



PHYSICS

BOOKS - SARAS PUBLICATION

THERMODYNAMICS

Example

1. If the cold junction of a thermocouple is kept at $0^{\circ}C$ and the hot junction is kept at $T^{\circ}C$ then the relation between neutral

temperature (T_n) and temperature of inversion (T_i) is :

A. $T_n = T_i + T$

B. $T_n = T_i / 2$

C. $T_n = 2T_i$

D. $T_n = T_i - T$

Answer:



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2. In thermodynamic processes which of the following statements is not true ?

A. In an isochoric process pressure remains constant

B. In an isothermal process the temperature remains constant

C. In an adiabatic process $PV^\gamma = \text{constant}$

D. In an adiabatic process the system is insulated from the surroundings

Answer:



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3. A black body at $227^{\circ}C$ radiates heat at the rate of $7\text{ cal s} / \text{cm}^{-2}\text{ s}^{-1}$ At a temperature of $727^{\circ}C$, the rate of heat radiated in the same units will be

A. 50

B. 112

C. 80

D. 60

Answer:



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4. If ΔU and ΔW represent the increase in internal energy and work done by the system respectively in a thermodynamical process, which of the following is true?

A. $\Delta U = -\Delta W$, in a adiabatic process

B. $\Delta U = \Delta W$, in a isothermal process

C. $\Delta U = \Delta W$, in a adiabatic process

D. $\Delta U = -\Delta W$, in a isothermal process

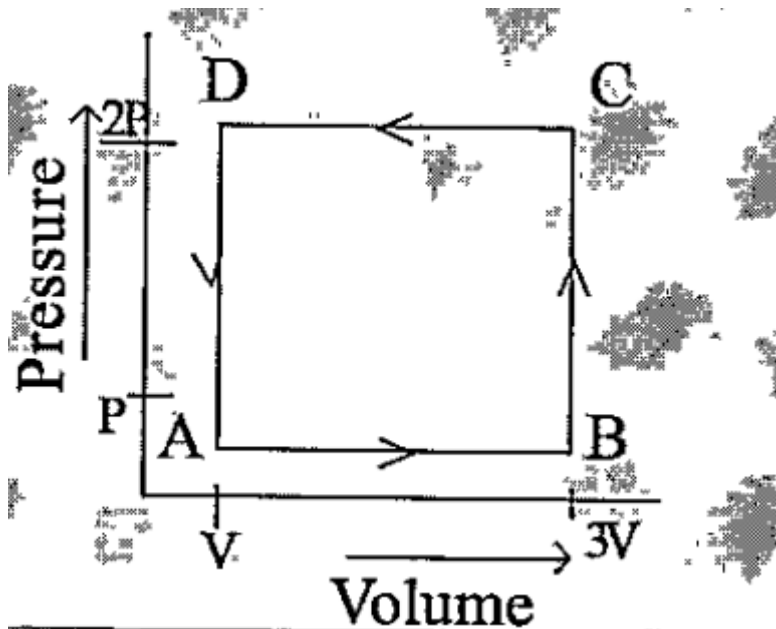
Answer:



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5. A thermodynamic system is taken through the cycle ABCD as shown in figure. Heat

rejected by the gas during the cycle is:



A. $4PV$

B. $\frac{1}{2}PV$

C. PV

D. $2PV$

Answer:



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6. The potential energy of a particle in a force field is : $U = \frac{A}{r^2} - \frac{B}{r^1}$, where A and B are positive constant and r is the centre of the field. For stable equilibrium, the distance of the particle is :

A. $2A / B$

B. A / B

C. B/A

D. $B/2A$

Answer:



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7. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature the ratio $\frac{C_p}{C_v}$ for the gas is

A. $\frac{4}{3}$

B. 2

C. $\frac{5}{3}$

D. $\frac{3}{2}$

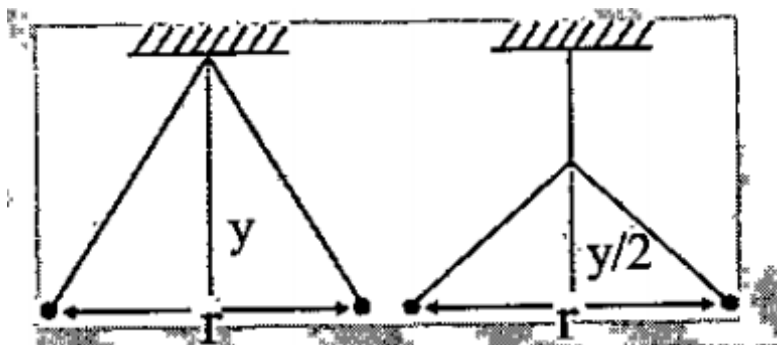
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8. Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation

between them is r . Now the strings are rigidly clamped at half the height. The equilibrium separation between the balls now become:



- A. $\frac{1}{\sqrt{2}}$
- B. $\frac{r}{3\sqrt{2}}$
- C. $\frac{2r}{\sqrt{3}}$
- D. $\frac{2r}{\sqrt{3}}$

Answer:



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9. A monatomic gas at a pressure P , having a volume V expands isothermally to a volume $2V$ and then adiabatically to a volume $16V$. The final pressure of the gas is

(Take $\gamma = \frac{5}{3}$)

A. $64P$

B. $32P$

C. $\frac{P}{64}$

D. $16P$

Answer:



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10. A thermodynamic system undergoes cyclic process ABCDA as shown in figure.

A. P_0V_0

B. $2P_0V_0$

C. $\frac{P_0 V_0}{2}$

D. zero

Answer:



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11. Two vessels separately contain two ideal gases A and B at the same temperature, the pressure of A being twice that of B. Under such conditions, the density of A is found to

be 1.5 times the density of B. The ratio of molecular weights of A and B is :

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. $\frac{3}{4}$

D. 2

Answer:



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12. An ideal gas compressed to half its initial volume by means of several processes. Which of the process results in the maximum work done on the gas?

A. Isothermal

B. Adiabatic

C. Isobaric

D. Isochoric

Answer:



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13. A rod of weight W is supported by two parallel knife edges A and B and is in equilibrium in a horizontal position. The knives are at a distance d from each other. The centre of mass of the rod is at distance x from A. The normal reaction on A is

A. $\frac{Wd}{x}$

B. $W \frac{(d-x)}{x}$

C. $W \frac{(d-x)}{d}$

D. $\frac{Wx}{d}$

Answer:



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14. A gas is compressed isothermally to half its initial volume. The same gas is compressed separately through an adiabatic process until its volume is again reduced to half. Then.

A. Which of the case (whether compression through isothermal or through adiabatic process) requires more work will depend upon the atomicity of the gas

B. Compressing the gas isothermally will require more work to be done

C. Compressing the gas through adiabatic process will require more work to be done

D. Compressing the gas isothermally or adiabatically will require the same amount of work

Answer:



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15. Therodynamic processes are indicated in the following diagram.

Column-1

Column-2

P. Process I

a. Adiabatic

Q. Process II

b. Isobaric

R. Process III

c. Isochoric

S. Process IV

d. Isothermal

A. $P \rightarrow c, Q \rightarrow a, R \rightarrow ds \rightarrow b$

B. $P \rightarrow c, Q \rightarrow d, R \rightarrow bS \rightarrow a$

C. $P \rightarrow d, Q \rightarrow b, R \rightarrow aS \rightarrow c$

D. $P \rightarrow a, Q \rightarrow c, R \rightarrow bS \rightarrow b$

Answer:



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