minimum Time
(i) Time of crossing across shortest path	(i) Time of crossing
(ii) Angle θ to reach at B or shortest path	(ii) Drift

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19 If the initial position of two particles are $\vec{r}_1$ and $\vec{r}_2$ and their velocities are $\vec{v}_1$ and $\vec{v}_2$, then, shortest distance between the particles (short cut formula)

And time after which this situation will occur (formula)

20 If a body is thrown vertically up with a velocity u in the uniform gravitational field (neglect air resistance), then

(i) Maximum height attained

(ii) Time of ascent

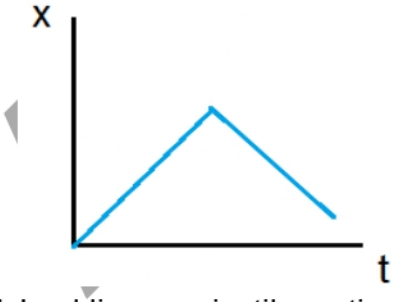
(iii) Time of descent

(iv) Total time of flight

21 1 miles per hour = km / h

22 Can a positive acceleration can be associated with a slowing down of the body?

23 Below x – t graph for a particle undergoing rectilinear motion is possible or not?



24 In oblique projectile motion, the speed gradually decreases up to highest point, then, increases because tangential / radial acceleration oppose the motion till the particle reaches the highest point, and, then favours the motion of the particle.

25 True / False:
In free fall, the initial velocity of a body is always zero.
Comment:

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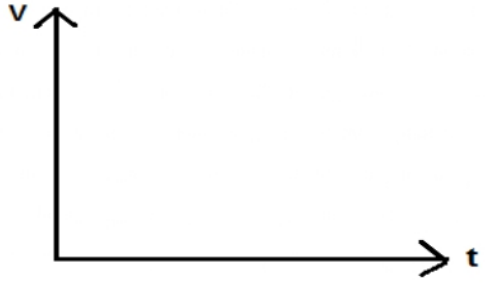
26 Plot X – t and V – t graph, for,

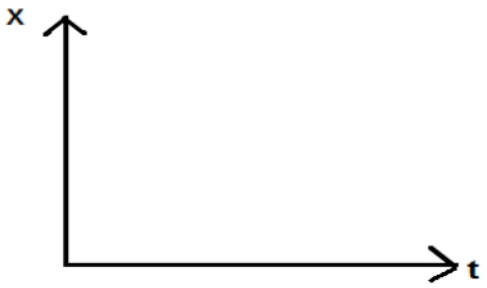
(i) Uniform Motion

(ii) Uniform accelerated motion with u = 0 at t = 0



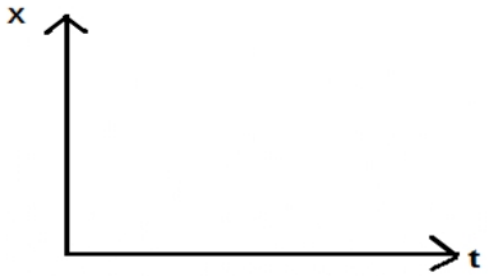
(iii) Uniform accelerated motion with $u \neq 0$, $x = 0$, at $t = 0$

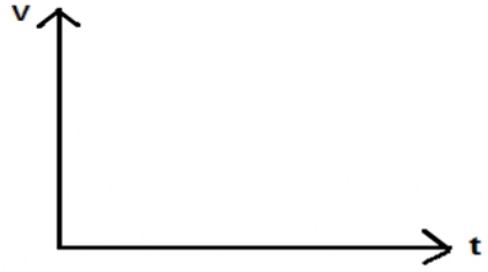
(iv) Uniform accelerated motion with $u \neq 0$, $x \neq 0$, at $t = 0$



(v) Uniformly retarded motion till velocity becomes zero,u ≠ 0 , x = 0 , at t = 0

(vi) when we throw an object in upward direction and it returns back to us, u ≠ 0 , x = 0 , at t = 0





27 The trajectory of an object moving under constant acceleration can be straight line **or** parabola.

28 The path of one projectile as seen from another projectile is
because

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