



## INDIAN SCHOOL AL WADI AL KABIR

<b>Class: XI</b>	<b>Department: SCIENCE 2020 - 2021</b>	<b>Date of completion</b> <b>30.06.2020</b>
<b>Worksheet</b> <b>No:02</b>	<b>Topic: MOTION IN A PLANE</b>	<b>Note:</b> <b>A4 FILE FORMAT</b>

### OBJECTIVE TYPE QUESTIONS

[1] Two projectiles A B are thrown from the same point with the same speed of 30m/s at angles of projection  $50^\circ$  and  $\theta$  respectively , so that both the projectiles having the same range. Then the angle  $\theta$  is

[a]  $45^\circ$  [b.]  $40^\circ$  [c]  $50^\circ$  [d]  $50^\circ$

[2] The range of a projectile, when launched at an angle of  $15^\circ$  with horizontal is 1.5km. What is the range of the projectile, when launched at an angle of  $45^\circ$  to the horizontal?

[a] 4km[b] 5km [c] 3.5 km[d] 3km

[3] If the muzzle velocity of the shell is 400m/s, the Maximum range of a gun along horizontal is

[a] 4km [b.]16 km [c] 8km [d] 20km

[4] The angular speed of a fly-wheel making 120 r.p.m is

[a]  $4\pi$  rad/s [ab] $\pi$  rad/s [c]  $2\pi$ rad/s [d]  $4\pi^2$  rad/s

[5] A body is whirled in a horizontal circle of radius 20cm. It has an angular velocity of 10 rad/s. What is the linear velocity at any point on the circular path?

[a]10m/s [b] 20 m/s [c]  $\sqrt{2}$  m/s[d] 2 m/s

### Answer Key

[1]b [2]d [3]b [4]a [5]d

### Very Short answer type questions (1marks)

- [6] Name the only force acting on a projectile, when it is projected into the atmosphere?
- [7] A ball is thrown in a parabolic path. Is there any point at which the acceleration is perpendicular to the velocity?
- [8] A ball 'A' is dropped from the top a tower and another ball 'B' is projected horizontally from the same point. Which ball will reach the ground first ?
- [9] What is the angle between the velocity vector and acc. vector in uniform circular motion ?
- [10] Two bullets A and B are fired horizontally with different velocities , $U_A$  and  $U_B$  respectively .If  $U_A$  is greater than  $U_B$ , which will reach the ground first. why?

#### Answer Key

[6] force due to gravity

[7] maximum height

[8] both at same time

[9] 90

[10] both at same time

### Short answer type questions (2 marks)

- [11] A boy is moving with velocity 3km/h along east and the rain is falling vertically with velocity 4km/hr. Calculate the velocity of rain relative to boy [take  $\tan 37^\circ = 0.75$ ]

Apply triangle law of vector addition and use the formula  $\tan \theta = \frac{\text{opp}}{\text{adj}}$

- [12] Show that when the horizontal range is maximum, height attained by the body is one fourth the maximum range in the projectile motion.

$$R_{\max} = \frac{u^2}{g} \quad H = \frac{u^2 \sin^2 \theta}{2g};$$

For  $\theta = 45^\circ$   $H = \frac{u^2}{4g} = \frac{1}{4}$  of the  $R_{\max}$ .

- [13] A cricket ball is thrown at a speed of 28m/s in a direction  $30^\circ$  above the horizontal.  
[i] Maximum height [ii] time of flight [iii] time taken to reach maximum height [iv] horizontal range.

$$[i] H = \frac{u^2 \sin^2 \theta}{2g} [ii] \frac{2u \sin \theta}{g} [iii] \frac{u \sin \theta}{g} [iv] \frac{u^2 \sin 2\theta}{g}$$

Ans-10m, 5.8s, 2.9s, 69.3m

**Long answer question (3 marks)**

[14] What is angular velocity and angular acceleration? Establish a relation with

- a) Angular velocity and linear velocity
- b) Angular acceleration and linear acceleration

[15] Show that there are two angles  $\theta_1$  and  $\theta_2$  projections for the same horizontal range.

[16] An aero plane moving horizontally at 150m/s releases a bomb at a height of 500m. The bomb hits the target. What was the horizontal distance of the aero plane from the target when the bomb was released?

$$\text{Horizontal Velocity} = \frac{\text{displacement}}{\text{time}}$$

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

$$\text{Horizontal distance} = 1500\text{m}$$

**Very Long answer question (5 marks)**

[17] Derive an expression to find the centripetal acceleration and hence centripetal force

[18] What is centripetal acceleration and centripetal force? Derive an expression for centripetal acceleration & centripetal force.

[19] Show that the path traced by a projectile is parabola. Derive the equations to find the  
 [i] Maximum height [ii] time of flight [iii] time taken to reach maximum height [iv] horizontal range.

[20] State the parallelogram law of vector addition. Derive an expression for magnitude and direction of resultant of the two vectors.

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CHECKED BY: HOD - SCIENCE