DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 3**

Topic :- MOTION IN A PLANE

1. A stone is thrown at an angle θ to the horizontal reaches a maximum heights H . then the time of flight of stone will be

a) $\sqrt{\frac{2H}{g}}$ b) $2\sqrt{\frac{2H}{g}}$ c) $\frac{2\sqrt{2H\sin\theta}}{g}$ d) $\frac{\sqrt{2H\sin\theta}}{g}$

2. A particle does uniform circular motion in a horizontal plane. The radius of the circle is $20\ cm$. The centripetal force acting on the particle is $10\ N$. It's kinetic energy is

a) $0.1\ J$ b) $0.2\ J$ c) $2.0\ J$ d) $1.0\ J$

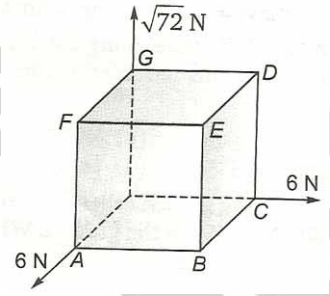
3. When a simple pendulum is rotated in a vertical plane with constant angular velocity, centripetal force is

a) Maximum at highest point b) Maximum at lowest point
c) Same at all lower point d) Zero

4. The magnitude of the vectors product o two vectors is $\sqrt{3}$ times their scalar product. The angle between the two vectors is

a) 90° b) 60° c) 45° d) 30°

5. Three forces of magnitudes 6N, 6N and $\sqrt{72}$ N at a corner of a cube along three sides as shown in figure. Resultant of these forces is



a) 12 N along OB b) 18 N along OA c) 18 N along OC d) 12 N along OE

6. The angle which the bicycle and its rider must make with the vertical when going round a curve of 7 m radius at 5 ms^{-1} is

a) 20° b) 15° c) 10° d) 5°

7. A projectile is thrown at angle β with vertical. It reaches a maximum height H. The time taken to reach the highest point of its path is

a) $\sqrt{\frac{H}{g}}$ b) $\sqrt{\frac{2H}{g}}$ c) $\sqrt{\frac{H}{2g}}$ d) $\sqrt{\frac{2H}{g\cos\beta}}$

8. A cart is moving horizontally along a straight line with constant speed $30\ m/s$. A projectile is to be fired

from the moving cart in such a way that it will return to the cart after the cart has moved $80\ m$. At what speed (relative to the cart) must the projectile be fired (Take $g = 10\ m/s^2$)

a) $10\ m/s$ b) $10\sqrt{8}\ m/s$ c) $\frac{40}{3}\ m/s$ d) None of these

9. A sphere of mass 0.2 kg is attached to an inextensible string of length 0.5 m whose upper end is fixed to the ceiling. The sphere is made to describe a horizontal circle of radius 0.3 m. The speed of the sphere will be

a) $1.5\ \text{m s}^{-1}$ b) $2.5\ \text{m s}^{-1}$ c) $3.2\ \text{m s}^{-1}$ d) $4.7\ \text{m s}^{-1}$

10. The resultant of two vectors $\vec{A}$ and $\vec{B}$ is perpendicular to the vector $\vec{A}$ and its magnitude is equal to half of the magnitude of vector $\vec{B}$. Then the angle between $\vec{A}$ and $\vec{B}$ is

a) 30° b) 45° c) 150° d) 120°

11. What is the smallest radius of a circle at which a cyclist can travel if its speed is $36\ \text{kmh}^{-1}$, angle of inclination 45° and $g = 10\text{ms}^{-2}$?

a) 20 m b) 10 m c) 30 m d) 40 m

12. A body of mass m moves in a circular path with uniform angular velocity. The motion of the body has constant

a) Acceleration b) Velocity c) Momentum d) Kinetic energy

13. A body of mass m is suspended from a string of length l. What is minimum horizontal velocity that should be given to the body in its lowest position so that it may complete one full revolution in the vertical plane with the point of suspension as the centre of the circle

a) $v = \sqrt{2lg}$ b) $v = \sqrt{3lg}$ c) $v = \sqrt{4lg}$ d) $v = \sqrt{5lg}$

14. A car is travelling with linear velocity v on a circular road of radius r. If it is increasing its speed at the rate of 'a'm/s^2, then the resultant acceleration will be

a) $\sqrt{\left\{\frac{v^2}{r^2} - a^2\right\}}$ b) $\sqrt{\left\{\frac{v^4}{r^2} + a^2\right\}}$ c) $\sqrt{\left\{\frac{v^4}{r^2} - a^2\right\}}$ d) $\sqrt{\left\{\frac{v^2}{r^2} + a^2\right\}}$

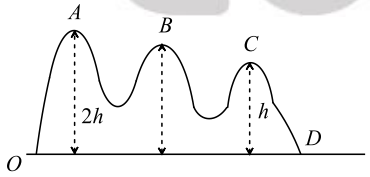
15. $(\vec{P} + \vec{Q})$ is a unit vector along X-axis. If $\vec{P} = \hat{i} - \hat{j} + \hat{k}$, then what value is $\vec{Q}$?

a) $\hat{i} + \hat{j} - \hat{k}$ b) $\hat{j} - \hat{k}$ c) $\hat{i} + \hat{j} + \hat{k}$ d) $\hat{j} + \hat{k}$

16. For a projection, $(\text{range})^2$ is 48 times of $(\text{maximum height})^2$ obtained. Find angle projection.

a) $60°$ b) $30°$ c) $45°$ d) $75°$

17. A small roller coaster starts at point A with a speed u on a curved track as shown in figure



The friction between the roller coaster and the track is negligible and it always remains in contact with the track. The speed of the roller coaster at point D on the track will be

a) $(u^2 + gh)^{\frac{1}{2}}$ b) $(u^2 + 2gh)^{\frac{1}{2}}$ c) $(u^2 + 4gh)^{\frac{1}{2}}$ d) u

18. A particle rests on the top of a hemisphere of radius R. Find the smallest horizontal velocity that must be imparted to the particle if it is to leave the hemisphere without sliding down it

a) $\sqrt{g\,R}$ b) $\sqrt{2g\,R}$ c) $\sqrt{3g\,R}$ d) $\sqrt{5g\,R}$

19. A 2 kg stone tied at the end of a string 1 m long is whirled along a vertical circle at a constant speed of $4\ ms^{-1}$. The tension in the string has a value of 52 N when the stone is
a) At the top of the circle
b) Half way down
c) At the bottom of the circle
d) None of the above

20. A stone thrown at an angle θ to the horizontal a projectile makes an angle $\pi/4$ with the horizontal, then its initial velocity and angle of projection are, respectively

a) $\frac{\sqrt{2h\sin\theta}}{g}$ b) $\frac{2\sqrt{2h\sin\theta}}{g}$ c) $2\sqrt{\frac{2h}{g}}$ d) $\sqrt{\frac{2h}{g}}$