PHYSICS

AAKASH INSTITUTE ENGLISH

TEST 4

Example

1. The ratio of the density and pressure of a fixed mass of an ideal gas is "5" at 10°C. Then this ratio at 110°C is

A. 3.69

B. 5

C. 8.46

D. 6.76

Answer: A

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2. When a wave travels in a medium, the particle displacement is given by, $y = p\sin 2\pi(qt - rx)$, where p, q and r are constants. The

maximum particle velocity will be twice the wave velocity if

A. pgtqr

B. q = pr

C. r=1/πp

D. r gt pπ

Answer:

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3. A mixture of n1 moles of diatomic gas and n2 moles of monatomic gas has $C_p/C_v = \gamma = 3/2$, then

A. $2n_1 = 3n_2$

B. $n_1 = n_2$

C. $n_2 = 3n_1$

D. $3n_1 = 2n_2$

Answer:

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4. The Velocity of four gas molecules are given by 1 km/s, 2 km/s, 6 km/s and 8 km/s respectively. The rms velocity is

A. $\sqrt{\frac{105}{17}}$

B. $\sqrt{\frac{105}{2}}$

C. $\sqrt{\frac{105}{4}}$

D. $\sqrt{\frac{17}{4}}$

Answer:

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5. A cylinder contains 12kg of gas at pressure of 10^7 N/m^2. The quantity of gas taken out of the cylinder, if final pressure is $3 \times 10^6 N/m^2$, will be (temperature of gas is constant)

A. 3.6 kg

B. 8.4 kg

C. 4.6 kg

D. 5.2 kg

Answer:

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6. When sound wave is refracted from air to water, then which of the following quantity will change?

A. Wave number

B. Wavelength

C. Wave velocity

D. All of these

Answer:

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7. The equation y= A sin2(ωt - kx) represent a wave motion with amplitude and frequency as

A. A and ω/2π

B. A and $\frac{\omega}{\pi}$

C. A/2 and $\frac{\omega}{2}\pi$

D. A/2 and $\frac{\omega}{\pi}$

Answer:

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8. A closed vessel of volume $0.2m^3$ contain hydrogen gas at temperature $300K$ and pressure 10^5Pa. Then the heat required to raise temperature to $600K$ is:(molar heat capacity of hydrogen at constant volume is $5cal/mol-K$)

A. 4 Kcal

B. 12 Kcal

C. 6 Kcal

D. 4.8 Kcal

Answer:

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9. The molar heat capacity of a certain substance varies with temperature "T" as c = a + bT where a = 27.2 J mol-1 K-2. Then the heat necessary to change the temperature of 2 moles of this substance from 27°C to 427°C is

A. 24,460 J

B. 23,360 J

C. 23,460 J

D. 22,360 J

Answer:

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10. Two vessel having equal volume contain molecular hydrogen at one atmosphere and helium at two atmospheres respectively. What is the ratio of rms speed of hydrogen molecule

to that of helium molecule? (Assume both the samples are at same temperature)

A. $1 : 2\sqrt{2}$

B. $2\sqrt{2} : 1$

C. $1 : \sqrt{2}$

D. $\sqrt{2} : 1$

Answer:

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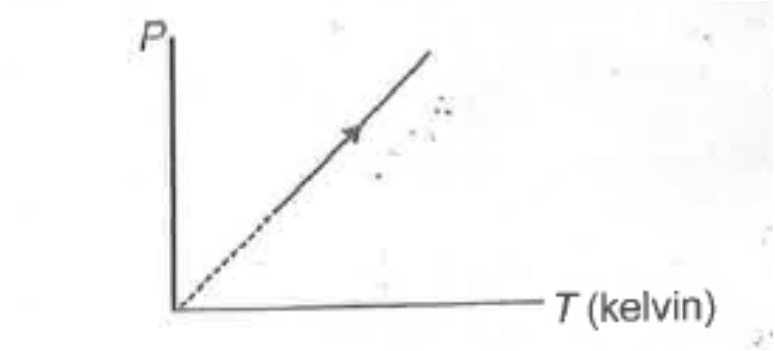
11. The graph of pressure and temperature for an ideal gas is as shown in figure. The given process is



A. Isothermal

B. Isobaric

C. Isochoric

D. Adiabatic

Answer:

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12. A particle of mass 0.2 kg exectites SHM under a force of F = - 20x N. If speed of particle at mean position is 12 m/s then the amplitude of oscillations is

A. 0.6 m

B. 1.2 m

C. 6 cm

D. 12 cm

Answer:

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13. A simple pendulum has time period T_1. The point of suspension is now moved upward according to the relatiori. y = kt^2 (k = 2 m/s^2) where y is the vertical displacement. The time period now becomes T_2 then the ratio of T_1^2/ T_2^2 (g = 10 m/s^2)

A. 6 : 5

B. 0.2125

C. 0.213194444444444

D. 7 : 5

Answer:

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14. Which of the following statement is incorrect?

A. Changes in pressure have no effect on the speed of sound

B. The speed of sound in water is higher than in air

C. Changes in temperature have no effect on the speed of sound

D. Frequency of sound wave does not change while travelling in different medium

Answer:

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15. If two SHMs are represented by equations $y_1 = 4 \sin[3\pi t + (\pi/3)]$, $y_2 = 4 [\sin(3\pi t) + \sqrt{3} \cos(3\pi t)]$, then the ratio of their amplitudes is

A. 0.043055555555556

B. 0.042361111111111

C. $\sqrt{3} : 1$

D. $1 : \sqrt{3}$

Answer:

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16. If at $t = 0$, a travelling wave pulse on a string is described by the function.

$$y = \frac{6}{x^2 + 3}$$

What will be the waves function representing the pulse at time t, if the pulse is propagating along positive x-axis with speed $4m/s$?

A. Y = 6/[$(x + 4t)^2$ + 3]

B. Y = 6/[$(x - 4t)^2$ + 3]

C. Y = 6/$(x + t)^2$

D. Y = 6/[$(x - t)^2$ + 10]

Answer:

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17. Two masses m_1 and m_2 are suspended together by a massless spring of constant k. When the masses are in equilibrium, m_1 is removed without disturbing the system. Then the angular frequency of oscillation of m_2 is

A. $\sqrt{\frac{k}{m_1}}$, (m_2g)`/k

B. $\sqrt{\frac{k}{m_1}}$, (m_1g)`/k

C. $\sqrt{\frac{k}{m_2}}$, (m_1g)`/k

D. $\sqrt{\frac{k}{m_2}}$, (m_1g)`/k

Answer:

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18. A block of mass m_1 resting on a frictionless horizontal surface is connected to a spring of spring constant k that is anchored in a near by

wall. A block of mass m_2 is placed on the top of the first block. The coefficient of static friction between the two blocks is μ Assuming that the two blocks move together as a unit, find the period of oscillation of the system and also find maximum oscillation amplitude that permits the two bodies to move as a unit.

A. $2\pi\sqrt{\frac{m_1+m_2}{k}}$, (mum_2g)`/k

B. $2\pi\sqrt{\frac{m_1+m_2}{k}}$, $(\mu m_1 g)$/k

C. $2\pi\sqrt{\frac{m_1+m_2}{k}}$,$(\mu(m_1+m_2))$/k

D. $2\pi\sqrt{\frac{m_1+m_2}{k}}$, $(\mu g(m_1+m_2))$/k

Answer:

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19. A body moves along a straight line OAB simple harmonically. It has zero velocity at the points A and B which are at distances 'a' and $b'respectivelyom0$' and has velocity 'V' when halfway between them then the period of SHM

A. πv/(b - a)

B. π(b - a)/ v

C. $\pi(a - b)/v$

D. $(b - a)/\pi v$

Answer:

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20. If a spring of force constant 'k' is cut into two parts, such that one part is thrice in length of the other part. Then the force constant of each part are

A. 3k/4, 4k

B. 4k/3 , 4k

C. (1/4)k, 4k/3

D. 2k/3, 3k

Answer:

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21. If the fundamental frequency of a closed of pipe is equal to the first overtone of an open

organ pipe then the ratio of lengths of closed organ pipe to open organ pipe is

A. 0.044444444444444

B. 0.16736111111111

C. 0.084027777777778

D. 0.043055555555556

Answer:

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22. A coin is placed on a horizontal platform which undergoes vertical SHM of angular frequency ω . The amplitude of oscillation is gradually increased. The coin will leave contact with platform for the first time.

A. At the mean position of the platform going upward

B. For an amplitude of g/ω^2

C. For an amplitude of g^2/ω^2

D. At the mean position of the platform going downward

Answer:

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23. A particle at the end of a spring executes SHM with a period t_1While the corresponding period for another spring is If the period of oscillation with the two springs in series is T, then :

A. $T^2 = t_1^2 + t_2^2$

B. $T^{-1} = t_1^{-1} + t_2^{-1}$

C. $T^{-2} = t_1^{-2} + t_2^{-2}$

D. $T = t_1 + t_2$

Answer:

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24. If v_1 and v_2 denote the sound velocity'and root mean square velocity of molecules of an

ideal gas then select the correct option (γ = adiabatic constant)

A. $v_1 = v_2 \left(\frac{\gamma}{2}\right)^{\frac{1}{2}}$

B. $v_1 = v_2 \left(\frac{\gamma}{3}\right)^{\frac{1}{3}}$

C. $v_1 = v_2 (\gamma)^{\frac{1}{2}}$

D. $v_1 = v_2 \left(\frac{\gamma}{2}\right)^{\frac{1}{3}}$

Answer:

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25. When sound is produced in an aeroplane moving With a velocity of 200. m/s horizontally its echo is heard after $10\sqrt{5}$ seconds. If velocity of sound in air is 300 ms^{-1} theielevation of aeroplane is

A. 1250 m

B. 250 m

C. 2500 m

D. $250\sqrt{5}$m

Answer:

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26. A simple harmonic progressive wave is represented by the equation- $y = 8\sin 2\pi(0.1x - 2t)$, where x and y are in cm and t is in second. At any instant the phase difference between two particles separated, by 2.0 cm in the x direction is

A. 54^{o}

B. 18^{o}

C. 72^{o}

D. 36°

Answer:

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27. For a certain organ pipe, three successive resonance frequencies are observed at 425, 595 and 765 Hz. The speed of sound in air is 340 m/s. The pipe is

A. Closed pipe of length 1 m

B. Closed pipe of length 2 m

C. Open pipe of length 1 m

D. Open pipe of length 2 m

Answer:

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28. The frequency of tuning forks A and B are respectively 5% more and 4% less than the frequency of tuning fork C. When A and B are simultaneously excited, 9 beats per second are

produced. Then the frequency of the tuning fork A (in Hz) is

A. 103 Hz

B. 105 Hz

C. 96 Hz

D. 100 Hz

Answer:

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29. Two wires are in unison. If the tension in one of the wires is increased by 2%, 5 beats are produced per second. The initial frequency of each wire is

A. 400 Hz

B. 1000 Hz

C. 500 Hz

D. 200 Hz

Answer:

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30. A transverse wave pulse is generated at the free end of a string which is hanging from a rigid support. The speed of the wave pulse at distance x from the free end is proportional to

A. 1/x

B. x^2

C. $\sqrt{x}$

D. $1/\sqrt{x}$

Answer:

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31. The stationary wave $y = 2a \sin kx \cos \omega t$ in a closed organ pipe is the result of the superposition of $y = a \sin(\omega t - kx)$ and

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32. In a resonance pipe the first and second resonances are obtained at depths 23.7 cm

and 72.3 cm respectively. Then the end correction will be

A. 0.6 cm

B. 1.2 cm

C. 0.8 cm

D. 2.4 cm

Answer:

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33. A person feels 2.5% difference of frequency of a motor-car horn. If the motor-car is moving towards the person and the velocity of sound is 320 m/s, then the velocity of motor car will be (approximately)

A. 80 m/s

B. 8 cm/s

C. 800 m/s

D. 8 m/s

Answer:

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34. If the amplitude of sound is doubled and the frequency reduced to one- fourth the intensity of sound at the same point will

A. Decreased by a factor of 4

B. Increased by a factor of 2

C. Decreased by a factor of 2

D. Increased by a factor of 4

Answer:

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35. Intensity level at a distance 200 cm frorn.a point source of sound is 80 dB. If there is it loss of acoustic power in air and intensity of tireshold hearing is 10^{-12} Wm^{-2}, then the intensity level at a distance of 4000 pm from source is (log 20` = 1.3)

A. 44 dB

B. 54 dB

C. 64 dB

D. Zero

Answer:

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36. Two cars are moving on two perpendicular roads towards a crossing with uniform speeds of 72 kmph and 36 kmph. If first car blows horn of frequency 300 Hz, then the frequency of horn heard by the driver of second car when

line joining the cars make 45° angle with the roads will be (Speed of sound = 330 m/s)

A. 340 Hz

B. 280 Hz

C. 289 Hz

D. 320 Hz

Answer:

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37. In an experiment, sonometer wire vibrates in 4 loops when a 50 g weight is placed in the pan of weight 15 g. To make the wire vibrates in 6 loops the mass that has to be removed from the pan is approximately [frequency of vibration remains constant]

A. 12 g

B. 24 g

C. 36 g

D. 42 g

Answer:

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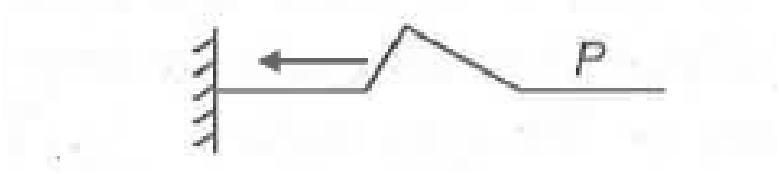
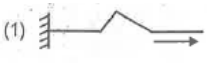
38. Given figure shows an incident pulse P reflected from a rigid support. Which one of following represents the reflected pulse correctly?



A. 

B. 

C. 

D. 

Answer:

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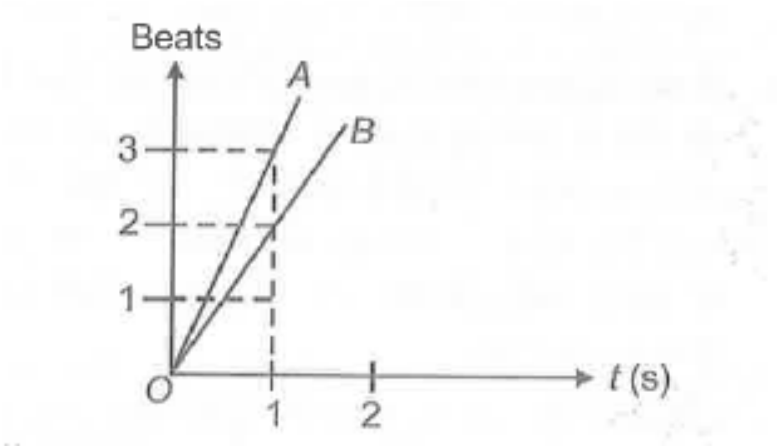
39. Two tuning forks P and Q are vibrated together. The number of beats produced are represented by the straight line OA in the following graph. After loading Q with wax

again these are vibrated together and the beats produced are represented by the line OB. If the frequency of P is 341 Hz, then frequency of Q will be



A. 341 Hz

B. 338 Hz

C. 344 Hz

D. 348 Hz

Answer:

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40. A string is rigidly tied at two ends and its equation of vibration is given by $y = \cos 2\pi t \sin 2\pi x$. Then minimum length of string is

A. 1 m

B. 5 m

C. 0.5 m

D. 2πm

Answer:

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41. The length of a sonometer wire is 0.75 m and density is 9×10^3 kg/m^3. It can bear a stress of 8.1×10^8 N/m^2 without exceeding the elastic limit. Then the fundamental frequency that can be produced in the wire is

A. 200 Hz

B. 400 Hz

C. 300 Hz

D. 100 Hz

Answer:

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42. Three waves of equal frequency having amplitudes 10 mm, 4 mm and 7 mm superpose at a given point with successive phase

difference of $\pi/2$. The amplitude of the resulting wave in mm is given by

A. 7

B. 5

C. 4

D. 6

Answer:

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43. A line source of sound of length 10 m, emitting a pulse of sound that travels radially outward from the source. The power of the source is P = 1.0.x 10^4 W What is the approximated intensity '/' of the sound when it reaches a distance of 10 m from the source?

A. 16 W/m^2

B. 25 W/m^2

C. 11 W/m^2

D. 6 W/m^2

Answer:

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44. The particles of a medium oscillate about their equilibrium position, whenever a wave travels through that medium. The phase difference between the oscillations of two such practices varies

A. Varies with time

B. Varies with time as well as distance

C. Varies with distance separating them

D. Is always zero

Answer:

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45. The change in frequency due to Doppler effect does not depend on

A. The speed of the source

B. The speed of the observer

C. The frequency of the source

D. Separation between the source and the observer

Answer:

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46. The dimensional formula of "Moment of force" is

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47. The direction of the angular velocity vector is along

A. pgtqr

B. q = pr

C. r=1/πp

D. r gt pπ

Answer:

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48. The rotational inertia of a disc about its geometrical axis does not depend upon its

A. Angular velocity of a body

B. Axis of rotation of the body

C. The mass of the body

D. The distribution of the body

Answer:

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49. A force with a given magnitude is to be applied to a wheel. The torque can be maximised by

A. $\sqrt{\frac{105}{17}}$

B. $\sqrt{\frac{105}{2}}$

C. $\sqrt{\frac{105}{4}}$

D. $\sqrt{\frac{17}{4}}$

Answer:

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50. A particle, held by a string whose other end is attached to a fixed point C, moves in a circle on a horizontal frictionless surface. If the string is cut, the angular momentum of the particle about the point C

A. increases

B. decreases

C. does not change

D. changes direction but not magnitude

Answer:

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51. A single force acts on a particle situated on the negative x-axis. The torque about the origin is in the positive z-direction. The force is

A. Wave number

B. Wavelength

C. Wave velocity

D. All of these

Answer:

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52. Ten seconds after an electric fan is turned on, the fan rotates at 300 rev/min. Its average angular acceleration is

A. A and $\omega/2\pi$

B. A and $\frac{\omega}{\pi}$

C. A/2 and $\frac{\omega}{2}\pi$

D. A/2 and $\frac{\omega}{\pi}$

Answer:

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53. The angular position of a point over a rotating flywheel is changing according to the relation, $\theta = \left(2t^3 - 3t^2 - 4t - 5\right)$ radian. The angular acceleration of the flywheel at time, t = 1 s is

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54. Keeping moment of inertia constant, the angular momentum of a body is increased by 20%. The percentage increase in its rotational kinetic energy is

A. 20%

B. 40%

C. 60%

D. 80%

Answer:

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55. The radius of gyration of a hollow sphere of radius R about an axis along its tangent is

A. $1 : 2\sqrt{2}$

B. $2\sqrt{2} : 1$

C. $1 : \sqrt{2}$

D. $\sqrt{2} : 1$

Answer:

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56. The two arms of a balanced are of unequal length. An object when placed in the left pan of the balance weighs 4 kg. The same object when placed in the right pan of the balance weighs 9 kg. The actual (or) true mass of the object is

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57. Two discs are mounted on frictionless bearings on a common shaft. The first disc has

rotational inertia / and is spinning with angular velocity ω. The second disc has rotational inertia 2/ and is spinning in opposite direction with angular velocity 3ω, as shown in figure. The two discs are slowly forced towards each other along the shaft until they couple and have a final common angular velocity of

A. 0.6 m

B. 1.2 m

C. 6 cm

D. 12 cm

Answer:

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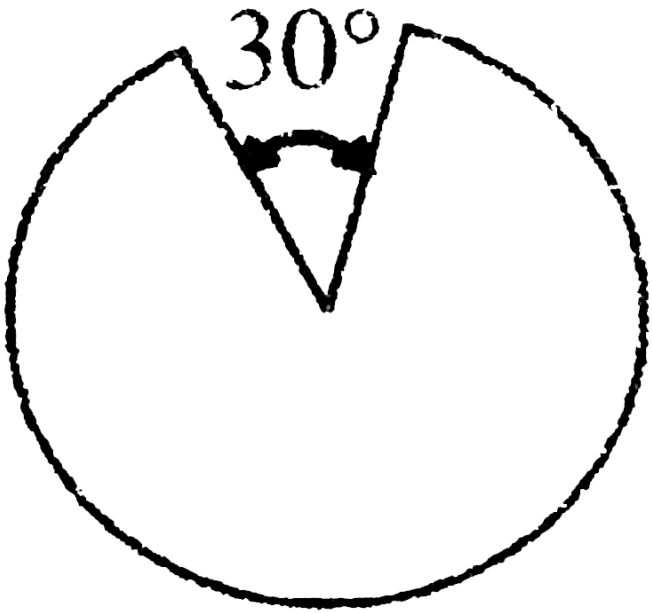
58. From a complete ring of mass M and radius R, a 30° sector is removed. The moment of inertia of the incomplete ring about an axis passing through the centre of the ring and

perpendicular to the plane of the ring is



,

A. 6 : 5

B. 0.2125

C. 0.213194444444444

D. 7 : 5

Answer:

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59. A rod is pivoted about its centre. A 10 N force is applied 4 m from the pivot and another force of 5 N is applied 2 m from the pivot, as shown. The magnitude of the total torque about the pivot is

A. Changes in pressure have no effect on the speed of sound

B. The speed of sound in water is higher than in air

C. Changes in temperature have no effect on the speed of sound

D. Frequency of sound wave does not change while travelling in different medium

Answer:

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60. Find the moment of inertia of a uniform square plate of mass M and edge a about one of its diagonals.

A. 0.043055555555556

B. 0.042361111111111

C. $\sqrt{3}:1$

D. $1:\sqrt{3}$

Answer:

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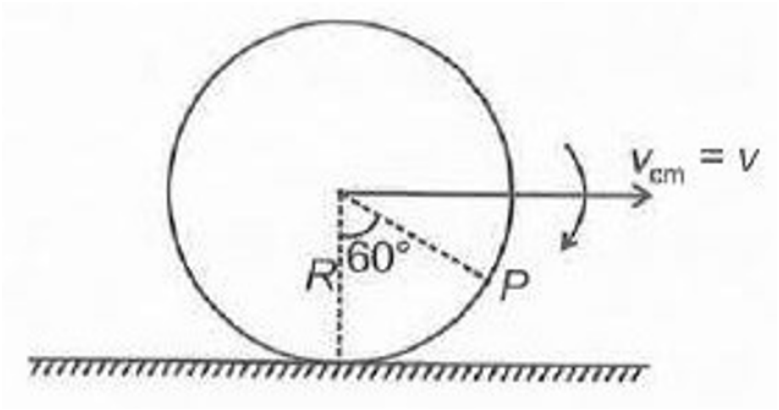
61. A cycle tyre of mass M and radius R is in pure rolling over a horizontal surface. If the velocity of the centre of mass of the tyre is v, then the velocity of point P on the tyre, shown in figure is



A. $Y = \dfrac{6}{(x+4t)^2+3}$

B. $Y = \dfrac{6}{(x-4t)^2+3}$

C. $Y = \dfrac{6}{(x+t)^2}$

D. $Y = \dfrac{6}{(x-t)^2} + 10$

Answer:

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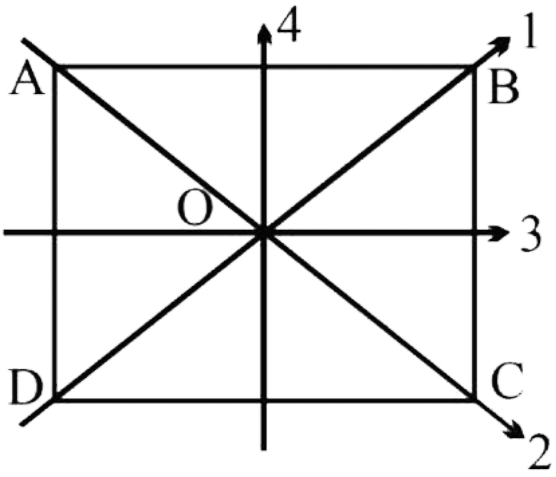
62. The moment of inertia of a thin square plate ABCD, fig, of uniform thickness about an

axis passing through the centre O and perpendicular to the plane of the plate is

where l_1, l_2, l_3 and l_4 are respectively the moments of intertial about axis 1,2,3 and 4 which are in the plane of the plate.



A. $\sqrt{\frac{k}{m_1}}$, (m_2g)`/k

B. $\sqrt{\frac{k}{m_1}}$, (m_1g)`/k

C. $\sqrt{\frac{k}{m_2}}$, (m_1g)`/k

D. $\sqrt{\frac{k}{m_2}}$, (m_1g)`/k

Answer:

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63. A boy of mass 30 kg is standing at one end on a stationary boat over a lake. The boat has a mass 70 kg and length 10 m. Now the boy walked to the other end of the boat. Relative to the ground

A. $2\pi\sqrt{\frac{m_1+m_2}{k}}$, (mum_2g)`/k

B. $2\pi\sqrt{\frac{m_1+m_2}{k}}$, $(\mu m_1 g)$/k

C. $2\pi\sqrt{\frac{m_1+m_2}{k}}$,$(\mu(m_1+m_2))$/k

D. $2\pi\sqrt{\frac{m_1+m_2}{k}}$, $(\mu g(m_1+m_2))$/k

Answer:

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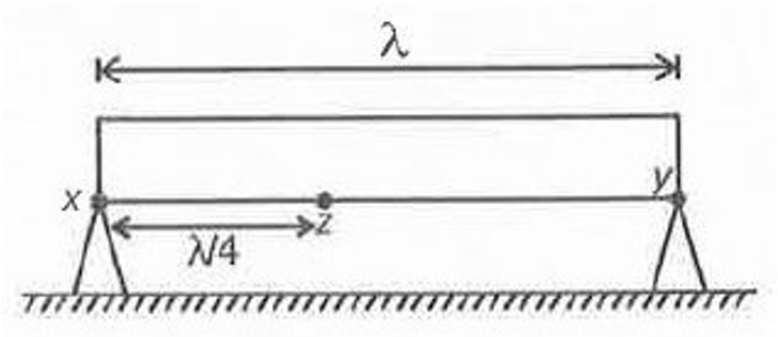
64. A uniform plank is supporeted by two equal 120 N forces at x and y as shown in figure. If the support at x is moved to z, then

the supporting forces at y and z are



A. $\frac{\pi v}{b-a}$

B. $\frac{\pi(b-a)}{v}$

C. $\frac{\pi(a-b)}{v}$

D. $\frac{b-a}{\pi v}$

Answer:

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65. A thin uniform wire of mass m and length l is bent into to shape of a semicircle. The moment of inertia of that wire about an axis passing through its free ends is

A. 3k/4, 4k

B. 4k/3 , 4k

C. (1/4)k, 4k/3

D. 2k/3, 3k

Answer:

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66. A ring rolls down an inclined plane and acquires a velocity v upon reaching the bottom of the inclined plane. If another body rolls down from the same height over the same inclined plane and acquires a velocity $\sqrt{\frac{6}{5}}v$ upon reaching the bottom of the inclined plane, then that body is

A. 0.044444444444444

B. 0.16736111111111

C. 0.084027777777778

D. 0.043055555555556

Answer:

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67. A thin ring of mass m and radius R is in pure rolling over a horizontal surface. If v_0 is the velocity of the centre of mass of the ring, then the angular momentum of the ring about the point of contact is

A. At the mean position of the platform going upward

B. For an amplitude of g/ω^2

C. For an amplitude of g^2/ω^2

D. At the mean position of the platform going downward

Answer:

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68. A 16 kg block is attached to a cord that is wrapped around the rim of a flywheel of diameter 0.4 m and hangs vertically, as shown in figure. The rotational inertia of the flywheel is 0.5 kg m^2. When the block is released and the cord unwinds, the acceleration of the block is

A. $T^2 = t_1^2 + t_2^2$

B. $T^{-1} = t_1^{-1} + t_2^{-1}$

C. $T^{-2} = t_1^{-2} + t_2^{-2}$

D. $T = t_1 + t_2$

Answer:

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69. A ring is rolling without slipping. The ratio of translational kinetic energy to rotational kinetic energy is

A. $v_1 = v_2 \left(\frac{\gamma}{2}\right)^{\frac{1}{2}}$

B. $v_1 = v_2 \left(\frac{\gamma}{3}\right)^{\frac{1}{3}}$

C. $v_1 = v_2 (\gamma)^{\frac{1}{2}}$

D. $v_1 = v_2 \left(\frac{\gamma}{2}\right)^{\frac{1}{3}}$

Answer:

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70. A pulley with a radius of 3 cm and rotational inertia of 4.5×10^{-3} kg m^2 is suspended from the ceiling. A rope passes over it with a 2 kg block attached to one end and a 4 kg block attached to the other. The

rope does not slip on the pulley. At any instant after the blocks start moving, the object with the greatest kinetic energy is

A. 1250 m

B. 250 m

C. 2500 m

D. $250\sqrt{5}$m

Answer:

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71. The moment of inertia of a cube of mass M and edge length a about an axis passing through one of its edge is

A. 54^{o}

B. 18^{o}

C. 72^{o}

D. 36^{o}

Answer:

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72. The moment of inertia of a solid sphere of radius R about an axis passing through its diameter is /. The sphere is melted and recast into a circular disc of thickness $\frac{R}{3}$. The moment of inertia of this disc about an axis perpendicular to plane and passing through its centre of mass is

A. Closed pipe of length 1 m

B. Closed pipe of length 2 m

C. Open pipe of length 1 m

D. Open pipe of length 2 m

Answer:

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73. A hollow sphere rolls down a rough inclined plane whose angle of inclination is θ, with horizontal. For the hollow sphere to undergo pure rolling, without slipping, the condition is [μ = coefficient of friction between the hollow sphere and inclined plane]

A. 103 Hz

B. 105 Hz

C. 96 Hz

D. 100 Hz

Answer:

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74. A body of mass m is projected with a velocity u at an angle θ with the horizontal. The angular momentum of the body, about

the point of projection, when it at highest point on its trajectory is

A. 400 Hz

B. 1000 Hz

C. 500 Hz

D. 200 Hz

Answer:

75. The centre of mass shifts by a distance S, when a square of side $\frac{R}{2}$ is cut from a uniform disc of radius R as shown in figure. The value of S is

A. 1/x

B. x^2

C. $\sqrt{x}$

D. $1/\sqrt{x}$

Answer:

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76. A particle of mass 300 g is moving with a speed of 20 ms^{-1} along the straight line y = x - $4\sqrt{2}$. The angular momentum of the particle about the origin is (where y & x are in metres)

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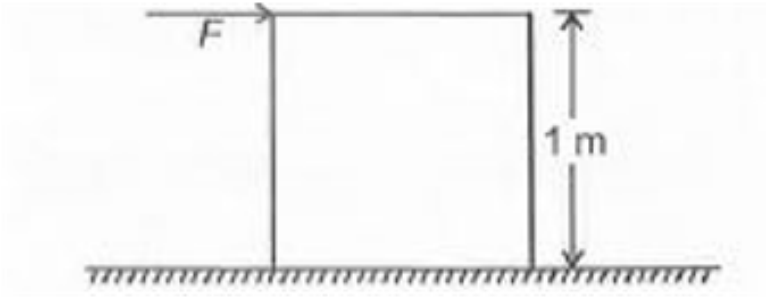
77. A cubical block of edge length 1 m and density 800 kg m^{-3} rests on a rough

horizontal surface with coefficient of friction μ . A horizontal force F is applied on the block as shown in figure. If the coefficient of friction is sufficiently large so that the block does not slide bofore toppling, then the minimum value of F to topple the block is [Take g = 10 ms^{-2}]



A. 0.6 cm

B. 1.2 cm

C. 0.8 cm

D. 2.4 cm

Answer:

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78. A body is thrown from ground for horizontal range 100 m. If the body breaks into two fragments of mass in the ratio $1:2$ at the highest point and smaller mass stops there and comes vertically downward, then

horizontal range of the centre of mass of the body is

A. 80 m/s

B. 8 cm/s

C. 800 m/s

D. 8 m/s

Answer:

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79. A body is in pure rolling over a horizontal surface. If the rotational kinetic energy of that body is 40% of its total kinetic energy, then the body is

A. Solid cylinder

B. Hollow cylinder

C. Solid sphere

D. Hollow sphere

Answer:

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80. A particle is rotating about a fixed axis with angular acceleration $\overrightarrow{\alpha} = \hat{i} + 2\hat{j} + 3\hat{k}$ rad/s^2. Find the tangential acceleration of a point having radius vector $\left(2\hat{i} - 3\hat{j} + \hat{k}\right)$m from axis of rotation in (in m/s^2)

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81. Two discs A and B have same mass and same thickness. If d_1 and d_2 are the densities

of the materials of the discs A and B respectively, then the ratio of the moment of inertia of the discs A and B about their geometrical axis is

A. 340 Hz

B. 280 Hz

C. 289 Hz

D. 320 Hz

Answer:

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82. The rotational inertia of a disc about its axis is 0.70 kg m^2. When a 2.0 kg mass is added to its rim, 0.40 m from the axis, the rotational inertia becomes

A. $1.02kg - m^2$

B. $1.00kg - m^2$

C. $1.05kg - m^2$

D. $1.07kg - m^2$

Answer:

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83. A force $\vec{F} = \left(\hat{i} + \hat{j} - \hat{k}\right) N$ acts at a point P(3 m, 6 m, 9 m). The torque exerted by this force about a point Q(2 m, 7 m, 8 m) is

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84. A pulley with a radius of 3 cm and rotational inertia of 4.5×10^{-3} kg m^2 is suspended from the ceiling. A rope passes over it with a 2 kg block attached to one end

and a 4 kg block attached to the other. The rope does not slip on the pulley. At any instant after the blocks start moving, the object with the greatest kinetic energy is

A. 341 Hz

B. 338 Hz

C. 344 Hz

D. 348 Hz

Answer:

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85. The angular velocity of a wheel rotating with constant angular acceleration, changes from 2 rad/s to 6 rad/s in a time interval of 31.4 s. The number of rotations made by the wheel in this interval of time is

A. 20

B. 30

C. 40

D. 50

Answer:

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86. A man stands on a rotating platform with his arms stretched holding a 5 kg weight in each hand. The angular speed of the platform is $1.2revs^{-1}$. The moment of inertia of the man together with the platform may be taken to be constant and equal to $6kgm^2$. If the man brings his arms close to his chest with the distance of each weight from the axis

changing from 100 cm to 20 cm . The new angular speed of the platform is

A. 7

B. 5

C. 4

D. 6

Answer:

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87. A wheel initially has an angular velocity of 18 rad/s. It has a costant angular acceleration of 2 rad/s^2 and is slowing at first. What time elapses before its angular velocity is 22 rad/s in the direction opposite to its initial angular velocity?

A. 16 W/m^2

B. 25 W/m^2

C. 11 W/m^2

D. 6 W/m^2

Answer:

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88. For a body to be in equilibrium under the combined action of several forces

A. Varies with time

B. Varies with time as well as distance

C. Varies with distance separating them

D. Is always zero

Answer:

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89. The SI unit of "Angular Impulse" is

A. The speed of the source

B. The speed of the observer

C. The frequency of the source

D. Separation between the source and the observer

Answer:

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