PHYSICS

BOOKS - R G PUBLICATION

MOTION IN A PLANE

Exercise

1. What is vector product of two vectors ? Give two examples .

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2. Which of the following is the correct relation between linear velocity and angular velocity of a particle?

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3. Establish a relation between linear acceleration and angular acceleration.

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4. A car is moving form rest. After 10 seconds its wheels rotate 360 times in 1 minute. If the radius of the wheel is 50cm. Then find angular acceleration

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5. A car is moving from rest. After 10 seconds its wheels rotate 360 times in 1 minute. If the radius of the wheel is 50cm. Then find angular velocity after 30 seconds.

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6. Deduce the equations of motion for constant acceleration using method of calculus.

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7. A projectile is fired with a velocity V making an angle θ with the horizontal. Show that its trajectory is parabolic.

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8. The position of a particle is given by $\bar{r} = 3.0t\hat{i} + 2.0t^2\hat{j} + 5.0\hat{k}$. Find the velocity of particle at t=2sec

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9. For the resultant of two vectors to be maximum , what must be the angle between them ?

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10. Establish a relation between linear acceleration and angular acceleration.

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11. A projectile is fired with a velocity V making an angle θ with the horizontal. Show that its trajectory is parabolic.

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12. Rain is falling vertically vertically with a speed of $35ms^{-1}$. Wind starts blowing after sometime with a speed of $12ms^{-1}$ in east to west direction. In which direction should a boy waiting at a bus top hold umbrella?

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13. State parallelogram law of vector addition and derive an expression for the resutlant of two vectors $\overrightarrow{\longrightarrow} P$ and $\overrightarrow{\longrightarrow} Q$ inclined to each other at angle θ.

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14. A projectile is fired with a velocity V making an angle θ with the horizontal. Show that its trajectory is parabolic.

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15. What is centripetal force? Derive an expression for it. Show that centripetal force does no work.

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16. Equations of Motion

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17. Under what condition the sum and difference of two vectors will be equal in magnitude ?

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18. What is time of flight and range of a projectile?

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19. What is the differences between angular displacement and angular velocity?

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20. Do $\overline{A} + \overline{B}$ and $\overline{A} - \overline{B}$ lie the same plane?

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21. Is $\hat{i} + \hat{j}$ a unit vector, explain.

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22. Consider a vecotor $\overrightarrow{\longrightarrow} rF = 4\hat{i} - 3\hat{j}$.

What is the vector perpendicular to F?

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23. When is the sum of two vectors maximum and when minimum.

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24. A particle is projected at an angle of 45° with a velocity $9.8ms^{-1}$. What is horizontal range.

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25. Two bodies are projected at an angle θ and $(90 - \theta)$ to the horizontal with the same speed. Find the ration of their time of flight.

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26. A body is projected vertically upwards. Is it a projectile.

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27. Two equal force act at a point. The square of their resultant is 3 times their product. Find the angle between them.

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28. Answer the question briefly and the point: Write down the relationship between linear velocity and angular velocity.

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29. Two forces whose magnitudes are in the ratio $3:5$ give a resultant of 28N. If the angle of their inclination is 60°, find the magnitude of each force.

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30. A projectile is given an initial velocity of $\hat{t} + 2.\hat{j}$. Find the cartisian equation of its path. (g = 10 ms^-1)`.

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31. A particle is projected form ground with an initial velocity $20ms^{-1}$ at an angle 30° with the horizontal. What is the magnitude of change of velocity in 5sec.

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32. State parallelogram of law of vector addition .

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33. What is meant by resolution of vectors ?

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34. If $\left|\overline{A}+\overline{B}\right|=\left|\overline{A}-\overline{B}\right|$ then prove that the angle between A & B is 90°.

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35. If $\overrightarrow{A}=2\hat{i}+2\hat{j}+2\hat{k}$ and $\overrightarrow{B}=5\hat{i}+5\hat{j}+5\hat{k}$ then $\overrightarrow{A}.\overrightarrow{B}$ and $\overrightarrow{A}\times\overrightarrow{B}$

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36. Establish the equation of trajectory of an angular projectile.

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37. Three vectors $\vec{A}, \vec{B}$ and $\vec{C}$ are such that $\vec{A}, = \vec{B} + \vec{C}$ and magnitude are 5,4,3 respectively. Find the angle between $\vec{A}$ and $\vec{C}$.

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38. Find the path of projectile, time of flight, horizontal range and maximum height, when a projectile is projectile is priojected with velocity v making an angle Θ with the vertical direction.

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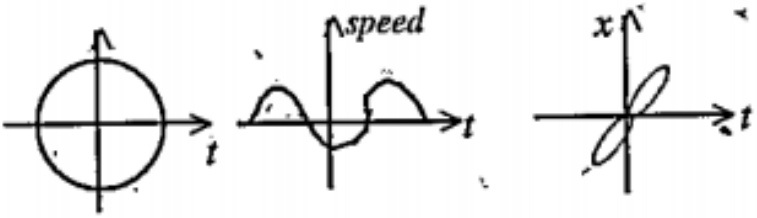
39. From the following graph which are not one dimensional motion. Explain.



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40. A body is projected downward at an angle 60° with the horizontal with a velocity $9.8ms^{-1}$ form building 20m high. How long will it take before striking the ground.

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41. If $\vec{A} = 2\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{B} = 3\hat{i} - 5\hat{j} + \hat{k}$.

Find the angle between $\vec{A}$ and $\vec{B}$.

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42. What is unit vector? Prove that magnitude of unit vector is one.

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43. Two vectors $\vec{A}$ and $\vec{B}$ are such that $\vec{A} + \vec{B} = \vec{C}$ and $A + B = C$

Write down the relation between $\vec{A}$ and $\vec{B}$ in each case.

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44. Two vectors $\vec{A}$ and $\vec{B}$ are such that $\vec{A} + \vec{B} = \vec{C}$ and $A + B = C$

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