PHYSICS

BOOKS - A2Z PHYSICS (HINGLISH)

MOCK TEST

Mock Test

1. Two spheres of same size , one of mass $2kg$ and another of mass $4kg$ are dropped smalltanausly from the top of is 72 as light

tower When they are $1m$ above the ground the two sphers have the same

A. momentum

B. kinetic energy

C. potential energy

D. acceleration

Answer: d

2. The moment of inertia of a rod about an axis through its centre and perpendicular to it is 1/12ML² (where M is the mass and L is te length of the rod). The rod is bent in the middle so that the two halves make an angle of 60°. the moment of inertia of the bent rod about the same axis would be

A. $\dfrac{1}{48}ML^2$

B. $\dfrac{1}{12}ML^2$

C. $\dfrac{1}{24}ML^2$

D. $\dfrac{ML^2}{8\sqrt{3}}$

Answer: b

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3. A boat at unchore by waves whose crests are $100m$ apart and velocity is $25m/s$ The hour bounces up once in every

A. $2500s$

B. $75s$

C. $4s$

D. $0.25s$

Answer: c

4. By sucking a straw a student can reduce the pressure in his lungs $750mm$ of $Hg(\text{density}) = 13.6g/cm^3$) Using the straw, he can drink water from a glass up to a maximum depth of :

A. $10cm$

B. $75cm$

C. $13.6cm$

D. $1.36cm$

Answer: c

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5. The magnetic moment has dimensions of

A. $[LA]$

B. $\left[L^2 A\right]$

C. $\left[LT^{-1}A\right]$

D. $\left[L^2 T^{-1}A\right]$

Answer: b

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6. For inclestic collsion between two spherical rigid bodies

A. the total kinetic energy is conserved

B. the total machanical energy is not

conserved

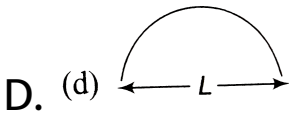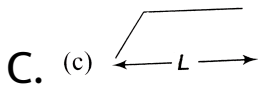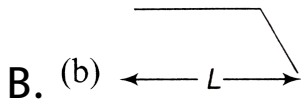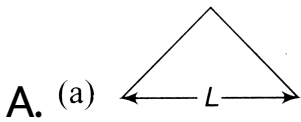C. the linearmomentum is not conserved
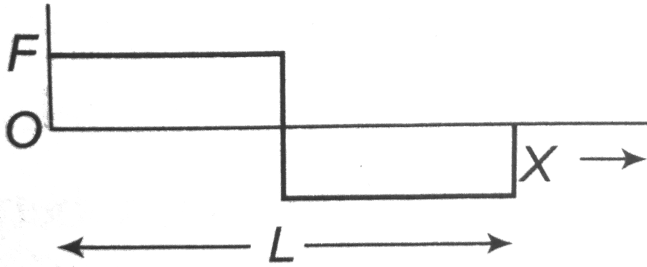
D. the linearmomentum is conserved

Answer: d

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7. A person used force (F) , shown in figure to

move a load with constant velocity on given

surface. Identify the correct surface profile:

A. (a)

B. (b)

C. (c)

D. (d)

Answer: a

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8. There obujects coloured black, gray and white can withstand hostile condition upto $2800°C$ These object are throw into a farance where each of them attanit a temperature of $2800°C$ Which object will glow brightess?

   A. The white object

   B. The black object

   C. All glow with equal beightness

   D. Gray object

Answer: b

9. Two ballons are filled one with pure he gas and the other by six repectively If the pressure and temperature of these bellows are same then the number of molecales per unit volum is

    A. mass in the He filled balloop

    B. mass in both filled balloop

C. mass in air filled balloop

D. in the ratio of 1.4

Answer: b

10. A weight w is sasponded from the mid - point of a tope whose ends are at the same level In after in make the rope perfectly horizontalthe force applied to each of its ends must be

A. less then w
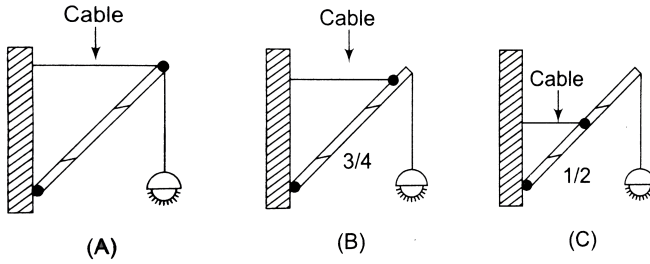
B. equal to w

C. equal to $2w$

D. infinitly large

Answer: d

11. If asteel light of mass M is suspended from

for end of a uniform rod of lkength L in

diffrence possible patents as shown in figure

(A)

(B)

(C)

A. Pettern A is more then study

B. Pettern B is more then study
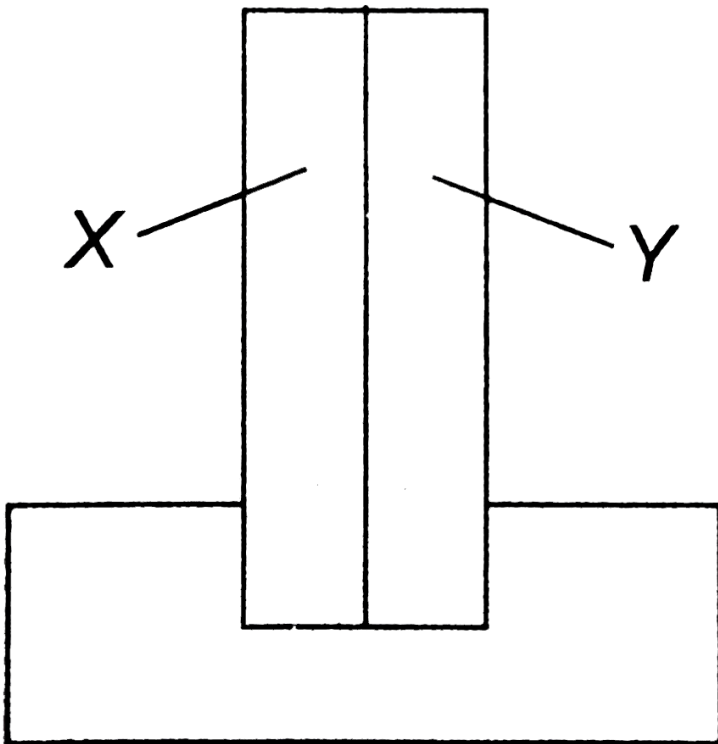
C. Pettern C is more then study

D. all will have same standients

Answer: a

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12. A bimetaltic stop constants of metals A and V it is montedrigully at the base as shown The motel A has a bigher coefficient of expernsions component to that for metal V when himetalic stop is that for placed in a cold bath.

A. It will bend toward the right

B. It will bend toward the left

C. It will not bend but shrink

D. It will nether bend not shrink

Answer: b

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13. The density of a body because four times its initial value .The new linear momentum will be

A. 10^{-4}

B. 10^{-2}

C. 10^{-1}

D. 10^2

Answer: a

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14. The kinetic energy of a body because four times its initial value ..The new linear momentum will be

A. eight times that of initial value

B. four times that of initial value

C. twice of the initial value

D. remain as the initial value

Answer: c

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15. The dimension of torque

A. $\left[ML^2T^{-3}\right]$

B. $\left[ML^{-1}T^{1}\right]$

C. $\left[ML^2T^{-2}\right]$

D. $\left[MT^{-2}\right]$

Answer: c

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16. If equation of a sound wave is

A. $2unit$

B. $0.3unit$

C. $0.1 unit$

D. $0.2 unit$

Answer: c

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17. The letent heat of caporisation of water is $2240J$ if the work done in the precess of caporization of $1g$ is 148J` then increases in initial energy will be

A. $1904J$

B. $2072J$

C. $2240J$

D. $2408J$

Answer: b

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18. If v_0 orbital velocity of a surface to a

circular orbital close in the earth's surface and

v_1 scape velocity from earth then relation between the two is

A. $v_e = 2v_o$

B. $v_e = \sqrt{3v_o}$

C. $v_e = v_o\sqrt{2}$

D. $v_o = v_e$

Answer: c

19. At the topmost point of a trajectory, its velocity and acceleration are an angle of

A. $180°$

B. $90°$

C. $60°$

D. $45°$

Answer: b

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20. if the vectors $P = \alpha\hat{i} + \alpha j + 3\hat{k}$ and $Q = \alpha\hat{i} - 2\hat{j} - \hat{k}$ are perpendicular to each other, then the positive value of α is

A. zero

B. 1

C. 2

D. 3

Answer: d

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21. A siren emiting sound of frequency $800Hz$ is going away from a static listence with a speed of $30m/s$ frequency of sound to be beand by the listener is (velocity of sound $= 330m/s$)

    A. $286.5Hz$

    B. $481.2Hz$

    C. $733.3Hz$

    D. $644.8Hz$

Answer: c

22. The volume of a gas is reduced adibatically to $(1/4)$ of its volume at $27°C$ if $y = 1.4$ The new temperature will be

A. $300 \times (4)^{0.4} K$

B. $150 \times (4)^{0.4} K$

C. $250 \times (4)^{0.4} K$

D. None of these

Answer: a

23. The velocities of sound at same temperature in two monoatomic gases of density ρ_1 and ρ_2 are v_1 and v_2 repectively , if $\dfrac{\rho_1}{\rho_2} = 4$, then the value of $\dfrac{v_1}{v_2}$ will be

A. 4

B. 2

C. $\dfrac{1}{2}$

D. $\dfrac{1}{4}$

Answer: c

24. The maximum range of a gun from horizontal terms is $16km$ If $g = 10m/s^2$ what must be the muzele velocity of the sheet?

A. $400m/s$

B. $200m/s$

C. $100m/s$

D. $50m/s$

Answer: a

25. There different objective of masses m_1, m_2 and m_2 are allowed to fall from rest and from the same point O along three difference frictionless path .The speeds of three objects on reaching the ground will be

A. $\dfrac{1}{m_1} : \dfrac{1}{m_2} : \dfrac{1}{m_3}$

B. $1 : 1 : 1$

C. $m_1 : 2m_2 : 3m_3$

D. $m_1 : m_2 : m_3$

Answer: b

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26. The radius of earth is about $6400 Km$ and that of mars is about $3200 km$ The mass of the earth is about 10times the mass of mars An object weight $200N$ on earth 's surface , then its weight on the surface of mars will be

A. 80N

B. 40N

C. 20N

D. 8N

Answer: a

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27. A stelite is launched into a circular orbit of radius R around the earth .While a second is lunched into an orbit of radius 1.01R The

period of the second satellite is longer than the first one by approximatly
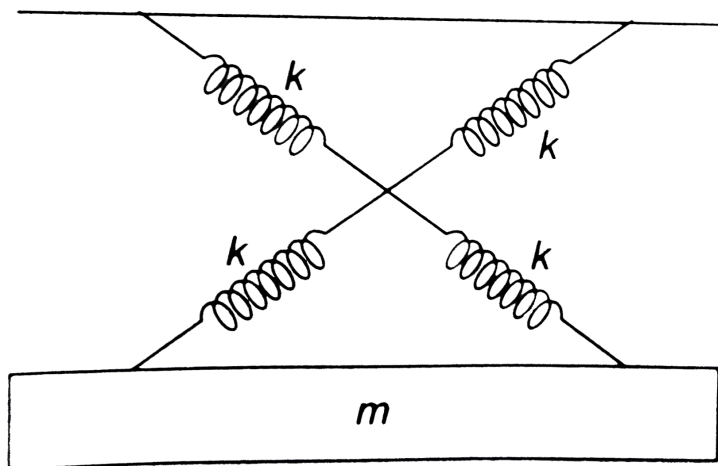
A. 3.0 %

B. 1.5 %

C. 0.7 %

D. 1.0 %

Answer: b

28. As shown in figure in a simple barmonic motion obscillator having identical four springs has time period

A. $T = 2\pi\sqrt{\dfrac{m}{4k}}$

B. $T = 2\pi\sqrt{\dfrac{m}{2k}}$

C. $T = 2\pi\sqrt{\dfrac{m}{k}}$

D. $T = 2\pi\sqrt{\dfrac{m}{8k}}$

Answer: c

29. A soup bubble in vacume has a redius $3cm$ and another soup bubble in vacume has radius $4cm$ If two bubble coulese under isothermal condition , then the radius of the new bubble will be

A. $7cm$

B. $5cm$

C. $4.5cm$

D. $2.3cm$

Answer: b

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30. As what temperature the speed of sound in air will because double of its value at $27°$?

A. $54°C$

B. $627^\circ C$

C. $927^\circ C$

D. $327^\circ C$

Answer: c

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31. A string in a musical instrument is $50cm$ long and its fundanmental frequency is $800Hz$ If the frequency of $1000Hz$ is to be produced then required length of spring is

A. $37.5cm$

B. $40cm$

C. $50cm$

D. $62.5cm$

Answer: b

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32. Bernoulli's equation is a consequence of conseevation of

A. energy

B. linear momentum

C. angular momentum

D. mass

Answer: a

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33. A neutron makes is a head - on elastic

collision with a stationary deuteron The

fraction energy loss of the neutron in the collision is

A. $16/81$

B. $8/9$

C. $8/27$

D. $2/3$

Answer: b

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34. The motion of plants in the solar system is radius R coalesece to from a single large drop .The radius of the tatal surface energies before and after the change is

    A. mass

    B. linear momentum

    C. angular momentum

    D. energy

Answer: c

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35. Two small drop of mencury , each of radius R coulesece in from a simple large drop The ratio of the total surface energies before and after the change is

A. $1 : 2^{1/3}$

B. $2^{1/3} : 1$

C. $2 : 1$

D. $1 : 2$

Answer: b

36. A black body at a temperature of $227°C$ radius head at a rate of $20 cal m^{-2} s^{-1}$. When its temperature is raised to $727°C$ the radiated by it in cal $m^{-2} s^{-1}$ will be closet
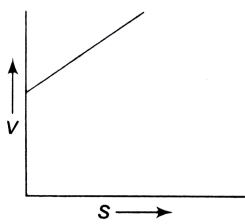
A. 40

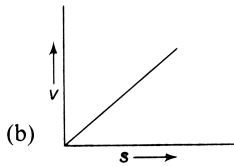B. 160

C. 320

D. 640

Answer: c

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37. A body starting from rest moves along a string line with a constant acceleration The variation of speed (v) with distance (s) is repressed by the graph
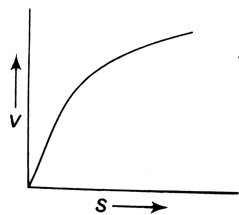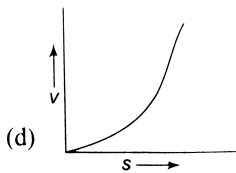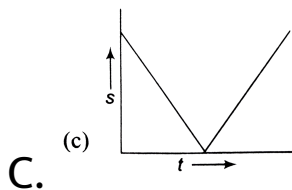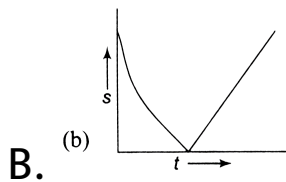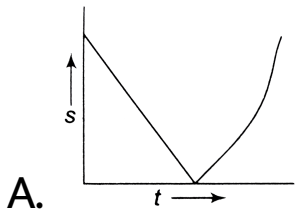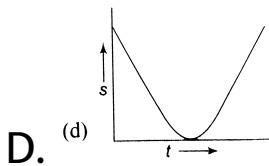
A.

(b)

B.

C.

(d)

D.

Answer: c

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38. A ball is thrown vertically upwards. Which of the following plots represent the speed graph of the ball during its flight if the air resistence is not ignored?

A.

B. (b)

C. (c)

D. (d)

Answer: d

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39. An earhquake generates both transverse (S) and logitudinal (P) sound wave in the earth .The speed of (S) wave is about $4.5 km/s$ and that of (P) wave is about $8.0 km/s$ A seimsograph records P and S wave fr5om an earthquake The first P wave arrives $4.0 \min$

before the first S wave The epicenter of the earthpake is located at a distance of about

A. $25km$

B. $250km$

C. $2500km$

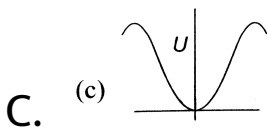D. $5000km$

Answer: c

40. During SHM, A particle has displacement a from mean position If acceleration Kinetic energy and excess potential repressented by a K and U respectively then chose the appropriate graph

A. (a)

B. (b)

C. (c)

D.

(d)
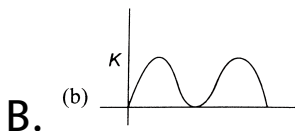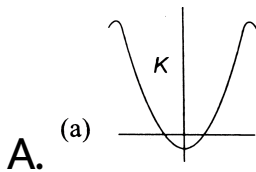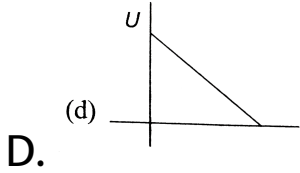
Answer: d

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41. Assertion : The root mean sguar and most probable speed of the molecules in a gas are the same

Reason : The Maxwell distribution for the speed of molecules in a gas is symentrical

A. If both assertion and reason are true and the reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true statement but reason is false.

D. If both assertion and reason are false.

Answer: d

42. Assertion: In adiabatic compression, the internal energy and temperature of the system get decreased.

Reason: The adiabatic compression is a slow process.

A. If both assertion and reason are true and the reason is the correct explanation of assertion.

B. If both assertion and reason are true but

   reason is not the correct explanation of

   assertion.

C. If assertion is true statement but reason

   is false.

D. If both assertion and reason are false.

Answer: c

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43. Assertion : A thin staindess steel needle

can by floating on a still water surface

Reason : Any object floats when the bayancey

force balace the weight of the object

  A. If both assertion and reason are true

     and the reason is the correct

     explanation of assertion.

  B. If both assertion and reason are true but

     reason is not the correct explanation of

     assertion.

C. If assertion is true statement but reason

is false.

D. If both assertion and reason are false.

Answer: c

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44. Assertion : A hollow metallic closed

container maintained at a uniform

temperature cab act as a source of black body

radiation.

Reason : All metals act as a black body.

A. If both assertion and reason are true and the reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true statement but reason is false.

D. If both assertion and reason are false.

Answer: c

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45. Assertion: The ratio of intertial mass to gravitational mass is equal to one.

Reason: The inertial mass and gravitational mass of a body are equivalent.

A. If both assertion and reason are true and the reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true statement but reason is false.

D. If both assertion and reason are false.

Answer: c

46. A paricle starting from the origin (0,0) moves in a straight line in (x,y) plane. Its coordinates at a later time are $\left(\sqrt{3}, 3\right)$. The path of the particle makes with the x-axis an angle of

A. $30°$

B. $45°$

C. $60°$

D. $0°$

Answer: C

47. A particle executes simple harmonic oscilliation with an amplitude a. The period of oscillations is T. The minimum time taken by the particle to travel half to the amplitude from the equlibrium position is

A. $\dfrac{T}{4}$

B. $\dfrac{T}{8}$

C. $\dfrac{T}{12}$

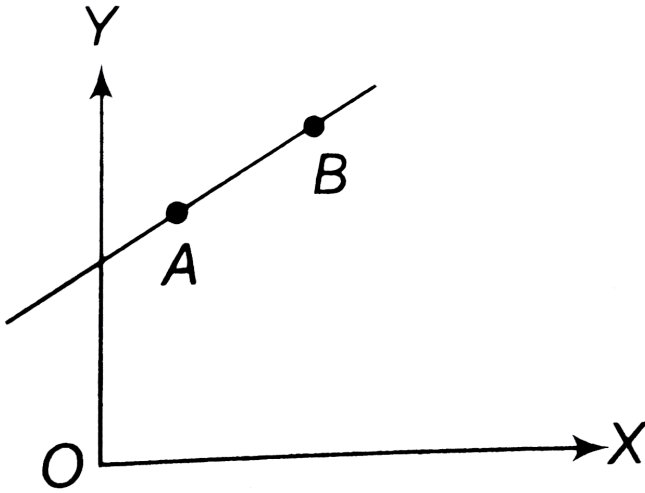D. $\dfrac{T}{2}$

Answer: C

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48. A particle of mass m moves in the XY plane with a velocity v along the straight line AB. If the angular momentum of the particle with respect to origin O is L_A when it is at A and

L_B when it is at B, then

A. $L_A > L_B$

B. $L_A = L_B$

C. the relationship between L_A and L_B

depends upon the slope of the line AB

D. $L_A < L_B$

Answer: B

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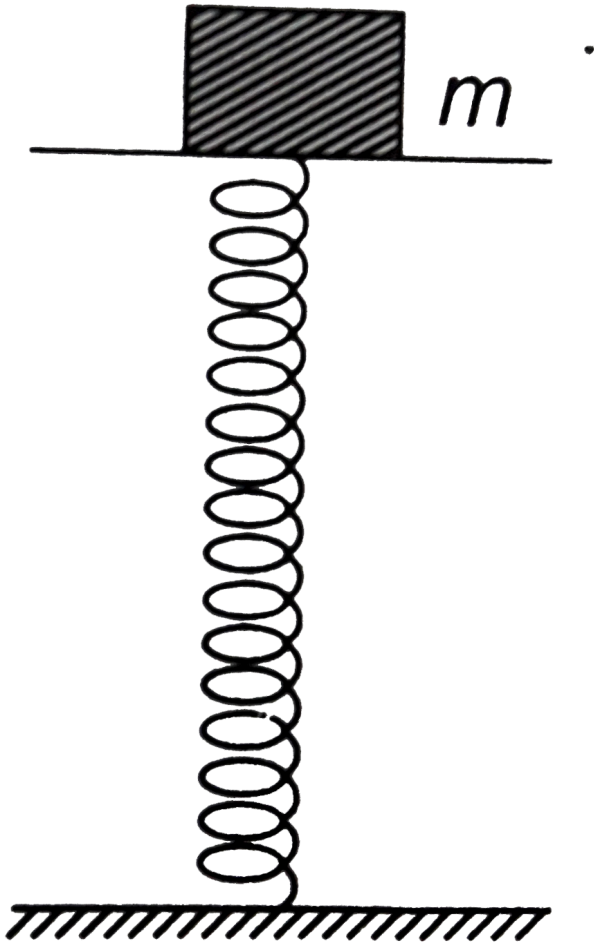**49.** A mass of $2.0kg$ is put on a flat pan attached to a vertical spring fixed on the ground as shown in figure. The mass of the spring and the pan is negligible. When pressed slightly and realeased the mass executes a simple contant is $200N/m$. What

should be the minimum amplitude of the

motion, so that the mass gets the detached

from the pan? $\left(Take g = 10m/s^2\right)$

A. $8.0cm$

B. $10.0cm$

C. Any value less than $12.0cm$

D. $4.0cm$

Answer: B

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50. The phase difference between the instantaneous Velocity and acceleration of a particle executing simple harmonic motion is

A. 0.5π

B. π

C. 0.707π

D. Zero

Answer: A

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51. Dimension of resistance in an elecatrical circuit, in terms of dimension of mass M, of length L, of time T, and of current I, would be

A. $\left[ML^2T^3I^{-I}\right]$

B. $\left[ML^2T^2\right]$

C. $\left[ML^2L^{-1}\right]$
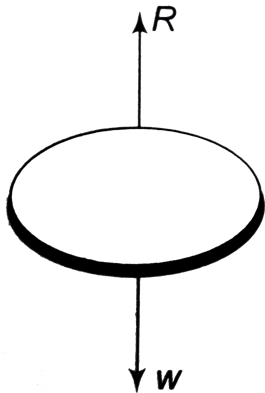
D. $\left[ML^2T^3\right]$

Answer: D

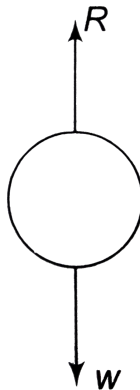▶ **Watch Video Solution**

52. When a body falls in a air, the resistance of air depends to a great extent on the shape of the body. The different shapes are givne.

Identify the combination of air resistance which truly represents the physical situation? (The cross-sectional areas are the same)

(1) disc   (2) ball   (3) cigar shaped

A. $1 < 2 < 3$

B. $2 < 3 < 1$

C. $3 < 2 < 1$

D. $3 < 1 < 2$

Answer: C

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53. A beam of parallel rays is brought to focus by a planoconvex. A thin Concave lens of the same focal length is joined to the first lens. The effect of this is

    A. the focus shifts to infinity

    B. the focal point shifts towards the lens by a small distance

C. the focal point shifts away from the lens

by a small distance

D. the focus remains undisturbed

Answer: A

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54. Fig shows of PV/T versus P for $1.00 \times 10^{-3} kg$ of oxygen gas at two different temperatures.

(a) What does the dotted plot signify ?

(b) Which is true : $T_1 < T_2$ or $T_2 < T_1$?

(c) What is the value of PV/T where the curves meet on the Y-axis ?

(d) If we obtained similar plot for $1.00 \times 10^{-3} kg$ of hydrogen, would we get the same value of PV/T at the point where the curves meet on the y-axis ? If not, what mass of hydrogen yield the same value of PV/T (for low pressure high temperature region of the plot) ? (Molecular mass of $H = 2.02u$, of

$$O = 32.0u, \quad R = 8.31 J\text{mol}^{-1}K^{-1}$$
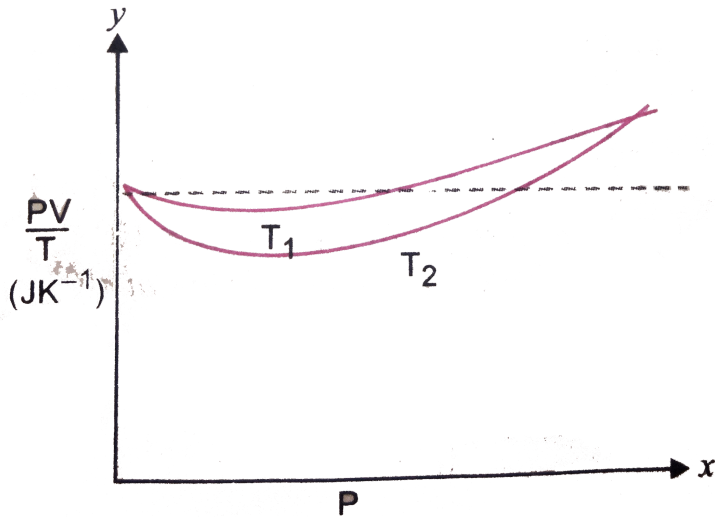
A. (i) only

B. (i) and (ii) only

C. All of the above

D. None of the above

Answer: C

55. An asteroid of mass m is approaching earth, initially at a distance $10R_E$ with speed v_i. It hits earth with a speed v_f (R_E and M_E are radius and mass of earth),. Then

A. $v_f^2 = v_i^2 + \dfrac{2Gm}{M_e R_e}\left(1 - \dfrac{1}{10}\right)$

B. $v_f^2 = v_i^2 + \dfrac{2Gm_e}{R_e}\left(1 + \dfrac{1}{10}\right)$

C. $v_f^2 = v_i^2 + \dfrac{2Gm_e}{R_e}\left(1 - \dfrac{1}{10}\right)$

D. $v_f^2 = v_i^2 + \dfrac{2Gm}{R_e}\left(1 - \dfrac{1}{10}\right)$

Answer: C

56. A spherical ball of mass $20kg$ is stationary at the top of a hill of height $100m$, it rolls down a smooth surface to the ground , then climbs up another bill of height of $30m$ and final rolls down to a horizontal base at a height of $20m$ about the ground . The velocity attained by the ball is

A. $40m/s$

B. $20m/s$

C. $10m/s$

D. $10\sqrt{30}m/s$

Answer: A

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57. A sound absorber attenuates the sound level by $20dB$. The intensity decreases by a factor of

A. 1000

B. 10000

C. 10
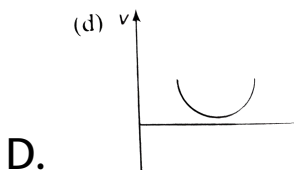
D. 100

Answer: D

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58. A particle is thrown above, then correct $v - t$ graph will be

A.

(a) v

B.

(b) v

C.

(c) v

D.

(d) v
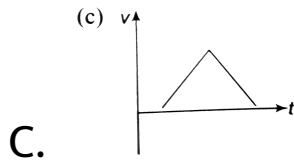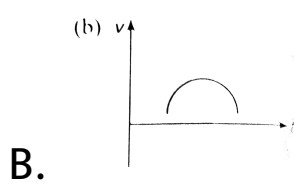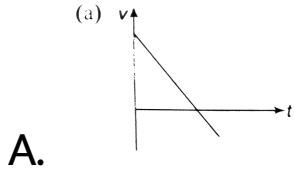
Answer: A

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59. The speed (v) of ripples on the surface of waterdepends on surface tension (σ), density (ϕ) and wavelength (λ). The square of speed (v) is proportional to

A. $\dfrac{\sigma}{\rho\lambda}$

B. $\dfrac{\rho}{\sigma\lambda}$

C. $\dfrac{\lambda}{\sigma\rho}$

D. $\rho\lambda\sigma$

Answer: a

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60. Simple pendulum is executing simple harmonic motion with time period T. If the length of the pendulum is increased by 21%, then the increase in the time period of the pendulum of the increased length is:

A. 22%

B. 13%

C. 50%

D. 10%

Answer: D

61. A gun fires a bullet of mass $50g$ with a velociy of $30m/s$. Due to this, the gun is pushed back with a velocity of $1m/s$, then the mass of the gun is :

    A. $1.5kg$

    B. $5.5kg$

    C. $0.5kg$

D. $3.5 kg$

Answer: A

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62. Which of the following pairs does not hace similar dimensions?

A. Tension and surface tension

B. Stress and Pressure

C. Planck's constant and angular

momentum

D. Angle and strin

Answer: A

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63. The escape Velocity from the earth is

$11.2 Km/s$. The escape Velocity from a planet

having twice the radius and the same mean

density as the earth, is :

A. $11.2 Km/s$

B. $22.4 Km/s$

C. $15.00 Km/s$

D. $5.8 Km/s$

Answer: B

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64. A metal ball of mass $2kg$ moving with speed of $36 Km/h$ has a collision with a stationary ball of mass $3kg$. If ater collision,

both the ball move together, the loss in Kinetic energy due to collision is :

A. $80J$

B. $40J$

C. $60J$

D. $160J$

Answer: C

65. The length and breadth of a metal sheet are 3.124m and 3.002m respectively. The area of this sheet upto correct significant figure is

A. $9.378m^2$

B. $9.37m^2$

C. $9.378248m^2$

D. $9.3782m^2$

Answer: A

66. Two equal vector have a resultant equal to either of them, then the angle between them will be:

A. $110°$

B. $120°$

C. $60°$

D. $150°$

Answer: B

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67. A stone tied to a string of $80cm$ long is whireled in a horizontal circle with a constant speed. If the stone makes 25 revolutions in $14s$ then, magnitude of acceleration of the same will be:

   A. $990cm/s^2$

   B. $680cm/s^2$

   C. $750cm/s^2$

   D. $650cm/s^2$

Answer: A

68. The tension in a piano wire is $10N$. The tension ina piano wire to produce a node of double frequency is

A. $20N$

B. $40N$

C. $10N$

D. $120N$

Answer: B

69. Two sound waves have phase difference of $60°$, then they will have the path difference of:

A. 3λ

B. $\dfrac{\lambda}{3}$

C. $\dfrac{\lambda}{6}$

D. λ

Answer: C

70. A string with a frequency n and B string with a frequency $1/8$ that of A. If the energy remains the same and the amplitude of A is a, then amplitude of B will be

A. $2a$

B. $8a$

C. $4a$

D. a

Answer: B

71. The velocity of a bullet is reduce from $200m/s$ to $100m/s$ while travelling through a wodden block of thickness $10cm$ Assuming it to be uniform, the retardation will be

A. $15 \times 10^4 m/s^2$

B. $10 \times 10^4 m/s^2$

C. $12 \times 10^4 m/s^2$

D. $14.5 m/s^2$

Answer: A

---

72. Two projectile are projected with the same velocity. If one is projected at an angle of $30°$ to the horizontal. The ratio if maximum heights reached, is:

A. $1:3$

B. $2:1$

C. $3:1$

D. $:4$

Answer: A

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73. In an adiabatic change, the pressure and temperature of a monoatomic gas are related with relation as $P \propto T^C$, Where C is equal to:

A. $\dfrac{5}{4}$

B. $\dfrac{5}{3}$

C. $\dfrac{5}{2}$

D. $\dfrac{3}{5}$

Answer: C

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74. If in a wire of Young's moduls Y, longitudinal strain X is produced then the

potential energy stored in its unit volume will

be:

A. $0.5YX^2$

B. $0.5Y^2X$

C. $2YX^2$

D. YX^2

Answer: A

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75. A stone tied to a string is rotated with a uniform speed in a vertical plane. If mass of the stone is m, the length of the string is r and linear speed of the stone is v when the stone is at its lowest point, then the tension in the string will be

(g= acceleration due to gravity)

A. $\dfrac{mv^2}{r} + mg$

B. $\dfrac{mv^2}{r} - mg$

C. $\dfrac{mv}{r}$

D. mg

Answer: A

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76. A black body is heated from $27°C$ to $127°C$. The ratio of their energies of radiation emitted will be

A. $9:16$

B. $27:64$

C. $81:256$

D. $3:4$

Answer: C

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77. A spherical drop of water has $1mm$ radius. If the surface tension of water is 70×10^{-3} N//m, then the difference of pressure between inside and outside of the spherical drop is:

A. $140N/m^2$

B. $14N/m^2$

C. $35N/M^2$

D. None of the above

Answer: A

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78. A body A starts from rest with an acceleration a_1. After 2 seconds, another body B starts from rest with an acceleration a_2. If

they travel equal distances in the 5th second, after the start of A, then the ratio $a_1 : a_2$ is equal to :

A. $9 : 5$

B. $5 : 7$

C. $5 : 9$

D. $7 : 9$

Answer: C

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79. In a sinusoidal wave the time required for a particular point to moce from equilibrium pasition to maximum diaplacement is $0.17s$, then the frequency of wave is:

A. $1.47Hz$

B. $0.36Hz$

C. $2.94Hz$

D. $2.48Hz$

Answer: A

80. The velocity with which a projectile must be fired so that is escapes earth's gravitation does not depend on:
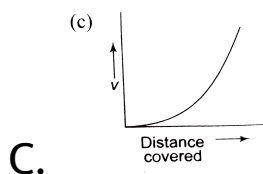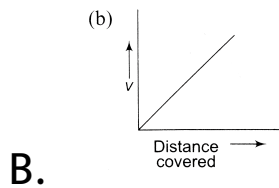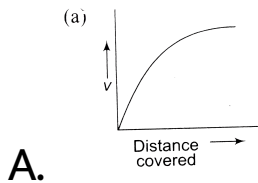
  A. mass of the earth

  B. mass of the projectile

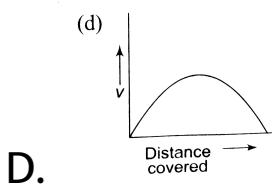 C. radius of the projectile

  D. gravitational constant

Answer: B

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81. A lead shot of a 1mm diameter falls through a long column of glycerine.The variation of its velocity v with distance coverd is represented by,

A.

(a)

Distance covered

B.

(b)

Distance covered

C.

(c)

Distance covered

Distance covered

D.

Answer: A

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82. The pressure on a square plate is measured by measuring the force on the plate and the length of the sides of the plate by using the formula $p = \dfrac{F}{l^2}$. If the maximum errors in the measurment of force and length are 4% and 2% respectively. Then the

maximum error in the measurment of pressure is

A. 1 %

B. 2 %

C. 8 %

D. 10 %

Answer: C

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83. A block has been placed on an inclined plane with the slope angle θ. Block slide down the plane at constant speed. The cofficient of Kinetic friction is equal to

    A. $\sin\theta$

    B. $\cos\theta$

    C. g

    D. $\tan\theta$

Answer: D

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84. A particle moves along a curve of unknown shape but magnitude of force F is constant and always acts along tangent to the curve.Then

A. F may be conservative

B. F must be conservative

C. F may be non conservative

D. F must be non-conservative

Answer: D

85. A rod of length L is hinged from one end. It is brought to a horizontal position and released. The angular velocity of the rod, When it is in verticle position is

A. $\sqrt{\dfrac{2g}{L}}$

B. $\sqrt{\dfrac{3g}{L}}$

C. $\sqrt{\dfrac{g}{2L}}$

D. $\sqrt{\dfrac{g}{L}}$

Answer: B

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86. Assertion: A ladder is more apt to slip, when you are high up on it than when you just begin to climb.

Reason: At the high up on the ladder, the torque is large and on climbing up the torque is small.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both aseertion and reason are false.

Answer: A

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87. Assertion: Water in a U-tube executes SHM, the time period for mercury filled up to the same height in the U-tube be greater then that in case of water.

Reason:The amplitude of an oscilliating pendulum goes on increasing.

    A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but

reason is not the correct explanation of

assertion

C. If assertion is true but reason is false.

D. If both aseertion and reason are false.

Answer: D

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88. Assertion: In taking into account the fact that any object which floats must have an average density less than that of water, during World war I, a number of cargo vessels are made of concrete.

Reason : Conctere cargo Vessel were filled with air.

   A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both aseertion and reason are false.

Answer: A

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89. Assertion: The acceleration of a body down a rough inclined plane is grater than the acceleration due to gravity.

Reason: The body is able to slide on an inclined plane only when its acceleration is greater than acceleration due to gravity.

   A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both aseertion and reason are false.

Answer: D

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90. Assertion: The temperature of the surface of the sun is approximately $6000K$. If we take a big lens and focus the sun rays, we can produce a temperature at $8000K$

Reason: This highest temperature can be produced according to second law of thermodynamics.

    A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both aseertion and reason are false.

Answer: D

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General Kinematics

1. A string is stretched between fixed points separated by 75.0cm. It is observed to have resonant frequencies of 420Hz and 315Hz. There are no other resonant frequencies between these two. Then, the lowest resonant frequency for this string is

A. 105 Hz

B. 1.05 Hz

C. 1050 Hz

D. 10.5 Hz

Answer: A

2. If the terminal speed of a sphere of gold (density $= 19.5kg/m^3$) is $0.2m/s$ in a viscous liquid (density $= 1.5kg/m^3$), find the terminal speed of a sphere of silver (density $= 10.5kg/m^3$) of the same size in the same liquid

A. $0.4m/s$

B. $0.133 m/s$

C. $0.1 m/s$

D. $0.2 m/s$

Answer: C

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3. A coin is placed on a horizontal platform which undergoes vertical simple harmonic motion of angular frequency ω. The amplitude of oscillation is gradually increased. The coin

will leave contact with the platform for the first time

A. at time mean position of the platform

B. for an amplitude of g/ω^2

C. for an amplitude of g^2/ω^2

D. at the highest position of the platform

Answer: B

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4. Four point masses, each of value m, are placed at the corners of a square ABCD of side l. The moment of inertia of the is system about an axis passing through A and parallel to BD is

A. $2ml^2$

B. $\sqrt{3}ml^2$

C. $3ml^2$

D. ml^2

Answer: C

5. Two rigid boxes containing different ideal gases are placed on a table. Box A contains one mole of nitrogen at temperature T_0, while Box contains one mole of helium at temperature $\left(\dfrac{7}{3}\right)T_0$. The boxes are then put into thermal contact with each other, and heat flows between them until the gasses reach a common final temperature (ignore the heat capacity of boxes). Then, the final temperature of the gasses, T_f in terms of T_0 is

A. $T_f = \dfrac{3}{7}T_0$

B. $T_f = \dfrac{7}{3}T_0$

C. $T_f = \dfrac{3}{2}T_0$

D. $T_f = \dfrac{5}{2}T_0$

Answer: C

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6. For the given uniform square lamina ABCD, whose centre is O,
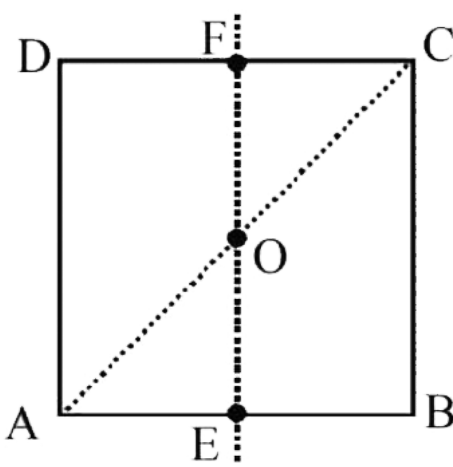
A. $\sqrt{2}I_{AC} = I_{EF}$

B. $I_{AD} = 3I_{EF}$

C. $I_{AC} = I_{EF}$

D. $I_{AC} = \sqrt{2}I_{EF}$

Answer: C

7. A particle of mass 10g is kept on the surface of a uniform sphere of masss 100kg and radius 10cm. Find the work to be done against the gravitational force between them to take the particel far away from the sphere (you may take $G = 6.67 \times 10^{-11} N \dfrac{m^2}{k} g^2$)

A. $13.34 \times 10^{-10} J$

B. $3.33 \times 10^{-10} J$

C. $6.67 \times 10^{-9} J$

D. $6.67 \times 10^{-10} J$

Answer: D

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8. A projectile can have the same range 'R' for two angles of projection . If $'T_1'$ and $'T_2'$ to be times of flights in the two cases, then the product of the two times of flights is directly proportional to .

A. R^2

B. $\dfrac{1}{R^2}$

C. $\dfrac{1}{R}$

D. R

Answer: D

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9. A parachutist after bailing out falls 50m without friction. When parachute opens, it decelerates at $2m/s^2$. He reaches the ground

with a speed of $3m/s$. At what height, did the bail out?

    A. 91 m

    B. 182 m

    C. 293 m

    D. 111 m

Answer: C

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10. The function $\sin^2(\omega t)$ represents:

A. a periodic but one simple harmonic motion with a period $2\pi/\omega$

B. a periodic but not simple harmonic motion with a period π/ω

C. a simple harmonic motion with a period $2\pi/\omega$

D. a simple harmonic motion with a period π/ω

11. A vertical spring with force constant k is fixed on a table. A ball of mass m at a height h above the free upper end of the spring falls vertically on the spring , so that the spring is compressed by a distance d. The net work done in the process is

A. $mg(h + d) + \dfrac{1}{2}kd^2$

B. $mg(h + d) - \dfrac{1}{2}kd^2$

C. $mg(h - d) - \dfrac{1}{2}kd^2$

D. $mg(h - d) + \dfrac{1}{2}kd^2$

Answer: B

12. A car travles 6km towards north at an angle of $45°$ to the east and then travles distance of 4km towards north at an angle of $135°$ to east (figure). How far is the point from the starting

point? What angle does the straight line

joining its initial and final position makes with

the east?
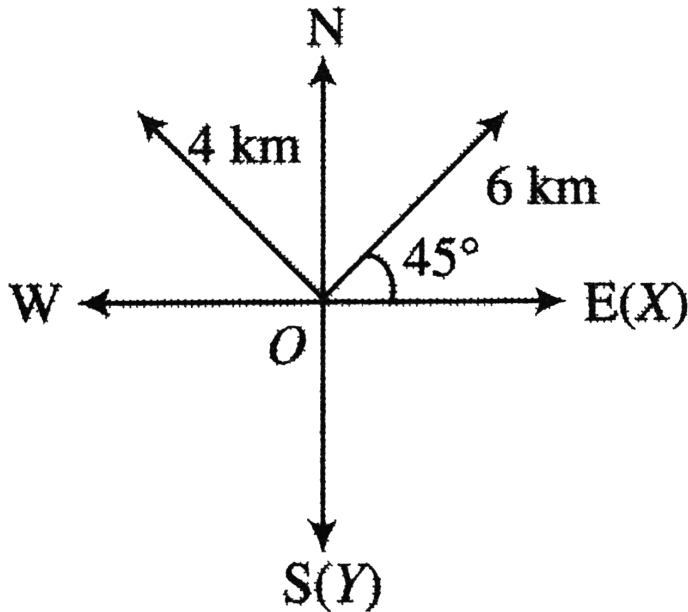
A. $\sqrt{50}km$ and $\tan^{-1}(5)$

B. $10km$ and $\tan^{-1}(\sqrt{5})$

C. $\sqrt{52}km$ and $\tan^{-1}(5)$

D. $\sqrt{5}km$ and $\tan^{-1}(\sqrt{5})$

Answer: C

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13. The speed of light (c), gravitational constant (G) and plank's constant (h) are taken as fundamental units in a system. The dimensions of time in this new system should be.

A. $G^{1/2}h^{1/2}c^{1/2}$

B. $G^{1/2}h^{1/2}c^{1/2}$

C. $G^{1/2}h^{1/2}c^{-3/2}$

D. $G^{1/2}h^{1/2}c^{1/2}$

Answer: A

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14. Two bodies of mass m_1 and m_2 are initially at rest placed infinite distance apart. They are then allowed to move towards each

other under mutual gravitational attaction. Show that their relative velocity of approach at separation r betweeen them is

$$v = \frac{\sqrt{2G(m_1 + m_2)}}{r}$$

A. $\left[2G\frac{(m_1 - m_2)}{r}\right]^{1/2}$

B. $\left[\frac{2G}{r}(m_1 - m_2)\right]^{1/2}$

C. $\left[\frac{r}{2G(m_1 m_2)}\right]^{1/2}$

D. $\left[\frac{2G}{r}m_1 m_2\right]^{1/2}$

Answer: B

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15. The adjacent graph shows the estension (Δl) of a wire of length 1m suspended from the top of a roof at one end and with a load W connected to the other end. If the cross-sectional area of the wire is $10^{-6}m^2$, calculate the Young's modulus of the material of the wire.

$\Delta l (\times 10^{-4} m)$

W (N)
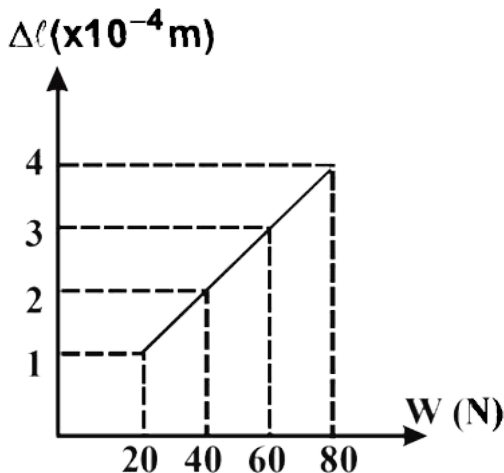
A. $2 \times 10^{11} N/m^2$

B. $2 \times 10^{-11} N/m^2$

C. $3 \times 10^{-12} N/m^2$

D. $2 \times 10^{-13} N/m^2$

Answer: A

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16. What is filled in a cylindrical container to a height of $3m$. The ratio of the cross-sectional area of the orifice and the beaker is 0.1. The

square of the speed of the liquid coming out from the orifice is $\left(g = 10m/s^2\right)$.

A. $50m^2/s^2$

B. $50.5m^2/s^2$

C. $51m^2/s^2$

D. $52m^2/s^2$

Answer: A

17. A particle of mass (m) is executing oscillations about the origin on the (x) axis. Its potential energy is $V(x) = k|x|^3$ where (k) is a positive constant. If the amplitude of oscillation is a, then its time period (T) is.

A. alphaortional to $\dfrac{1}{\sqrt{a}}$

B. independent of a

C. alphaortional to $\sqrt{a}$

D. alphaortional to $a^{3/2}$

Answer: A

18. A person speaking normally produces a sound intensity of $40dB$ at a distance of $1m$. If the threshold intensity for reasonable audibility is $20dB$, the maximum distance at which he can be heard cleary is.

A. 4 m

B. 5 m

C. 10 m

D. 20 m

Answer: C

19. v_{rms}, v_{av} and v_{mp} are root mean square average and most probable speeds of molecules of a gas obeying Maxwellian velocity distribution. Which of the following statements is correct ?

A. $v_{rms} < v_{av} < v_{mp}$

B. $v_{rms} > v_{av} > v_{mp}$

C. $v_{mp} < v_{rms} < v_{av}$

D. $v_{mp} > v_{rms} > v_{av}$

Answer: B

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20. N moles of a monoatomic gas is carried round the reversible rectangular cycle $ABCDA$ as shown in the diagram. The temperature at A is T_0

The thermodynamic efficiency of the cycle is :

A. 15 %

B. 50 %

C. 20 %

D. 25 %
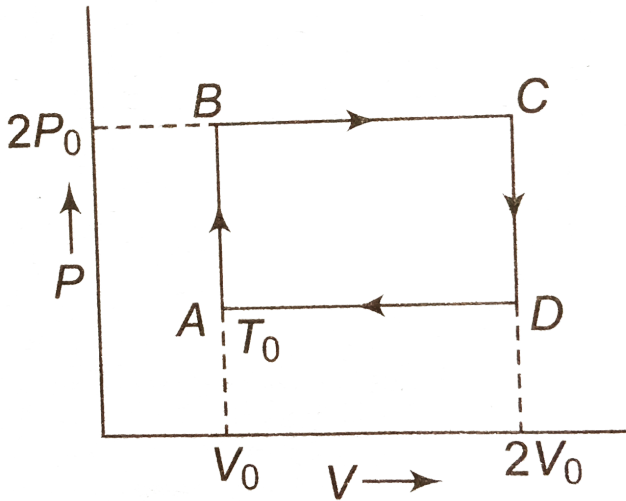
21. An organ pipe is closed at one end has fundamental frequency of 1500 Hz. The maximum number of overtones generated by this pipe which a normal person can hear is

A. 4

B. 13

C. 6

D. 9

Answer: C

22. A bomb of mass $3.0kg$ explodes in air into two pieces of masses $2.0kg$ and $1.0kg$. The smaller mass goes at a speed of $80m/s$. The total energy impared to the two fragments is :

A. 1.07 kJ

B. 2.14 kJ

C. 2.4 kJ

D. 4.8 kJ

Answer: D

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23. Suppose the sun expands so that its radius

becomes 100 times its present radius and its

surface temperature becomes half of its

present value. The total energy emited by it then will increase by a factor of :

A. 10^4

B. 625

C. 256

D. 16

Answer: B

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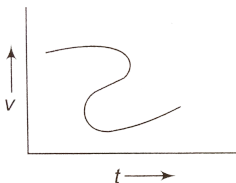**24.** The temperature (T) dependence of resistivity (rho) of a semiconductor is represented by :
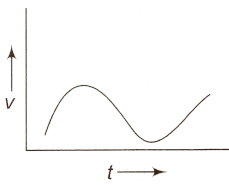
A.

B.

C.

D.
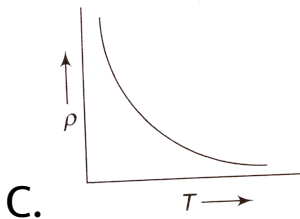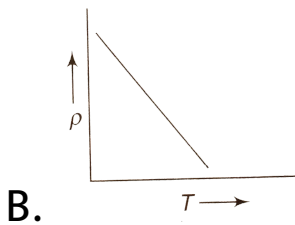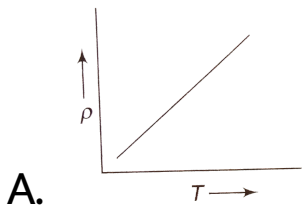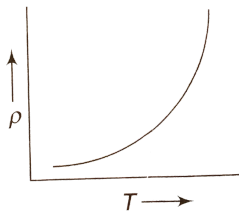
Answer: B

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25. Which of the following velocity-time graphs shows a realistic situation for a body in motion ?
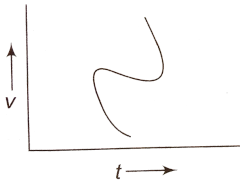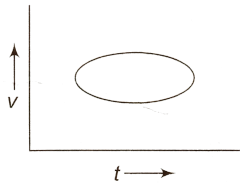

A.

B.

C.

D.

Answer: B

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26. In an orbital motion, the angular momentum vector is :

A. along the radius vector

B. parallel to the linear momentum

C. in the orbital plane

D. perpendicular to the orbital plane

Answer: D

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27. A sphere of mass M and radius R is falling in a viscous fluid. The terminal velocity attained by the falling object will be alphaortional to :
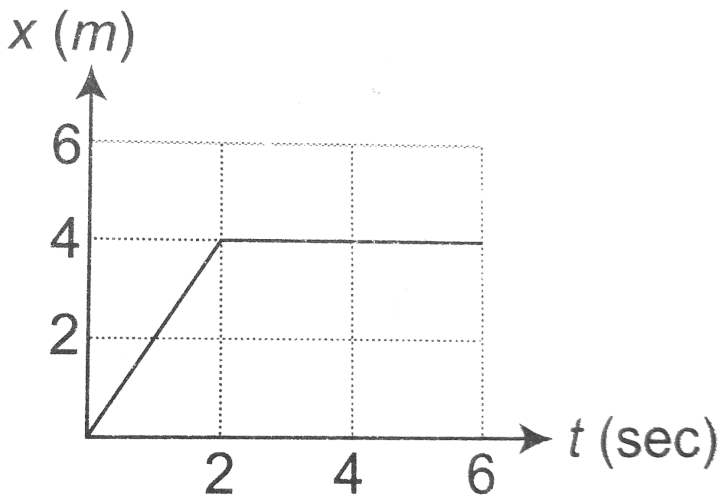
A. R^2

B. R

C. $1/R$

D. $1/R^2$

Answer: A

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28. In the figure given below, the position-time graph of a particle of mass $0.1kg$ is shown. The impuslse at $t = 2$ sec is

A. $0.2kgms^{-1}$

B. $-0.2kgms^{-1}$

C. $0.1 kgms^{-1}$

D. $-0.4 kgms^{-1}$

Answer: A

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29. A bolck of mass $10kg$ is moving in x-direction with a constant speed of $10m/s$. it is subjected to a retardeng force $F = -0.1xJ/m$. During its travel from

$x = 20m$ to $x = 30m$. Its final kinetic energy will be .

A. 475 J

B. 450 J

C. 275 J

D. 250 J

Answer: A

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30. Which of the following functionss represents a simple harmonic oscillation ?

A. $\sin \omega t - \cos \omega t$

B. $\sin^2 \omega t$

C. $\sin \omega t + \sin 2\omega t$
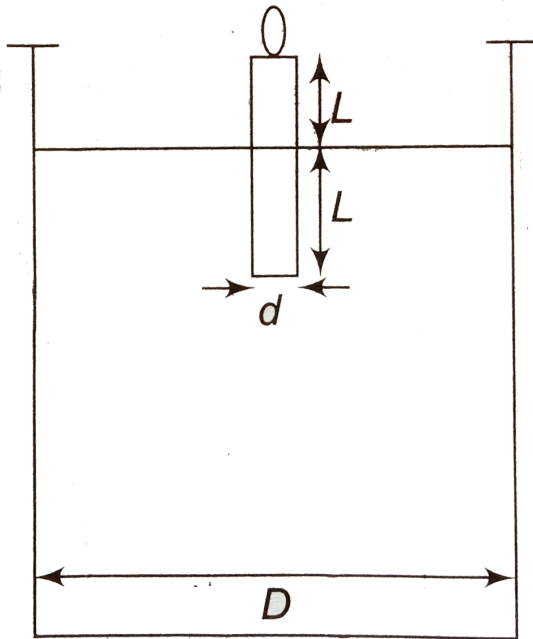
D. $\sin \omega t - \sin 2\omega t$

Answer: A

1. A candle of diameter d is floating on a liquid in a cylindrical container of diameter $D(D < < d)$ as shown in figure. If is burning at the rate of $2cm/h$ then the top of the

candle will :

A. remain at the same height

B. fall at the rate of $1cm/h$
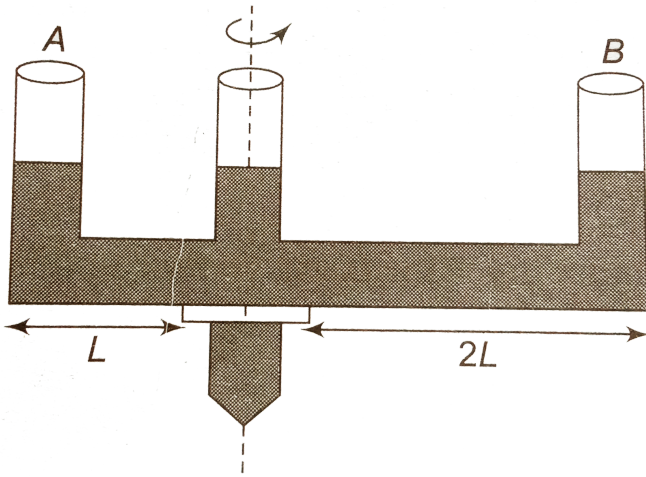
C. fall at the rate of $2cm/h$

D. go up at the rate of $1cm/h$

Answer: B

2. A given shaped glass tube having uniform cross-section is filled with water and is mounted on a rotatable shaft as shown in figure. If the tube is rotated with a constant

angular velocity ω then :

A. water levels in both sections A and B go

up

B. water level in section A goes up and

that in B comes down

C. water level in section A comes down and

that in B it goes up

D. water level remain same in both sections

Answer: A

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3. When a ball is thrown up vertically with

velocity v_0, it reaches a maximum height of h.

If one wishes to triple the maximum height

then the ball should be thrown with velocity
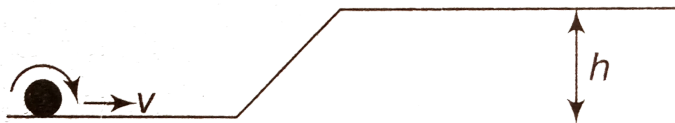
A. $\sqrt{3}v_0$

B. $3v_0$

C. $9v_0$

D. $3/2v_0$

Answer: A

4. A solid sphere is rolling on a frictionless surface, shown in figure with a translational velocity vm/s. If is to climb the inclind surface

then v should be :

A. (1) $\geq \sqrt{\dfrac{10}{7}gh}$

B. $\geq \sqrt{2gh}$

C. $2gh$

D. $\dfrac{10}{7}gh$

Answer: A

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5. A horizontal platform is rotating with uniform angular velcity around the vertical axis passing through its centre. At some instant of time a viscous fluid of mass m is dropped at the centre and is allowed to spread out and finally fall. The angular velocity during this period :

A. decrease continuously

B. decreases initially and increases again
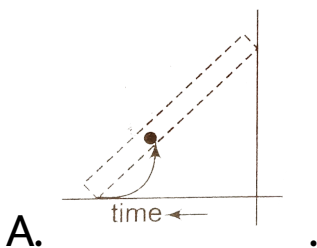
C. remains unaltered
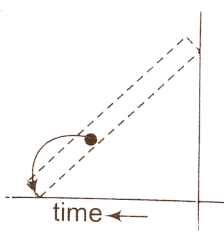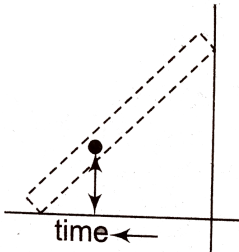
D. increases continuously

Answer: B

6. A ladder is leaned against a smooth wall and it is allowed to slip on a frictionless floor. Which figure represents the track of its centre of mass ?

A. .

B. .

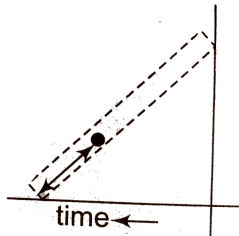C. .

D. .

Answer: C

7. A person is standing in an elevator. In which situation he finds his weight less ?

A. When the elevator moves upward with constant acceleration

B. When the elevator moves downward with constant acceleration

C. When the elevator moves upward with uniform velocity

D. When the elevator moves downward with uniform velocity.

Answer: B

8. A particle having change q and m is projected with velocity $\vec{v} = 2\hat{i} - 3\hat{j}$ in uniform electric field $\vec{E} = E_0 . \hat{j}$ change in momentum $\left| \Delta \vec{p} \right|$ during any time interval t is given by :

A. $\sqrt{13}M$

B. $qE_0 t$

C. $\dfrac{qE_0t}{m}$

D. zero

Answer: B

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9. The velocity of a particle moving in the $x - y$ plane is given by $\dfrac{dx}{dt} = 8\pi \sin 2\pi t$ and $\dfrac{dy}{dt} = 5\pi \sin 2\pi t$ where, $t = 0$, $x = 8$ and $y = 0$, the path of the particle is.

A. a straight line

B. an ellipse

C. a circle

D. a parabola

Answer: B

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10. A ball is droped from a high rise platform $t = 0$ starting from rest. After $6s$ another ball is thrown downwards from the same platform

with a speed v. The two balls meet at $t = 18s$.

What is the value of v ?

A. $74m/s$

B. $64m/s$

C. $84m/s$

D. $94m/s$

Answer: A

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11. Assertion: The error in the measurement of radius of sphere is 0.3%. The permissible error in its surface area is 0.6%.

Reason: The permissible error is calculated by the formula $\dfrac{\Delta A}{A} = \dfrac{4\Delta r}{r}$.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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12. Assertion: The isothermal curves intersect

each other at a certain point.

Reason: The isothermal changes takes place

rapidly, so the isothermal curves have very little slope.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

13. Assertion: The velocity of a body at the bottom of an inclind plane of given height is more when is slides down the plane, compared to, when it rolling down the same plane.

Reason: In rolling down a body acquires both, kinetic energy of translation and rotation.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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14. Assertion: A body of mass $1kg$ is making $1rps$ in a circle of radius $1m$. Centrifugal force acting on it is $4\pi^2 N$.

Reason: Centrifugal force is given by $F = \dfrac{mv^2}{r}$.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but

reason is not the correct explanation of

assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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15. Assertion: The change in air pressure effects the speed of sound.

Reason: The speed of sound in gases is alphaortional to the square of pressure.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

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