PHYSICS

BOOKS - SARAS PUBLICATION

BULK MATTER

Example

1. A black body is at $727^\circ C$ It emits energy at a rate which is proportional to :

A. $(727)^4$

B. $(727)^2$

C. $(1000)^4$

D. $(1000)^2$

Answer:

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2. The radioactive materials X_1 and X_2 have decay constants 5λ and λ respectively. If intially they have the same number of nuclei,

then the ratio of number of nuclei of X_1 to that of X_2 will be $\dfrac{1}{e}$

A. λ

B. $\dfrac{1}{2}\lambda$

C. $\dfrac{1}{4\lambda}$

D. $\dfrac{e}{\lambda}$

Answer:

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3. On a new scale of temperature (which is linear) and caller the W scale , the freezing and boiling points of water are $39°$ W and $239°$ W respectively . What will be the temperature on the new scale , corresponding to a temperature of $39°C$ on the celsius scale?

    A. $78°W$

    B. $117°W$

    C. $200°W$

    D. $139°W$

Answer:

4. Two nuclei have their mass numbers in the ratio of $1:3$ The ratio of their nuclear densities would be :

    A. $1:3$

    B. $3:1$

    C. $(3)\dfrac{1}{3}:1$

    D. $1:1$

Answer:

5. Curie temperature is the temperature above which

- A. Ferromagnetic material becomes diamagnetic material

- B. Ferromagnetic material becomes paramagnetic material

C. Paramagnetic   material   becomes

diamagnetic material

D. Paramagnetic   material   becomes

ferromagnetic material

Answer:

6. Which two of the following five physical

paramertes have the same dimensions?

a)energy density, b)refractive index, c)dielectric

constant , d)Young 's modulus, e)magnetic field,

A. (b) and (d)

B. (c)and(e)

C. (a) and (d)

D. (a) and (e)

Answer:

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7. A long solenoid has 500 turns.When a current of 2 ampere is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb. The self inductance of the solenoid is :

A. $2.5 henry$

B. $2.0 henry$

C. $1.0 henry$

D. $4.0 henry$

Answer:

8. A body under the action of a force $F = 6\hat{i} - 8\hat{j} + 10\hat{k}$, acquires an acceleration of $1m/s^2$. The mass of this body must be :

A. $10kg$

B. $20kg$

C. $10\sqrt{2}kg$

D. $2\sqrt{2}kg$

Answer:

9. Which one of the following is a network solid ?

    A. metallic bonding

    B. Van der Waal's bonding

    C. ionic bonding

    D. covalent bonding

Answer:

10. In an isothermal reversible compression of an ideal gas the sign of $q, \Delta S$ and w are respectively

    A. 150 J of heat has been removed from the gas

    B. 150 J of heat has been added to the gas

    C. 300 J of heat has been added to the gas

D. No heat is transferred because the

process is isothermal

Answer:

11. A 200W sodium street lamp emits yellow ligth of wave length $0.6\mu m$. Assuming it to be 25% efficient in converting electrical energy to light the number of photons of yellow ligth it emits per second is a

A. 6×10^8

B. 62×10^{20}

C. 3×10^{19}

D. 1.5×10^{20}
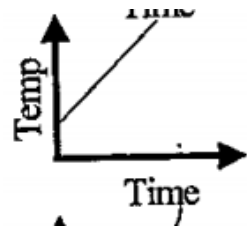
Answer:

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12. Liquid oxygen at 50K is heated to 300 K at constant pressure of 1 atm . The rate of heating is constant. Which one of the

following graphs represents the varitation of
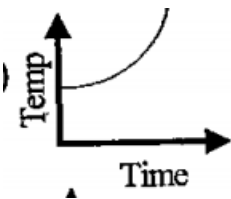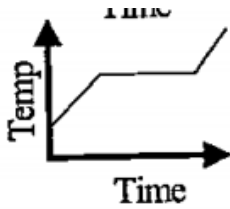
temperature with time ?

A.
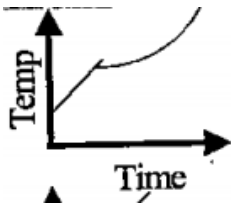
B.

C.

D.

Answer:

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13. A car of mass 1000 kg negotiates a banked curve of radius 90 m on a frictionless road . If the banking angle is $45°$, the speed of car is :

A. $30 ms^{-1}$

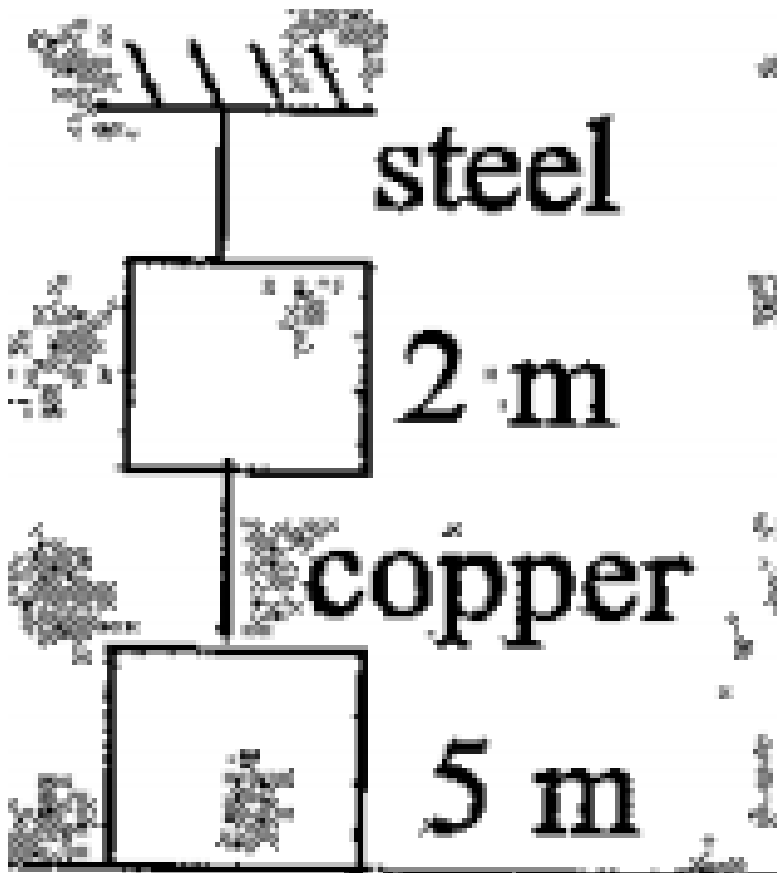B. $5 ms^{-1}$

C. $10 ms^{-1}$

D. $20 ms^{-1}$

Answer:

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14. If the ratio of diameters,lengths and Young's modulus of steel and copper wires shown in the figure are p,q and s respectively

then the corresponding ratio of increase in

their lengths would be

steel

2 m

copper

5 m

A. $\dfrac{7q}{(5sp)}$

B. $\dfrac{5q}{(7sp^2)}$

C. $\dfrac{7q}{(5sp^2)}$

D. $\dfrac{2q}{5sp}$

Answer:

15. The density of water at $20°$ is$998kg/m^3$ and at $40°$ 992kg//m^3` The coefficient of volume expansion of water is

A. $10^{-4}/°C$

B. $3 \times 10^{-4} /^{\circ} C$

C. $2 \times 10^{-4} /^{\circ} C$

D. $6 \times 10^{-4} /^{\circ} C$

Answer:

16. Two metal rods 1and 2 of same lengths have same temperature difference between their ends . Their thermal conductivities and K_1 and K_2 and cross sectional areas $A_1$and

A_2 respectively .If the rate of heat conduction

in 1 is four times that in 2, then

A. $K_1 A_1 = K_2 A_2$

B. $K_1 A_1 = 4 K_2 A_2$

C. $K_1 A_1 = 2 K_2 A_2$

D. $4 K_1 A_1 = K_2 A_2$

Answer:

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17. In a vessel, the gas is at a pressure P.If the mass of all the molecules is halved and their speed is doubled ,then the resultant pressure will be

   A. 4P

   B. 2P

   C. P

   D. $P/2$

Answer:

18. The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied ?

A. Length = 50 cm, diameter= 0.5 mm

B. Length = 100 cm, diameter=1mm

C. Length - 200 cm, diameter= 2 mm

D. Length = 300 cm, diameter= 3 mm

Answer:

19. The wettability of a surface by a liquid depends primarily on

    A. Viscosity

    B. Surface tension

    C. Density

D. Angle of contact between the surface and the liquid

Answer:

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20. A piece of iron is heated in a flame . It first becomes dull red then becomes reddish yellow and finally turns to white hot. The correct explanation for the above observation is possible by using.

A. Stefan's Law

B. Wien's displacement Law

C. Kirchoff's Law

D. Newton's Law of cooling

Answer:

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21. The amount of heat energy required to raise the temperature of 1g of helium at NTP, from $T_1K \rightarrow T_2K$ is

A. $\dfrac{3}{8} N_a K_B (T_2 - T_1)$

B. $\dfrac{3}{2} N_a K_B (T_2 T_1)$

C. $\dfrac{3}{4} N_a K_B (T_2 T_1)$

D. $\dfrac{3}{4} N_a K_B \left[\dfrac{T_2}{T_1} \right]$

Answer:

22. A black hole is an object whose gravitational field is so strong that even light cannot escape from it. To what approximate

radius would Earth (mass $= 5.98 \times 10^{24} kg$)

have to be compressed to be a black hole?

A. $10^{-9}m$

B. $10^{-6}m$

C. $10^{-2}m$

D. 100m

Answer:

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23. Steam at $100°$ C is passed.into 20 g of water at $10°C$ Whenwater acquires a temperature of $80°C$ the mass of water present will be :[take specific heat of $steam = 1calg^{-1}$ ^ $\circ C^{-1}$and latent of $water = 540calg^{-1}$]

A. 24g

B. 31.5g

C. 42.5g

D. 22.5g

Answer:

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24. Certain quantity of water,cools from $70°C$ to $60°C$ in the first 5 minutes! and to$54°C$ in the next 5 minutes. The temperature of the surrounding is

    A. $45°C$
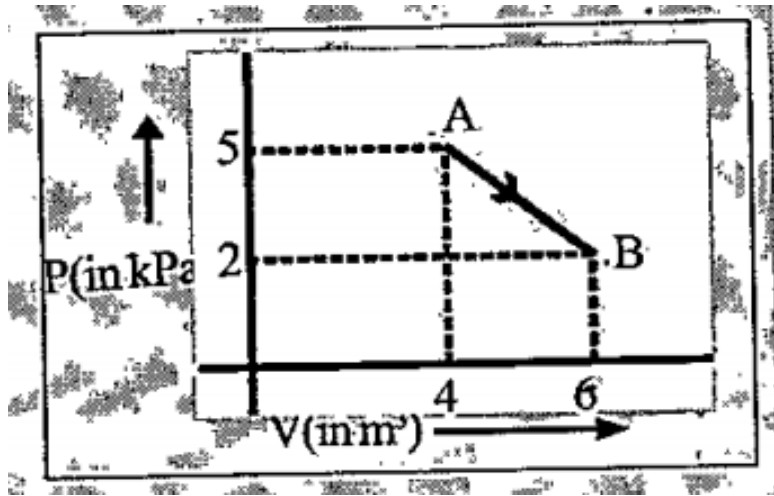
    B. $20°C$

    C. $42°C$

D. $10°C$

Answer:

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25. One mole of an ideal diatomice gas undergoes a transition from AtoB along a path AB as shown in the figure,The change in the internal energy of the gas during the

tranition is :

A. $-20KJ$

B. $20J$

C. $-12KJ$

D. $20KJ$

Answer:

26. The ratio of the specific heats $\dfrac{C_p}{C_v} = \gamma$ in terms of degrees of freedom (n) is given by:

A. $\left[1 + \dfrac{n}{3}\right]$

B. $\left[1 + \dfrac{2}{n}\right]$

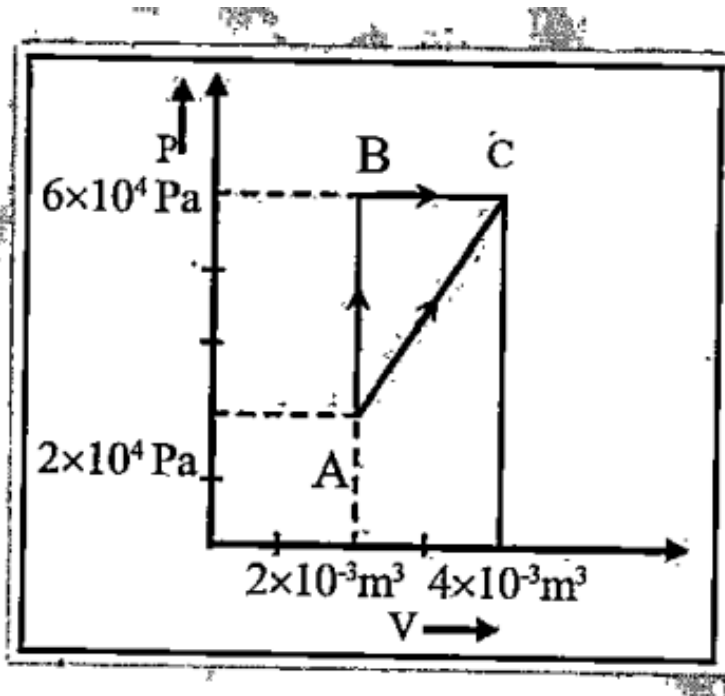C. $\left[1 + \dfrac{n}{2}\right]$

D. $\left[1 + \dfrac{1}{n}\right]$

Answer:

27. Figures below shows two paths that may be taken by a gas to go from a state A to a state C. In process AB , 400J of heat is added to the system an in process ? BC ,100J of heat is added to the system . The heat absorbed by

the system in the process AC will be :

A. 500J

B. 460J

C. 300J

D. 380J

Answer:

28. The two ends of metal rod are maintained at temperatures $100°C$ and $110°C$. The rate of heat flow in the rod is found to be $4.0J/S$ .If the end are maintained at temperatures $200°C$ and $210°C$, the rate of heat flow will be.

A. $16.8J/S$

B. $8.0J/S$

C. $4.0J/S$

D. $44.0.\ J/S$

Answer:

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29. The young's modulus of steel is twice that of brass . Two wires of same length and of same area of cross section, one of steel and another of brass are suspended from the

same roof .If we want the lower ends of the wires to be at the same level, then the weigths added to the steel and brass wires must be in the ratio of :

A. $1:1$

B. $1:2$

C. $2:1$

D. $4:1$

Answer:

30. Light of wavelength 500 nm is incident on a metal with work function 2.28 eV. The de Broglie wavelength of the emitted electron is :

A. $\leq 2.8 \times 10^{-12} m$

B. $< 2.8 \times 10^{-10} m$

C. $< 2.8 \times 10^{-9} m$

D. $\geq 2.8 \times 10^{-9} m$

Answer:

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31. If dimensions of critical velocity of a liquid v_c flowing through a tube are expressed as $[\eta^x \rho^y r^z]$, where η, ρ and r are the coefficient of viscosity of liquid, density of liquid and radius of the tube respectively, then the values of x, y and z are given by :

A. 1,1,1

B. 1,-1,-1

C. $-1, -1, 1$

D. $-1, -1, -1$

Answer:

32. A bullet of mass 10g moving horizontally with a velocity of $400ms^{-1}$ strikes a wooden block of mass 2kg which is suspended by a light inextensible string of length 5m .As a result , the centre of gravity of the block is found to rise a vertical distance of 10 cm . The speed of the bullet after it emerges out horizontally from thr block will be

A. $120ms^{-1}$

B. $160ms^{-1}$

C. $100ms^{-1}$

D. $80ms^{-1}$

Answer:

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33. A rectangular film of liquid is extended from $(4cm \times 2cm)$to$(5cm \times 4cm)$.If the work

done is 3×10^{-4}J, the value of the surface tension of the liquid is :

A. $0.2Nm^{-1}$

B. $8.0Nm^{-1}$

C. $0.250Nm^{-1}$

D. $0.125Nm^{-1}$

Answer:

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34. Three liquids of densities $\rho_1 \rho_2$ and ρ_3 (with $\rho_1 > \rho_2 > \rho_3$), having the same value of surface tension T, rise to the same height in three identical capillaries.The angles of contact θ_1 θ_2 andθ_3 obey

A. $\dfrac{\pi}{2} < \theta_1 < \theta_2 < \theta_3 < \pi$

B. $\pi > \theta_1 > \theta_2 > \theta_3 > \dfrac{\pi}{2}$

C. $\dfrac{\pi}{2} > \theta_1 > \theta_2 > \theta_3 \geq 0$

D. $0 \leq \theta_1 < \theta_2 < \theta_3 < \dfrac{\pi}{2}$

Answer:

35. Two identical bodies are made of a material for which the heat capacity increases with temperature.One of these is at $100°C$,while the other one is at 0^C.If the two bodies are brought into contact, then assuming no heat loss .the final common temperature is

    A. less then $50°C$ but greater than $0°C$

    B. $0°C$

    C. $50°C$

D. more than $50° C$

Answer:

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36. Coefficient of linear expansion of brass and steel rods are σ_1 and σ_2 length of brass and steel rods are l_1 & l_2 if $(l_2 - l_1)$ is maintained same at all temperature which one of the following relation hold good ?

A. $\alpha_1 l_1 = \alpha_2 l_2$

B. $\alpha_1 l_2 = \alpha_2 l_1$

C. $\alpha_1 l_2^2 = \alpha_2 l_1^2$

D. $\alpha_1^2 l_2 = \alpha_2^2 l_1$

Answer:

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37. A piece of ice falls from a height h so that it melts completely .Only one-quarter of the heat produced is absorbed by the ice and all energy of ice get converted into heat during its

fall.The value of h is [Latent heat of ice is

$3.4 \times 10^5 J/K$ and $g = 10N/Kg$]

A. 68km

B. 34km

C. 544km

D. 136km

Answer:

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38. A black body is at temperature of 5760 K.The energy of radiation emitted by the body at wavelength 250 nm is U_1 at wavelength 500nm is U_2 and that at 1000 nm is U_3.Wien 's constant, $b = 2.88 \times 10_6 nmk$. Which of the following is correct?
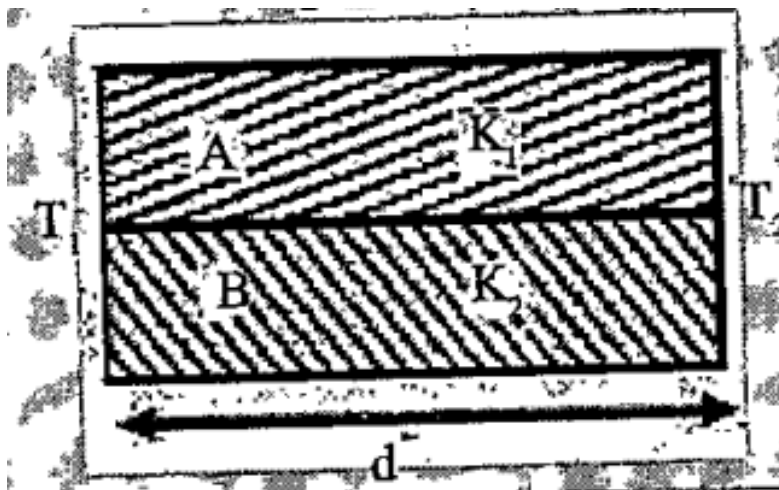
A. $U_2 > U_1$

B. $U_1 = 0$

C. $U_3 = 0$

D. $U_1 > U_2$

Answer:

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39. Two rods Aand B of different material are welded together as shown in figure . Their thermal conductivity of the composite rod will be:

A. $\dfrac{3(k_1 + k_2)}{2}$

B. $k_1 + k_2$

C. $2(k_1 + k_2)$

D. $\dfrac{(k_1 + k_2)}{2}$

Answer:

40. Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8^(th) bright fringe in

the medium lies where 5th dark fringe lies in air .The refractive index of the medium is nearly:

A. 1.59

B. 1.69

C. 1.78

D. 1.25

Answer:

41. A spherical black body with a radius of 12 cm radiates 450 watt power at 500K.If the radius were halved and the temperature doubled , the power radiated in watt would be :

A. 450

B. 1000

C. 1800

D. 225

Answer:

42. The bulk modulus of a spherical object is 'B' , If it is subjected to uniform pressure 'P' the fractional decrease in radius is :

A. $\dfrac{B}{3p}$

B. $\dfrac{3p}{B}$
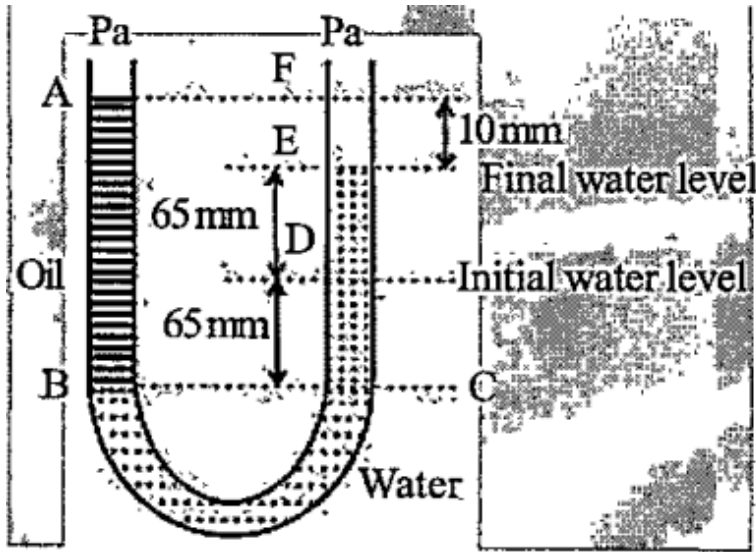
C. $\dfrac{p}{3B}$

D. $\dfrac{p}{B}$

Answer:

43. A U tube will both ends open to the atmosphere, is partially filled with water .Oil which is immiscible with water ,is poured into one side until it stands at va distance of 10mm above the water level on the other side .Mean while the water rises by 65 mm from its original level (see diagram).The density of the

oil is :

A. $425 Kgm^{-3}$

B. $800 Kgm^{-3}$

C. $928 Kgm^{-3}$

D. $650 Kgm^{-3}$

Answer: