# Physics

| Board - CBSE | Class - 12 | Topic - Motion in a Straight Line |
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**Very Short Answer Type 1 Mark Questions**

| 1. | What does the slope of v-t graph indicate? |
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| | **Ans:** |
| 2. | Under what condition the average velocity equal to instantaneous velocity? |
| | **Ans:** |
| 3. | The position coordinate of a moving particle is given by $x = 6 + 18t + 9t^2$ (x in meter, t in seconds) what is it's velocity at t=2s |
| | **Ans:** |
| 4. | Give an example when a body moving with uniform speed has acceleration. |
| | **Ans:** |
| 5. | Two balls of different masses are thrown vertically upward with same initial velocity. Height attained by them are $h_1$ and $h_2$ respectively what is $h_1/h_2$. |
| | **Ans:** |
| 6. | What is the angular velocity of the hour hand of a clock? |
| | **Ans:** |
| 7. | What is the angle between velocity and acceleration at the peak point of the projectile motion? |
| | **Ans:** |
| 8. | What is the source of centripetal acceleration for earth to go round the sun? |
| | **Ans:** |
| 9. | Why guns are provided with the shoulder support? |
| | **Ans:** |
| 10. | What is the average value of acceleration vector in uniform circular motion? |
| | **Ans:** |

**Short Answer Type 2 Mark Questions**

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| 1. | Derive an equation for the distance travelled by a uniform acceleration body in $n^{th}$ second of its motion. |
| | **Ans:** |
| 2. | The velocity of a moving particle is given by $V=6+18t+9t^2$ (x in meter, t in seconds) what is its acceleration at t=2s |
| | **Ans:** |
| 3. | what is relative velocity in one dimension, if $V_A$ and $V_B$ are the velocities of the body A and B respectively then prove that $V_{AB}=V_A-V_B$? |
| | **Ans:** |
| 4. | Show that when the horizontal range is maximum, height attained by the body is one fourth the maximum range in the projectile motion. |
| | **Ans:** |
| 5. | |
| | **Ans:** |
| 6. | State the parallelogram law of vector addition. Derive an expression for magnitude and direction of resultant of the two vectors. |
| | **Ans:** |
| 7. | A gunman always keeps his gun slightly tilted above the line of sight while shooting. Why |
| | **Ans:** |
| 8. | Derive the relation between linear velocity and angular velocity. |
| | **Ans:** |
| 9. | What do you mean by rectangular components of a vector? Explain how a vector can be resolved into two rectangular components in a plane. |
| | **Ans:** |
| 10. | The greatest height to which a man can a stone is h, what will be the longest distance up to which he can throw the stone? |
| | **Ans:** |

| | **Short Answer Type 3 Mark Questions** |
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| 1. | If 'R' is the horizontal range $\ominus$ for inclination and H is the height reached by the projectile, show that R(max.) is given by $$R_{max} = 4H$$ |
| | **Ans:** |
| 2. | A body is projected at an angle $\ominus$ with the horizontal. Derive an expression for its horizontal range. Show that there are two angles $\ominus_1$ and $\ominus_2$ projections for the same horizontal range. Such that $(\ominus_1 + \ominus_2) - 90^a$ |
| | **Ans:** |
| 3. | Prove that there are two values of time for which a projectile is at the same height. Also show that the sum of these two times is equal to the time of flight. |
| | **Ans:** |
| 4. | Draw position -time graphs of two objects, A and B moving along straight line, when their relative velocity is zero. (i) Zero |
| | **Ans:** |
| 5. | Two vectors A and B are inclined to each other at an angle $\ominus$. Using triangle law of vector addition, find the magnitude and direction of their resultant. |
| | **Ans:** |
| 6. | Define centripetal acceleration. Derive an expression for the centripetal acceleration of a particle moving with constant speed v along a circular path of radius r. |
| | **Ans:** |
| 7. | When the angle between two vectors of equal magnitudes is $2\pi/3$, prove that the magnitude of the resultant is equal to either. |
| | **Ans:** |
| 8. | A ball thrown vertically upwards with a speed of 19.6 m/s from the top of a tower returns to the earth in 6s. find the height of the tower. (g = 9.8 m/sec$^2$) |
| | **Ans:** |
| 9. | Find the value of A so that the vector $\vec{A} = 2\hat{\imath} + \lambda\hat{\jmath} + \hat{k}$ and $\vec{B} = 4\hat{\imath} - 2\hat{\jmath} - 2\hat{k}$ are perpendicular to each. |
| | **Ans:** |
| 10. | Show that a given gun will shoot three times as high when elevated at angle of 60° as when fired at angle of 30° but will carry the same distance on a horizontal plane. |
| | **Ans:** |

**Long Answer Type 5 Marks Questions**

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| 1. | Draw velocity- time graph of uniformly accelerated motion in one dimension. From the velocity - time graph of uniform accelerated motion, deduce the equations of motion in distance and time. |
| | **Ans:** |
| 2. | (a) With the help of a simple case of an object moving with a constant velocity show that the area under velocity - time curve represents over a given time interval.<br>(b) A car moving with a speed of 126 km/h is brought to a stop within a distance of 200m. calculate the retardation of the car and the time required to stop it. |
| | **Ans:** |
| 3. | Establish the following vector in equalities:<br>(i)  $\|\vec{a} + \vec{b}\| \le \|\vec{a}\| + \|\vec{b}\|$<br>(ii) $\|\vec{a} - \vec{b}\| \le \|\vec{a}\| + \|\vec{b}\|$<br>When does the equality sign apply? |
| | **Ans:** |
| 4. | What is a projectile? show that its path is parabolic. Also find the expression for:<br>(i)  Maximum height attained and<br>(ii) Time of flight |
| | **Ans:** |
| 5. | Define centripetal acceleration. Derive an expression for the centripetal acceleration of a body moving with uniform speed v along a circular path of radius r. explain how it acts along the radius towards the centre of the circular path. |
| | **Ans:** |