



Physics worksheet

3rd Quarter Physics worksheet for Grade 11

Name _____ Sec. _____ Academic Year 2020 G.C

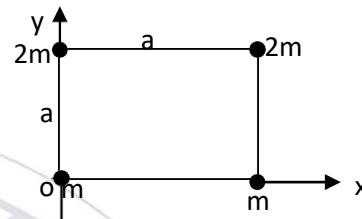
choose the correct answer for the following questions.

- ___1. A body moves along a circular track of radius 20cm. It starts from one end of a diameter, moves along the circular track and reaches the other end of the diameter in 5sec. What is the angular speed of the body?
- A. $\frac{\pi}{2}$ rad/sec B. $\frac{\pi}{5}$ rad/sec C. $\frac{\pi}{4}$ rad/sec D. $\frac{\pi}{3}$ rad/sec
- ___2. A train rounds an un banked circular bend of radius 50m at a speed of 15m/s. The angle of banking required to prevent wearing out of rails is given by.
- A. $\theta = \tan^{-1}(0.15)$ C. $\theta = \tan^{-1}(0.45)$
B. $\theta = \tan^{-1}(0.25)$ D. $\theta = \tan^{-1}(0.35)$
- ___3. When a spring is stretched by an amount x, the potential energy stored in it is U. When the spring is stretched by an amount 2x ,the potential energy stored in it will be
- A. U/2 B. 2U C. U/4 D. 4U

- ___4. In which of the following case work is done by the force
- A. A man carrying a bucket of water, walking on a level road with a uniform speed
 - B. A drop of rain falling vertically with constant velocity
 - C. A man whirling a stone tied to a string in a circle with a constant speed
 - D. A man walking up on a staircase
- ___5. A body is subjected to a constant force $\vec{F}$ (in Newton) given by $\vec{F} = -i+2j+3k$
- What is the total work done by the force in moving the body through a distance of 4m along the z-axis and then 3m along the y-axis?
- A. 24J
 - B. 18J
 - C. 12J
 - D. 6J
- ___6. A particle of mass m has half the kinetic energy of another particle of mass $m/2$. If the speed of the heavier particle is increased by $2m/s$, its new kinetic energy equals the original kinetic energy of the lighter particle. The ratio of the original speeds of the lighter & heavier particles is
- A. 1:1
 - B. 1:2
 - C. 1:3
 - D. 1:4
- ___7. Which of the following force is non conservative?
- A. Coulomb force between charged particles at rest
 - B. Frictional force
 - C. Gravitational force between two masses
 - D. Force of a compressed elastic spring

- ___8. four particles of masses $m, m, 2m$ & $2m$ are placed at the four corners of a square of side a as shown in fig. 4. The (x, y) coordinates of the center of mass are

- A. $(\frac{a}{2}, 2a)$ C. $(\frac{a}{2}, \frac{2a}{3})$
B. $(\frac{a}{2}, a)$ D. $(a, \frac{a}{3})$



- ___9. A sphere rolls down an inclined plane without slipping. What fraction of its total energy is rotational? ($I = \frac{2}{5}mr^2$)

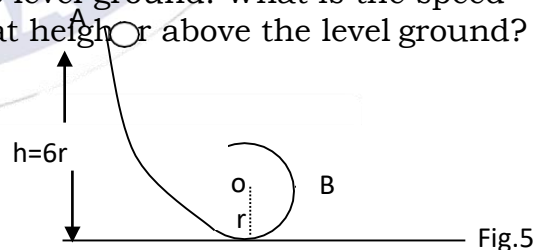
- A. $\frac{5}{7}$ B. $\frac{4}{7}$ C. $\frac{2}{7}$ D. $\frac{3}{7}$

- ___10. A disc of radius 4cm has a moment of inertia of 0.02kgm^2 . A force of 20N is applied tangentially to the rim of the disc. The angular acceleration produced is

- A. 20rad/s^2 B. 10rad/s^2 C. 50rad/s^2 D. 2.5rad/s^2

- ___11. The track shown in figure given ends a circular track of radius r with centre at O . A small solid sphere of mass m rolls from rest without slipping from a point A at a height $h = 6r$ from the level ground. What is the speed of the sphere when it reaches a point B at height r above the level ground?

- A. $\sqrt{10gr}$ C. $\sqrt{\frac{50}{7}gr}$
B. $\sqrt{\frac{22}{7}gr}$ D. zero

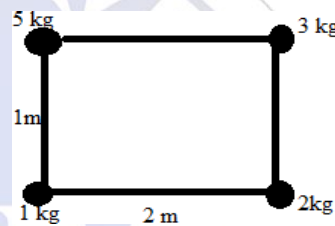


___12. A mass is whirled in a circular path with constant angular velocity and its angular momentum is L . If the string is now halved keeping the angular velocity the same, the angular momentum is

- A. $2L$ B. L C. $\frac{L}{2}$ D. $\frac{L}{4}$

___13. At what position of the center of mass of the system of four masses shown on fig below

- A. $(\frac{10}{11}, \frac{8}{11})$ B. $(\frac{11}{10}, \frac{11}{8})$ C. $(\frac{1}{11}, \frac{80}{11})$ D. $(\frac{10}{13}, \frac{8}{13})$



___14. Three point masses, $M_A = 5\text{Kg}$, $M_B = 1\text{kg}$, and $M_C = 2\text{kg}$, are connected by a rigid rod of negligible weight as shown in fig 3, below. If the separation b/n M_A and M_B is 1m and the separation b/n M_A and M_C is 2m , where is the location of the center of mass measured from M_A ?

- A. 1.375m
B. 0.625m
C. 1.10m
D. 0.8m

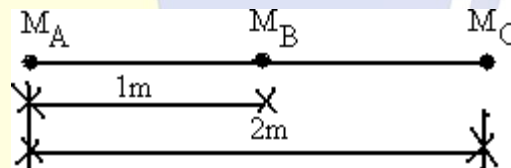


Fig 3

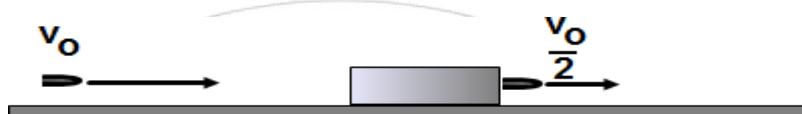
___15. The banking angle of a high way curve on a horizontal plane surface is 60° . It is banked in such a way that a car traveling with a speed of 19.4m/s will have no tendency to skid sideways. What is the radius of curvature of the curve? ($\sin 60^\circ = 0.104$, $\cos 60^\circ = 0.99$, $\tan 60^\circ = 0.105$ and $g = 10\text{ m/s}^2$)

- A. 14.31 m B. 1295.011 m C. 136.1 m D. 358.4 m

___16. A bullet penetrates a wooden block and loses its velocity by a half.

What is the ratio between the initial kinetic energy of the bullet and kinetic energy when the bullet leaves the block?

- A. $\frac{KE_i}{KE_f} = \frac{1}{2}$ B. $\frac{KE_i}{KE_f} = \frac{1}{4}$ C. $\frac{KE_i}{KE_f} = \frac{2}{1}$ D. $\frac{KE_i}{KE_f} = \frac{4}{1}$



___17. A constant net force of $F = (100\mathbf{i} - 40\mathbf{j} + 20\mathbf{k})\text{N}$ acts on a 45 kg block and displaces it by $S = (5\mathbf{i} - 10\mathbf{j} + 4\mathbf{k})\text{m}$. What is the work done by the applied net force?

- A. 980 J B. 580 J C. 500J D. 180J

___18. A force F is at an angle θ above the horizontal is used to pull a heavy suitcase of weight mg a distance d along a level floor at constant velocity. The coefficient of friction between the floor and the suitcase is μ . The work done by the force F is:

- A. $Fd\cos\theta - \mu mgd$ C. $-\mu mgd$
B. $Fd\cos\theta$ D. $2Fd\sin\theta - \mu mgd$

___19. An object is thrown straight up. Which of the following is true about the sign of work done by the gravitational force while the object moves up and then down?

- A. Work is positive on the way up, work is positive on the way down
B. Work is negative on the way up, work is negative on the way down
C. Work is negative on the way up, work is positive on the way down
D. Work is positive on the way up, work is negative on the way down

___20. If g is the acceleration due to gravity on the earth's surface, the gain in

the potential energy of an object of mass m raised from the surface of the earth to a height equal to the radius R of the earth is

- A. $\frac{1}{2} mgR$ B. $\frac{1}{4} mgR$ C. mgR D. $2mgR$

- ___21. Four point masses, each of value m , are placed at the corners of square ABCD (in fig.2) of side r . The moment of inertia of this system about an axis passing through A & parallel to BD is

- A. $2mr^2$
- B. $3mr^2$
- C. $2mr^2$
- D. $\sqrt{3}mr^2$

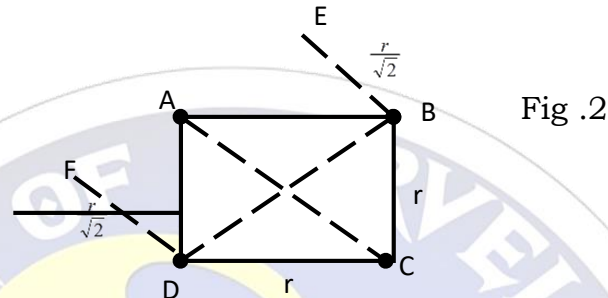


Fig .2

- ___22. A solid sphere is rotating in free space. If the radius of the sphere is increased, keeping its mass the same, which of the following will not be affected?
- A. Moment of inertia
 - B. angular velocity
 - C. Angular momentum
 - D. Rotational kinetic energy
- ___23. Which of the following statement is false for a particle moving in a circle with a constant angular speed?
- A. The velocity vector is along the tangent to the circle
 - B. The acceleration vector is along the tangent to the circle
 - C. The acceleration vector points towards the centre of the circle
 - D. The velocity & acceleration vectors are perpendicular to each other

- ___24. A worker pushes a wheelbarrow with a horizontal force of 50 N on level ground over a distance of 5.0 m. If a friction force of 43 N acts on the wheelbarrow in a direction opposite that of the worker, what work is done on the wheelbarrow by the worker?
- A. 250 J B. 215 J C. 35 J D. 10 J
- ___25. calculate the torque that should be applied to the turbine of a jet engine of moment of inertia 100 kg m^2 so that it will have a final angular velocity of 200 rad/sec in 20 sec starting from rest
- A. 1000Nm B. 500Nm C. 5000Nm D. 2000Nm
- ___26. From question 25 above what is the kinetic energy at this angular velocity.
- A. 1MJ B. 5MJ C. 5MJ D. 2MJ
- ___27. Which of the following is **true** about angular momentum?
- A. If the net external torque acting on a system about a given axis of rotation is constant then the angular momentum about the axis will be constant.
 - B. If the net external torque acting on a system about a given axis of rotation is zero then the angular momentum about the axis will be constant
 - C. If the net external force acting on a system is zero the angular momentum is constant.
 - D. If the net external torque acting on a system about a given axis of rotation is zero then the angular momentum about the axis will be zero.

- ___28. A disk of momentum of inertia $I_1 = 1 \text{ kgm}^2$ is rotating freely with angular speed of $\omega_1 = 3 \frac{\text{rad}}{\text{sec}}$ when a second none rotating disk with $I_2 = 0.5 \text{ kgm}^2$ is couple on to it.

The two then rotate as a unit. What is the final angular speed?

- A. $1 \frac{\text{rad}}{\text{sec}}$ B. $0.5 \frac{\text{rad}}{\text{sec}}$ C. $25 \frac{\text{rad}}{\text{sec}}$ D. $1.5 \frac{\text{rad}}{\text{sec}}$

- ___29. A wheel starts from rest under the influence of a constant torque and turns through 500 radian in 10 sec. what is its angular acceleration?

- A. $40 \frac{\text{rad}}{\text{sec}}$ B. $50 \frac{\text{rad}}{\text{sec}}$ C. $25 \frac{\text{rad}}{\text{sec}}$ D. $20 \frac{\text{rad}}{\text{sec}}$

- ___30. A car of mass 1500 kg moves on a circular track of radius 50m with a speed of 40m/s. what is the magnitude of its angular momentum relative to the center of the track?

- A. $3 \times 10^6 \frac{\text{kgm}^2}{\text{s}^2}$ C. $1 \times 10^6 \frac{\text{kgm}^2}{\text{s}^2}$
B. $4 \times 10^6 \frac{\text{kgm}^2}{\text{s}^2}$ D. $2 \times 10^6 \frac{\text{kgm}^2}{\text{s}^2}$

- ___31. What is the torque due to a force $\vec{F} = (2\hat{i} - 3\hat{j} + 4\hat{k}) \text{ N}$ acting at a point $\vec{r} = (3\hat{i} + 2\hat{j} + 4\hat{k}) \text{ m}$ about the origin?

- A. $(6\hat{i} - 6\hat{j} + 12\hat{k}) \text{ N.m}$ C. $(-20\hat{i} + 4\hat{j} + 13\hat{k}) \text{ N.m}$
B. $(-6\hat{i} + 6\hat{j} + 12\hat{k}) \text{ N.m}$ D. $(20\hat{i} - 4\hat{j} - 13\hat{k}) \text{ N.m}$

- ___32. In which of the following situations is the work done on a body different from zero?

- A. If the force is perpendicular to the displacement
B. If the force is parallel to the displacement
C. When the body is at rest while a force is acting on it
D. When no net force is exerted on the body while it is moving

- ___33. A 2kg block is accelerated uniformly from rest to a speed of 12m/s in 3sec. what is the work done on the block during this time?
- A. 36J B. 169J C. 90J D. 144
- ___34. When a torque acting up on a system is zero, which physical quantity remains a constant?
- A. Force C. linear momentum
B. linear impulse D. angular momentum
- ___35. A 2 kg solid disk having a radius of 50 cm accelerates when an external torque of 0.4Nm is exerted on it. What is the angular acceleration of the disk? ($I = \frac{1}{2}mr^2$)
- A. 4 rad/s² B. 20 rad/s² C. 2 rad/s² D. 0.5 rad/s²
- ___36. Which of the following objects has the smallest moment of inertia assuming they all have the same mass and radius?
- A. A solid disk C. A circular loop
B. A solid sphere D. A solid cylinder
- ___37. Force of 20 N acts on the edge of a wheel with a diameter of 0.6m. How much work does the force do on the wheel if the wheel makes 5 revolutions?
- A. 60 J B. 30J C. 60 π J D. 30 π J
- ___38. The total angular momentum of a system of particles,
- A. Changes when a net external force acts upon the system
B. Remains constant under all circumstances
C. Changes when a net torque acts up on the system
D. May or may not change under the influence of a net external torque depending upon the direction of the torque
- ___39. What torque due to a force $F = (2i - 3j + 4k)$ N acting at a point $r = 3i + 2j + 4k$ about the origin?
- A. $6i - 6j + 12k$ C. $-17i + 6j + 13k$
B. $-6i + 6j + 12k$ D. $17i + 6j - 13k$
- ___40. A particle of mass 5kg has a position vector $\vec{r} = (4, 2)$ m and velocity vector $\vec{v} = (1, 3)$. What is the magnitude of the angular momentum of the particle?
- A. 50Kgm²/s B. 25Kgm²/s C. 10Kgm²/s D. 15Kgm²/s