AL Physics MC Answers

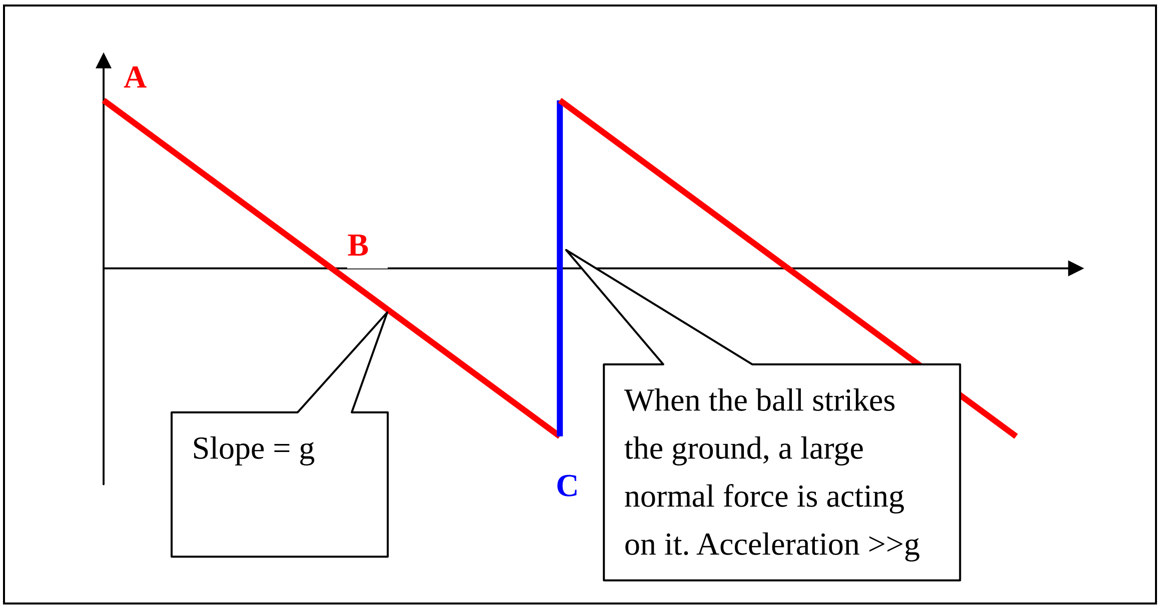
Year:1988

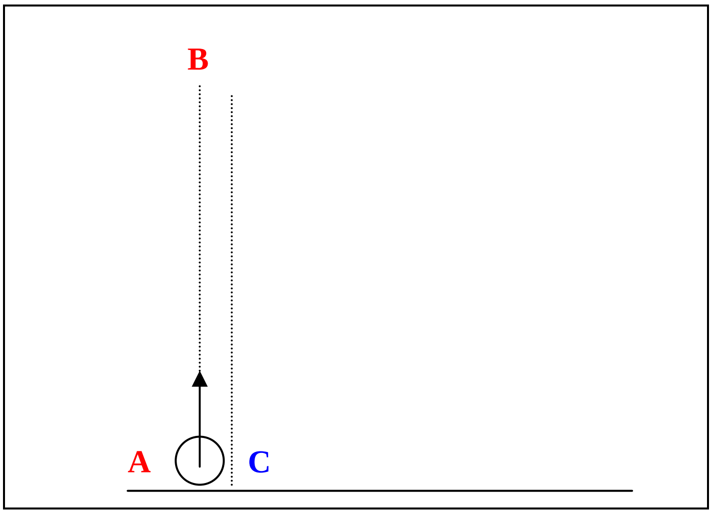
Question Number: 1,2,16,30,41

1988MC (1)

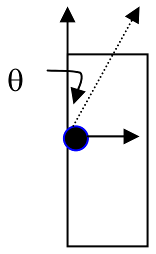
v = u+gt

So the v-t graph is a straight line





1988MC (2)

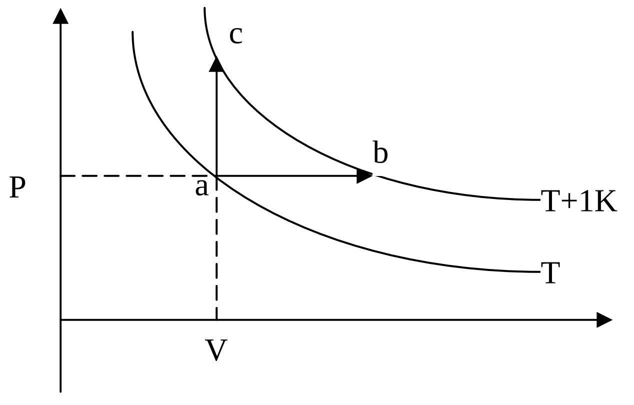


In one second, the ship moves to the north by 1.73 m. At the same time, the man walks to the east by 1 m. So his motion is N-W with angle $\theta = \tan^{-1}(1/1.73) = 30^0$.

His direction is $N30^0E$.

1988 MC (16)

Referring to the PV diagram, the energy (in here, the term "energy" refers to heat) supplied during the process a to b is Q_1, while that from a to c is Q_2.



The changes in internal energy in these two processes are the same because of the same temperature rise.

Process a to b, there is a work done by the gas (the gas expands).

PV = nRT, so work $\Delta W = P\Delta V = nR\Delta T = R$ (n = 1 mole and ΔT = 1K)

Since $\Delta U = \Delta Q - \Delta W$ and same ΔU, i.e.

$$(\Delta Q - \Delta W)_{\text{a to c}} = (\Delta Q - \Delta W)_{\text{a to b}}, \quad \text{so } Q_1 = Q_2 - R = Q_2 - \frac{PV}{T}$$

1988MC (30)

Total potential = scalar sum of potentials due to each charge.

Let x be the separation between center and corner, i.e $x = \frac{a}{\sqrt{2}}$

At the center,

potential due to the charge placed at the top-left corner $V_1 = \frac{-2q}{4\pi\varepsilon_o x}$

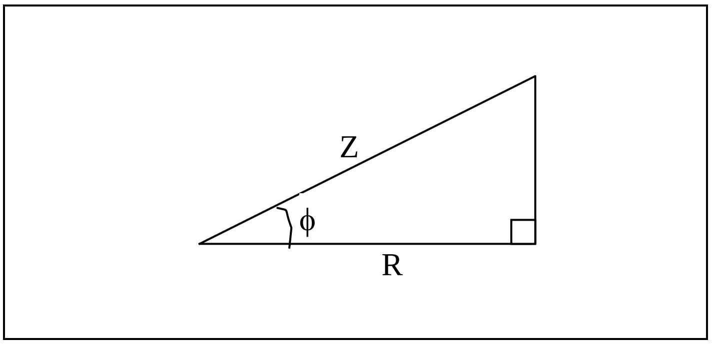
potential due to the charge placed at the top-right corner $V_2 = \frac{q}{4\pi\varepsilon_o x}$

potential due to the charge placed at the bottom-left corner $V_3 = \frac{q}{4\pi\varepsilon_o x}$

potential due to the charge placed at the bottom-right corner $V_4 = \dfrac{-2q}{4\pi\varepsilon_o x}$

The answer is the sum of V_1, V_2, V_3 and V_4.

1988MC (41)



Power factor cosϕ = R/Z = 1/2

Power = $V_{rms,supply} I_{rms,supply}$ cosϕ

So Power = IV/2