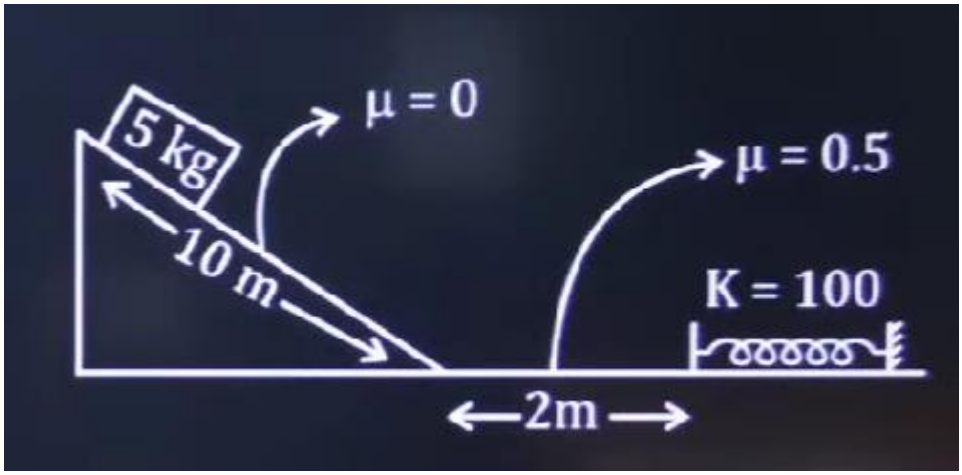
JEE Main 2024 April 9 Shift 1 Question Paper

1. A point at which intensity is 1 of maximum intensity, find y?
2. If the wavelength of the electron and proton are the same, then find the ratios of their kinetic energies.
3.

In the given diagram calculate the maximum compression in the spring.
(The angle of wedge is 30°)



4.

A disc of mass M and radius R is rotating with angular speed ω then and another disc of mass M/2 is kept on it then find angular velocity of system
(a) 3ω/4
(b) ω/4
(c) ω/2

5.

Dimension formula of $\varepsilon_0 E^2$.
(where E is electric field and ε_0 is permittivity of free space)

A $[M L^2 T^{-2}]$

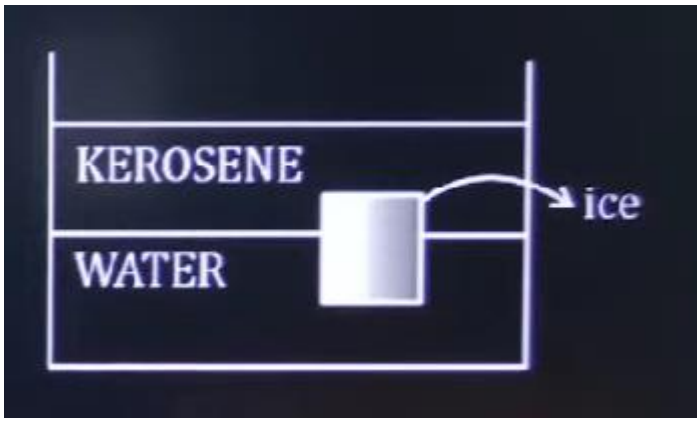
B $[M L^{-2} T^{-2}]$

C $[M L^{-1} T^{-2}]$

D $[M L T^{-2}]$

6.

Find the ratio of volume of ice in kerosene and water. (Specific gravity of kerosene = 0.8 and specific gravity of ice = 0.9)



7.

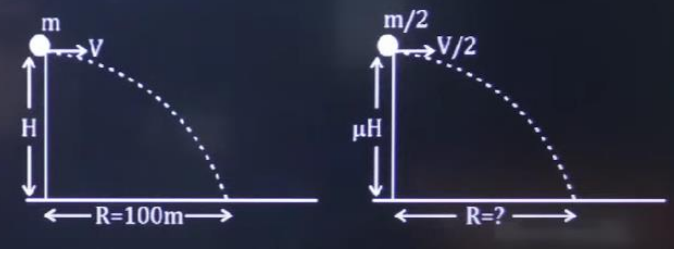
The work done by a diatomic gas during an isobaric process is 100 J. Calculate the heat supplied.

8.

An infinitely long current carrying wire of radius 'a' carries uniform current (i) find out the ratio of magnetic field at distance a/2 and 2a.

9.

Two particles are projected from two different towers of heights H and 4H with velocity V and V/2 respectively. If horizontal range for first particle is 100 m then find horizontal rangle for other.

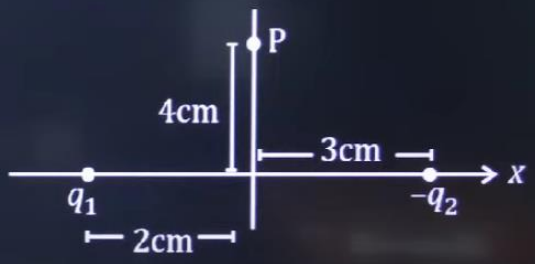


10.

A given object takes n times as much time to slide down at 45° rough incline as it takes to slide down a perfectly smooth 45° incline. The coefficient of kinetic friction between the object and the incline is given by:

11.

Figure shows two charges q_1 and q_2 placed on x-axis as shown. If electric field at P is along x-direction, find $\frac{q_1}{q_2}$.



A $\frac{4\sqrt{5}}{25}$

B $\frac{8\sqrt{5}}{25}$

C $\frac{12}{25}$

D $16\sqrt{5}$

12.

Two satellites are revolving around a planet at radius a and 4a respectively. If the speed of first satellite is 6u, then find the speed of second satellite.

A 4u

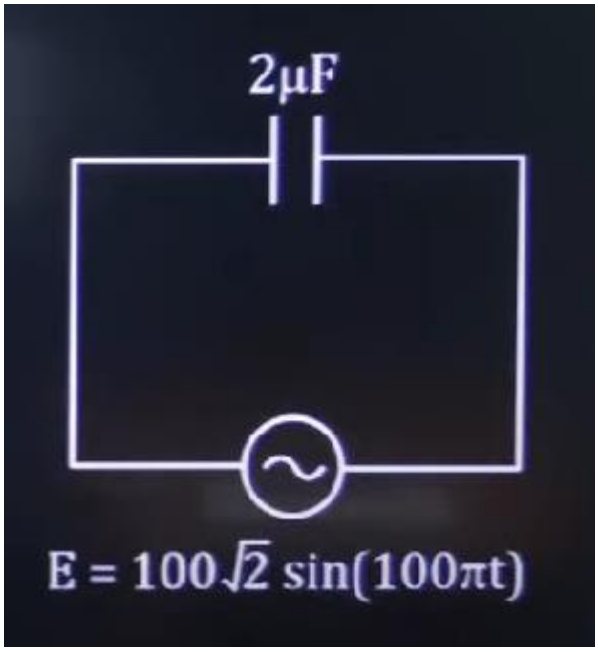
B 5u

C 3u

D 2u

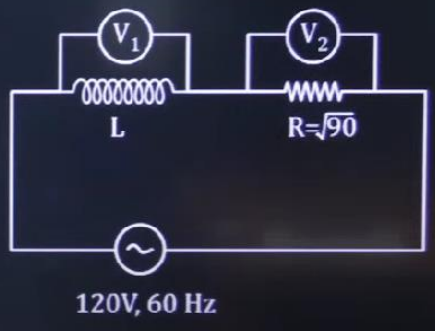
13.

An AC source is connected across a capacitor having capacitance 2μF. Find the rms current in the given circuit.



14.

In given AC circuit consisting resistor R and inductor C and source emf. Two voltmeter V_1 and V_2 are connected as shown in figure. If $V_2 = 36V$ then inductance of inductor is:



15.

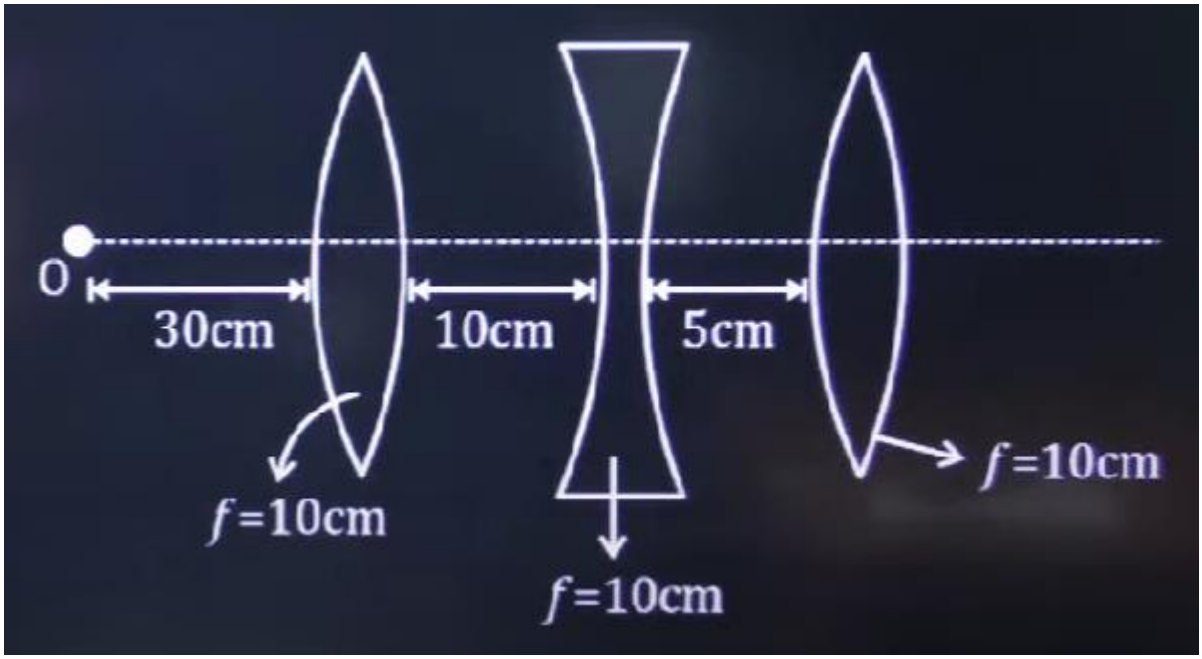
An isotope $^{12}B_5$ of mass m having proton (m_p) and neutron (m_n) then what will be the binding energy in terms of m_p, m_n and m.

16.

Some amount of water is heated using a constant supply source for 20 minutes. Now if we change the length of heating element then same amount of water gets heated using same source in 15 minutes calculate the change in length.

17.

Find distance between final image and object.



18.

A disc having radius 3m have a smooth groove a shown in figure. Disc is rotating with som constant angular velocity if particle have some mass (m) as disc is put gently at distance 1m from centre. Then velocity of particle wrt disc when it leave the disc is $(2\omega\sqrt{x})$ find x

19.

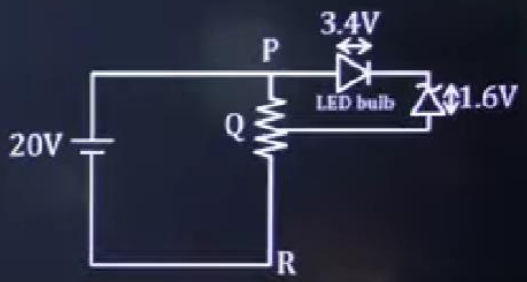
A particle is performing SHM, at a particular position $x = 0.4$m, potential energy is 0.4 J and kinetic energy is 0.5 J, then find amplitude of SHM.

20.

In the given circuit length of PR is 20 cm. Find the length PQ so that bulb will glow.

A 15 cm

B 5 cm

C 10 cm

D 2 cm