PHYSICS

AAKASH INSTITUTE ENGLISH

MOCK TEST 10

Elxample

1. Where does the centre of mass of two particle system lie, if one particle is more massive than the other ?

A. Towards 2 kg

B. Towards 5 kg

C. At mid point between 2kg and 5 kg

D. Anywhere between 2 kg and 5 kg

Answer: B

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2. The centre of mass of a body

A. lies always outside the body

B. may lie within,outside , on the surface of the body

C. lies always inside the body

D. lies always on the surface of the body

Answer: B

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3. A system consists of 3 particles each of mass 2 kg located at (1,1), (2,2) and (3, 3) respectively. Find the coordinates of the centre of mass.

A. (2,2)

B. (1,1)

C. (0,0)

D. $\left(\frac{1}{3}, \frac{1}{3}\right)$

Answer: A

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4. The center of mass of a system of two particles divides the distance between them.

A. In inverse ratio of square of masses

B. In direct ratio of square of masses of particles

C. In inverse ratio of masses of particles

D. In direct ratio of masses of particles

Answer: C

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5. A rod of mass M and length L is made to stand vertically. Potential energy of the rod in this position is

A. Mgl

B. $Mg\frac{l}{2}$

C. $Mg\frac{l}{3}$

D. $Mg\frac{l}{4}$

Answer: B

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6. The distance between the hydrogen atom and the fluorine atom in a hydrogen fluoride (HF) is 0.92 Armstrong. the mass of hydrogen atom is 1 a.m.u and mass of fluorine atom is 19 a.m.u the position of the centre of mass of the hydrogen fluoride molecule is

A. 0.5 Armstrong from hydrogen atom

B. 0.5 Armstrong from fluorine atom

C. 0.87 Armstrong from hydrogen atom

D. 0.87 Armstrong from fluorine atom

Answer: C

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7. If the linear mass density of a rod of length 3 m (lying from $y = 0$ to $y = 3$m) varies as λ= (2+y)kg/m,then position of the centre of mass of the rod from y=0 is nearly at

A. 2m

B. 1.7m

C. 2.5m

D. 2.7m

Answer: B

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8. A solid toy is in the form of a hemisphere surmounted by a right circular cone of same radius. The height of the cone is 10 Cm and the radius of the base is 7 cm. Determine the volume of the toy. Also find the area of the

coloured sheet required to cover the toy. (Use $\pi = 22/7$ and $\sqrt{149} = 12.2$)

A. $\frac{R}{3}$

B. $\frac{R}{2}$

C. $\frac{R}{6}$

D. $\frac{R}{4}$

Answer: A

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9. State the modal class.

Class interval	50–55	55–60	60–65	65–70	70–75	75–80	80–85	85–90
Frequency	5	20	10	10	9	6	12	8

A. $(0, \frac{1}{\pi})$

B. $(0, \frac{2}{\pi})$

C. $(\frac{1}{\pi}, 0)$

D. $(\frac{2}{\pi}, 0)$

Answer: B

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10. A shell following a parabolic path explodes somewhere in its flight. The centre of mass of fragments will move in

A. move in any direction

B. move in straight line

C. move along the vertical direction

D. continue to move along the same parabolic path

Answer: D

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11. Two particles of equal mass are moving along the same line with the same speed in the same direction. What is the speed of the centre of mass of the system ?

A. $\frac{v}{2}$

B. 2v

C. v

D. zero

Answer: C

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12. On a straight line passing through the foot of a tower, two points C and D are at distances of 4 m and 16 m from the foot respectively. If the angles of elevation from C and D of the top of the tower are complementary, then find the height of the tower.

A. Body C

B. Body B

C. Depends on height of breaking

D. Does not shift

Answer: D

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13. If the net external forces acting on the system oif particles is zero, then which of the following may vary?

A. Momentum of the system

B. Kinetic energy of the system

C. Acceleration of centre of mass

D. All of these

Answer: B

14. Two bodies of different masses $2kg$ and $4kg$ are moving with velocities $2m/s$ and $10m/s$ towards each other due to mutual gravitational attraction. Then the velocity of the centre of mass is

A. $5\frac{m}{s}$

B. $6\frac{m}{s}$

C. Zero

D. $8\frac{m}{s}$

Answer: B

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15. A man of mass m is stationary on a stationary Flat car. The car can move without friction along horizontal rails. The man starts

walking with velocity v relative to the car. Work done by him

A. $M\frac{u}{M+m}$

B. $M\frac{v_0}{m+M}$

C. $u+v_0$

D. u

Answer: D

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16. Two bodies of masses 10 kg and 2 kg are moving with velocities $2\hat{i} - 7\hat{j} + 3\hat{k} ms^{-1}$ and $-10\hat{i} + 35\hat{j} - 3\hat{k} ms^{-1}$ respectively. The velocity of their centre of mass is

A. $2\hat{i}$m/s

B. $2\hat{k}$m/s

C. $(2\hat{j} + 2\hat{k})$m/s

D. $(2\hat{i} + 2\hat{j} + 2\hat{k})$m/s

Answer: B

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17. Consider a system of two particles having masses 2kg and 5 kg the particle of mass 2 kg is pushed towards the centre of mass of particles through a distance 5 m,by what distance would particle of mass 5kg move so as to keep the centre of mass of particles at the original position?

A. 2 m

B. 12.5m

C. 8m

D. 5m

Answer: A

18. If linear speed of a particle moving in a circular path is constant then,angular speed is proportional to (r is radius of circle)

A. 1/r

B. $\frac{1}{r^2}$

C. $\frac{1}{r^3}$

D. r^0

Answer: A

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19. Two masses 6 kg and 4 kg are connected by massless flexible and inextensible string passing over massless and frictionless

pulley.The acceleration of centre of mass is (g=10ms^2)

A. $0.4ms^{-2}$

B. $2ms^{-2}$

C. $50ms^{-2}$

D. Zero

Answer: A

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20. If the length of second`s hand in a clock is 4 cm,the angular velocity and linear velocity of the tip is

A. $\frac{\pi}{30} rads^{-1}, \frac{\pi}{750} \frac{m}{s}$

B. $\frac{\pi}{6} rads^{-1}, \frac{\pi}{1500} \frac{m}{s}$

C. $\frac{\pi}{15} rads^{-1}, \frac{\pi}{375} \frac{m}{s}$

D. $\frac{\pi}{12} rads^{-1}, \frac{\pi}{350} \frac{m}{s}$

Answer: A

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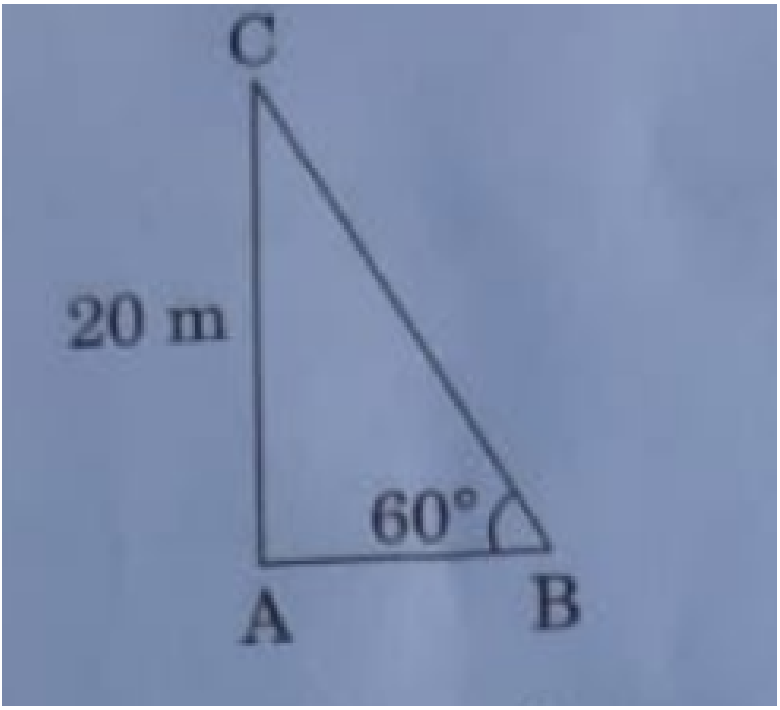
21. In figure, the angle of elevation of the top of a tower AC from a point B on the ground is 60°. If the height of the tower is 20m , find the distance of the point from the foot of the tower.



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22. Which of the following is correct ? (symbols have their ususal meanings)

A. $\vec{v} = \vec{r} \times \vec{\omega}$

B. $\vec{v} = \vec{\omega} \times \vec{r}$

C. $\vec{\omega} = \vec{v} \times \vec{r}$

D. $\vec{\omega} = \vec{r} \times \vec{v}$

Answer: B

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23. $\vec{A} = \left(\hat{i} - 2\hat{j} + 6\hat{k}\right)$ and $\vec{B} = \left(\hat{i} - 2\hat{j} + \hat{k}\right)$, find the cross product between $\vec{A}$ and $\vec{B}$.

A. $5\hat{i} + 10\hat{j}$

B. $5\hat{i} - 10\hat{j}$

C. $10\hat{i} + 5\hat{j}$

D. $10\hat{i} - 5\hat{j}$

Answer: C

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24. Select the correct option.

A. if centre of mass remains at rest then net work done by the forces acting on the system must be zero

B. is centre of mass remains at rest ,then the net external force must be zero

C. its centre of mass moving with constant velocity then the net external force must be zero

D. Both(2) and (3)

Answer: D

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25. Which of the following is correct ? (symbols have their ususal meanings)

A. $\vec{\tau} = \vec{r} \times \vec{F}$

B. $\vec{\tau} = \vec{F} \times \vec{r}$

C. $\vec{F} = \vec{r} \times \vec{\tau}$

D. $\vec{F} = \vec{\tau} \times \vec{r}$

Answer: A

26. When a torque acting upon a system is zero. Which of the following will be constant?

A. Linear momentum

B. Angular momentum

C. kinetic energy

D. Both (1) and (2)

Answer: B

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27. A force $\vec{F} = 4\hat{i} - 5\hat{j} + 3\hat{k}$N is acting on a point $\vec{r}_1 = 2\hat{i} + 4\hat{j} + 3\hat{k}$m. The torque acting about a point $\vec{r}_2 = 4\hat{i} - 3\hat{k}$m is

A. Zero

B. $42\hat{i} - 30\hat{j} + 6\hat{k}$Nm

C. $42\hat{i} + 30\hat{j} + 6\hat{k}$Nm`

D. $42\hat{i} + 30\hat{j} - 6\hat{k}$Nm

Answer: D

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28. Match the column A with column b .

S. No.	Column A	Column B
(i)	Sodium chloride	Increases
(ii)	Ammonium ion	Covalent bond
(iii)	Electronegativity across a period	Ionic bond
(iv)	Non-metallic character down the group	Covalent and co-ordinate bond
(v)	Carbon tetrachloride	Decreases

A. $L_A > L_B$

B. $L_A < L_B$

C. $L_A = L_B$

D. nothing can be said

Answer: C

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29. The angular momentum of a body is given by $L = 5t^2 + 2t + 1kg\frac{m^2}{s}$.The torque acting on the body at $t = 1$s is

A. $12N - m$

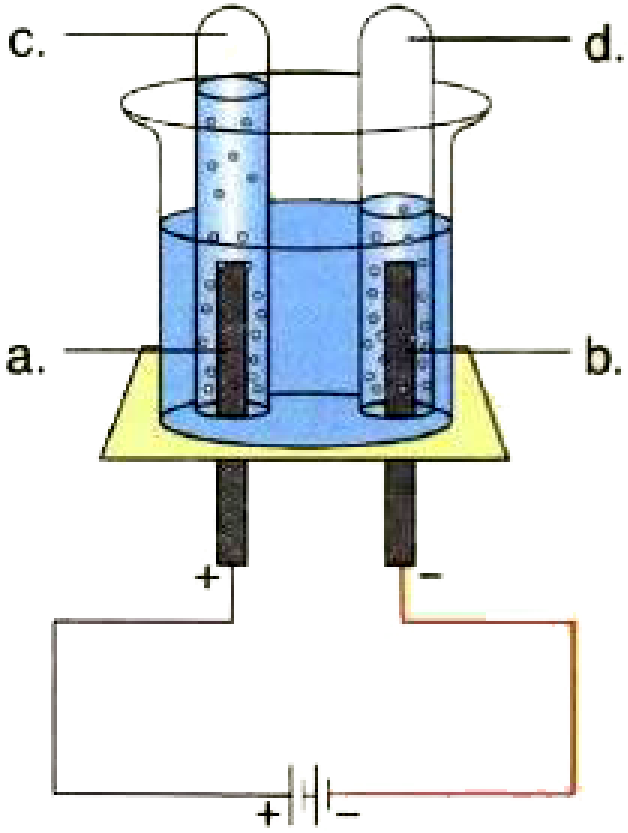
B. 10N-m

C. 4N-m

D. Zero

Answer: A

30. Name the process shown in the figure.



A. 90Nm

B. 180Nm

C. 270Nm

D. 750Nm

Answer: A

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