FREEDOM INTERNATIONAL SCHOOL

WORKSHEET

PHYSICS

CLASS XI

MOTION IN A PLANE

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1. Find the angle between two vectors $\vec{P}$ and $\vec{Q}$ if the resultant of the vectors is given by $R^2 = P^2 + Q^2$
2. A vector $\vec{X}$, when added to the resultant of the vectors $\vec{A} = (3\,\hat{\imath} - 5\hat{\jmath} + 7\hat{k})$ and $\vec{B} = (2\,\hat{\imath} + 4\hat{\jmath} - 3\hat{k})$ gives a unit vector along Y-axis. Find the vector $\vec{X}$.
3. Find the unit vector parallel to the resultant of the vectors $\vec{A} = (2\,\hat{\imath} - 6\hat{\jmath} - 3\hat{k})$ and $\vec{B} = (4\,\hat{\imath} + 3\hat{\jmath} - \hat{k})$.
4. For what value of m, is the vector $\vec{A} = (2\,\hat{\imath} + 3\hat{\jmath} - 6\hat{k})$ perpendicular to the vector $\vec{B} = (3\,\hat{\imath} - m\hat{\jmath} + 6\hat{k})$?
5. A body is projected with a velocity of 20 m/s in a direction making an angle 60° with the horizontal. Calculate its (i) position after 0.5 s and (ii) velocity after 0.5 s.
6. The maximum vertical height of a projectile is 10 m. If the magnitude of the initial velocity is 28 m/s, what is the direction of the initial velocity? Take g = 9.8 m/s^2.
7. A bullet fired at an angle of 60° with the vertical hits the ground at a distance of 2 km. Calculate the distance at which the bullet will hit the ground when fired at an angle of 45°, assuming the speed to be the same.
8. A body of mass 10 kg revolves in a circle of diameter 0.40 m, making 1000 revolutions per minute. Calculate its linear velocity and centripetal acceleration.
9. What is the angular velocity of a second hand and minute hand of a clock?
10. A body is projected with a velocity of 30 m/s at an angle of 30° with the vertical. Find the maximum height, time of flight and the horizontal range.
11. Assuming that the moon completes one revolution in a circular orbit around the earth in 27.3 days, calculate the acceleration of the moon towards the earth. The radius of the circular orbit can be taken as 3.85 x 10^5 km.
12. A particle is acted upon by four forces simultaneously:

    30 N due east

    20 N due north

    50 N due west and

    40 N due south. Find the resultant force on the particle.

13. Determine a unit vector perpendicular to both $\vec{A} = (2\,\hat{\imath} + \hat{\jmath} + \hat{k})$ and $\vec{B} = (\hat{\imath} - \hat{\jmath} + 2\hat{k})$.