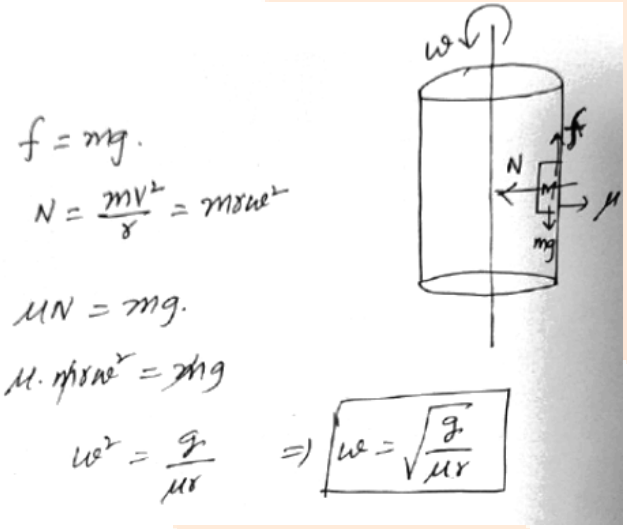
JEE-Main-21-01-2026 (Memory Based)
[EVENING SHIFT]
Physics

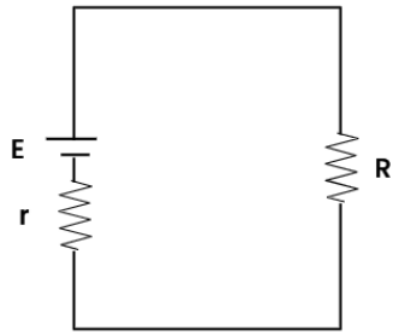
Question: A big drum of radius 'r' had a block of mass 'm' sticked to its wall & it has ωeff of friction 'μ' & rotating with 'ω' rad/s. For what value of 'ω' will the block stick to the wall?

Answer: ($\omega = \sqrt{\frac{g}{\mu r}}$ **)**

Solution:



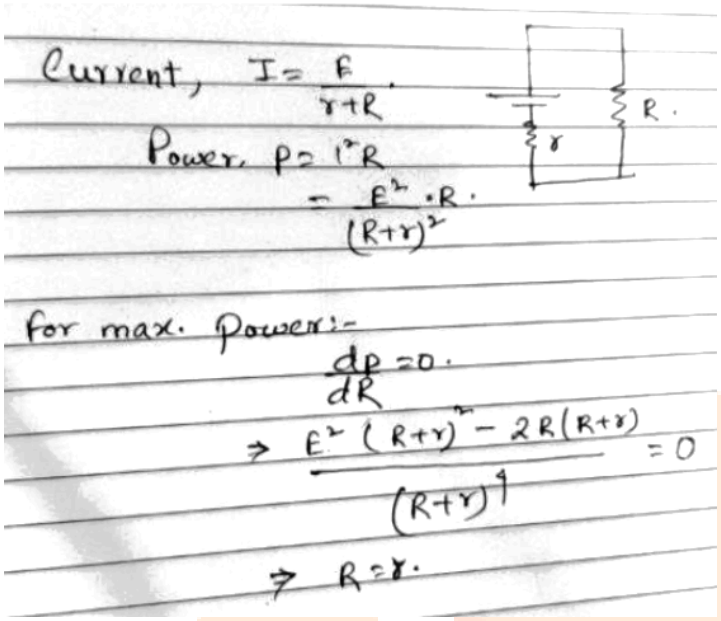
Question: In a circuit there is a battery with internal resistance r and Emf E, which is connected to external load resistance R as shown. Find value of R so that maximum power dissipated across R.



Options:

(a) R = r
(b) R = r/2
(c) R = √2 r
(d) R = 2r

Answer: (a)
Solution:



Question: A spherical ball of radius 6 mm falls through a viscous fluid cond attains terminal velocity of 20 m/s. If another spherical ball of same material and density but of radius 3 mm falls through the same fluid, Find V_T.
Answer: (5 m/s)
Solution:

$V_t \propto r^2$

$r_1 = 6mm, \; V_1 = 20m/s$

$r_2 = 3mm, \; V_2 = ?$

$$\frac{V_2}{V_1} = \left(\frac{r_2}{r_1}\right)^2 = \left(\frac{3}{6}\right)^2 = \frac{1}{4}$$

$$\Rightarrow V_2 = V_1 \times \frac{1}{4} = 20 \times \frac{1}{4}$$

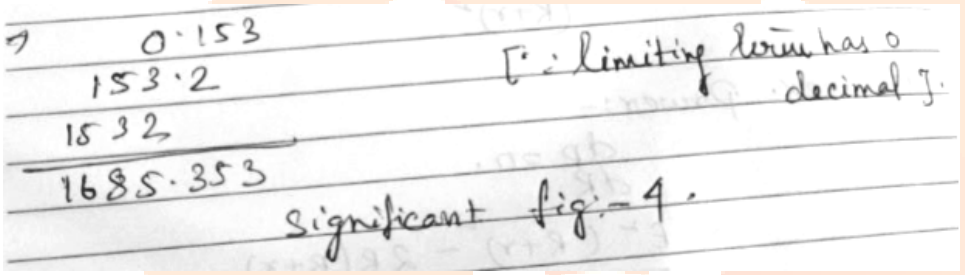
$$= 5m/s$$

Question: A particle of mass m = 9.1 × 10^{-31} kg and charge e = 1.6 × 10^{-19} C is accelerated through a potential difference of 1.2 V. If h = 6.63 × 10^{-34}J, Find its de-Broglie wavelength.
Answer: (11.21 nm)
Solution:

$$\lambda = \frac{h}{p} = \frac{h}{\sqrt{2meV}}$$

$$= \frac{6.63 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 1.6 \times 10^{-19} \times 1.2}}$$

Question: What will be significant figure of summation of 0.153, 153.2 and 1532?
Options:
(a) 3
(b) 4
(c) 5
(d) 6
Answer: (b)
Solution:



Question: The energy of an electron in nth bohr orbit is given by $E_n = -\frac{\varepsilon_0}{n^2}$. For a certain excited state of hydrogen, the magnitude of electron's energy is formed to be $\frac{\varepsilon_0}{25}$. Find value of $\frac{2\pi L}{h}$.
Answer: (5)
Solution:

$$E_n = \frac{E_0}{n^2}$$

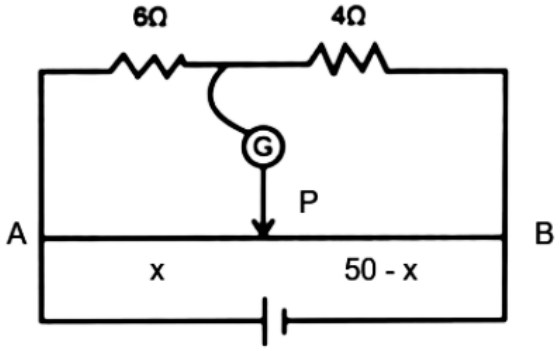
$$\Rightarrow 0.04E_0 = \frac{E_0}{n^2}$$

$$\Rightarrow \boxed{n = 5}$$

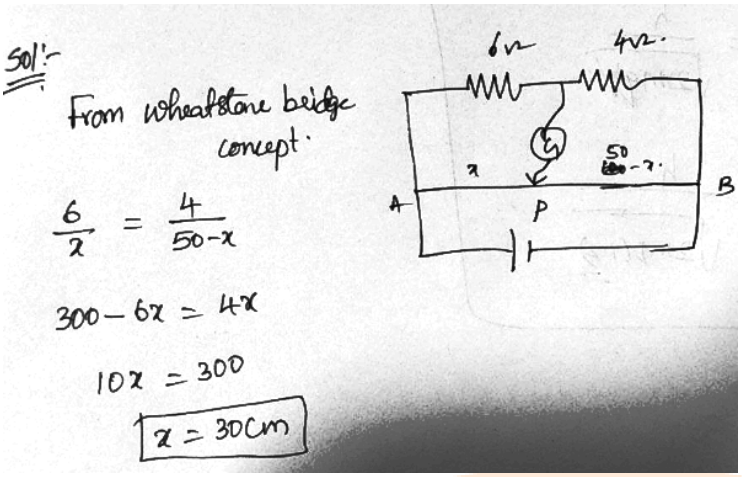
$$\because L = \frac{nh}{2\pi}$$

$$\boxed{n = \frac{2\pi L}{h} = 5}$$

Question: The total length of potentiometer wire AB is 50 cm in the arrangement shown in the in fig. If 'P' is the point where the galvanometer shows zero reading Then the length Ap is _____



Options:
(a) 15
(b) 20
(c) 30
(d) 25
Answer: (c)
Solution:



Question: The Kinetic energy of a simple harmonic oscillating with angular frequency of 176 rad/s. The frequency of the simple harmonic oscillator is - $Hz\left(\pi = \frac{22}{7}\right)$

Options:

(a) 176

(b) 14

(c) 28

(d) 88

Answer: (d)

Solution:

$K.E = \frac{1}{2} m\omega^2 A^2 \cos^2 \omega t$

$= \frac{1}{4} \times m\omega^2 A^2 (1 + 2\cos \omega t)$

$K.E \rightarrow \omega = 176 rad/s$

$SHM \rightarrow \frac{\omega}{2} = 88 rad/s$

Question: Two spheres having equal mass m, charge q and radius R, are moving towards each other. Both have speed u at an instant when distance between their centers is 4R. Minimum value of u so that they touch each other is

Options:

(a) $\sqrt{\frac{q^2}{4\pi\varepsilon_0 mR}}$

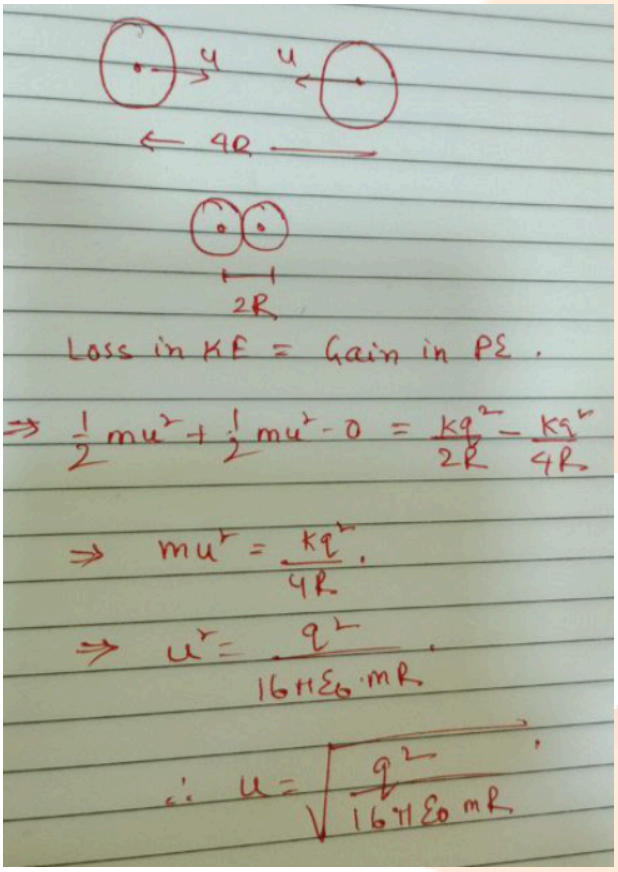
(b) $\sqrt{\frac{q^2}{16\pi\varepsilon_0 mR}}$

(c) $\sqrt{\frac{q^2}{\pi\varepsilon_0 mR}}$

(d) $\sqrt{\frac{q^2}{8\pi\varepsilon_0 mR}}$

Answer: (b)

Solution:



Question: The rms speed of O_2 molecules at 47 ℃ is equal to rms speed of H_2 molecules at _____ ℃ ?

Options:

(a) -100 ℃

(b) -253 ℃

(c) -20 ℃

(d) -235 ℃

Answer: (b)

Solution:

$$V_{rms} = \sqrt{\frac{3RT}{M}}$$

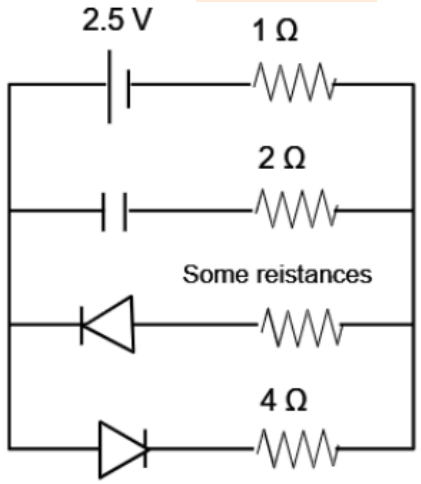
$$\sqrt{\frac{3R \times 320}{32}} = \sqrt{\frac{3R \times T}{2}}$$

$$\Rightarrow \frac{320}{32} = \frac{T}{2}$$

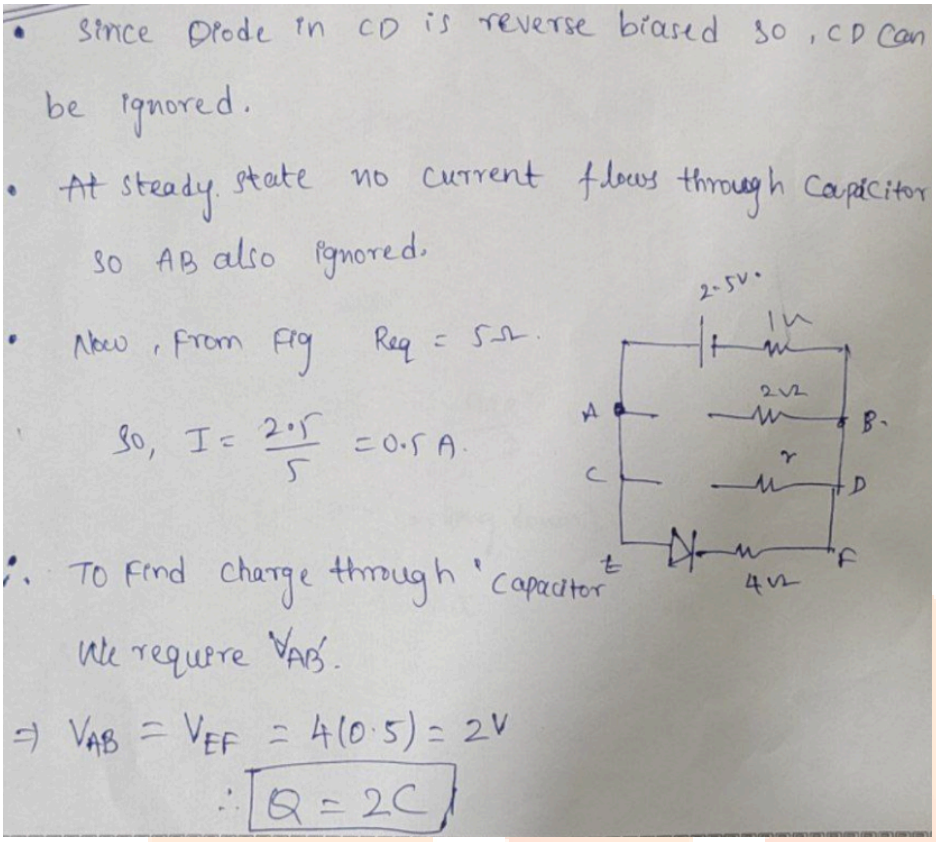
$$\Rightarrow T = 20K$$

$$T_C = (20 - 273)^\circ C$$
$$= -253^\circ C$$

Question: Find the charge on capacitor in steady state?

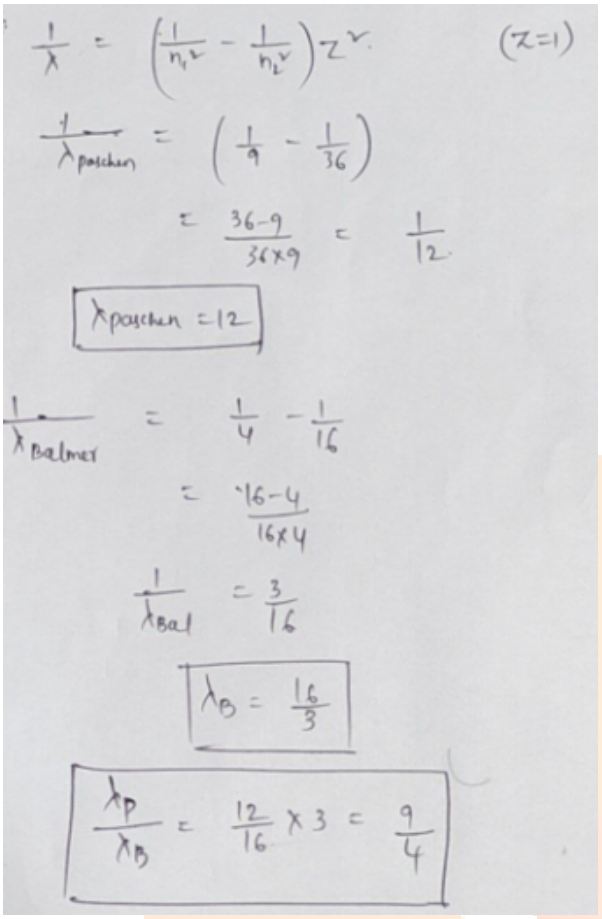


Answer: (10 μc)
Solution:



Question: Refractive index of right angled prism is √2. What should be the angle of incidence for a light ray such that emerging ray grazes out of the surface.
Answer: (90°)

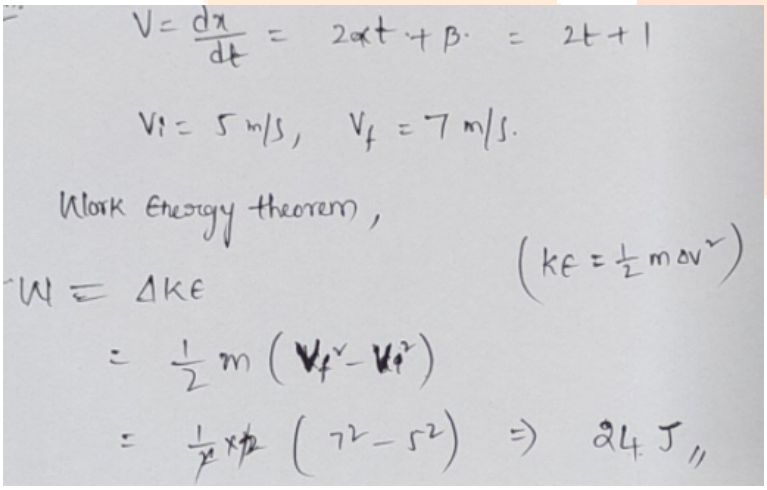
Question: The ratio of Wavelength of 3rd line of Paschen Series, 2nd line of Balmer in H-atom
Options:
(a) 9/4
(b) 4/9
(c) 3/4
(d) 4/3
Answer: (a)
Solution:



Question: If mass of the particle m = 2 kg and displacement of particle varies with the time as $x = \alpha t^2 + \beta t + \gamma$. Then find the work done in the time interval t = 2 sec to t = 3 sec ($\alpha = 1, \beta = 1, \gamma = 1$)

Answer: (24 J)

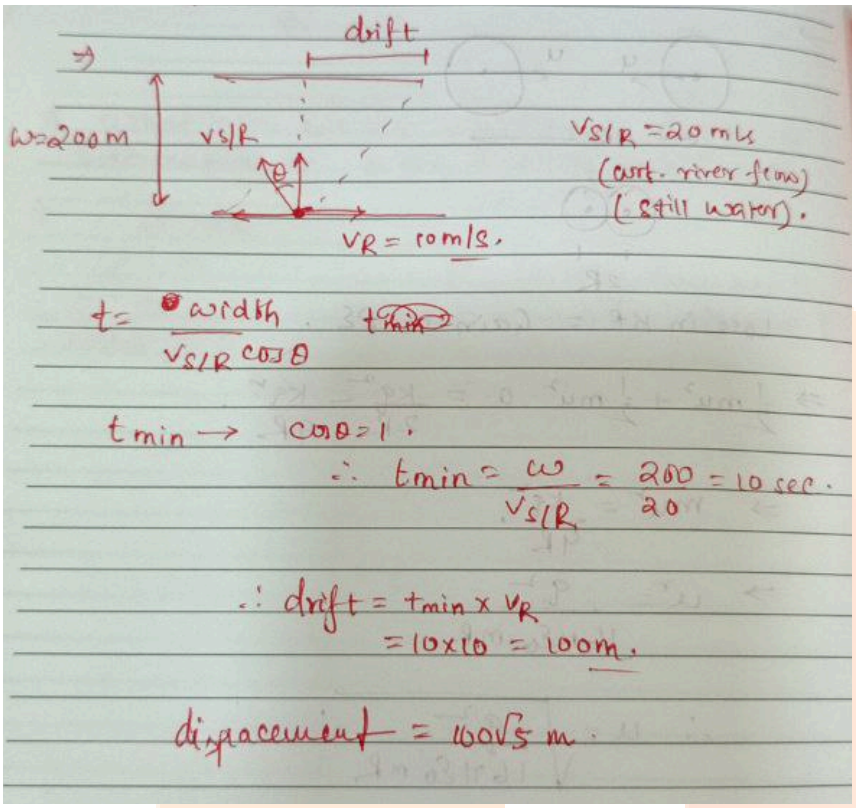
Solution:



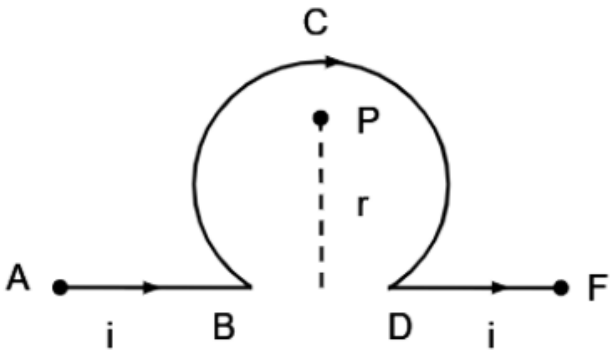
Question: Width of river is 200 m following with velocity 10 ms. A boat can move with speed of 20 m/sec. Wrt river flow. Find min time to cross river and displacement along river bank.

Options:

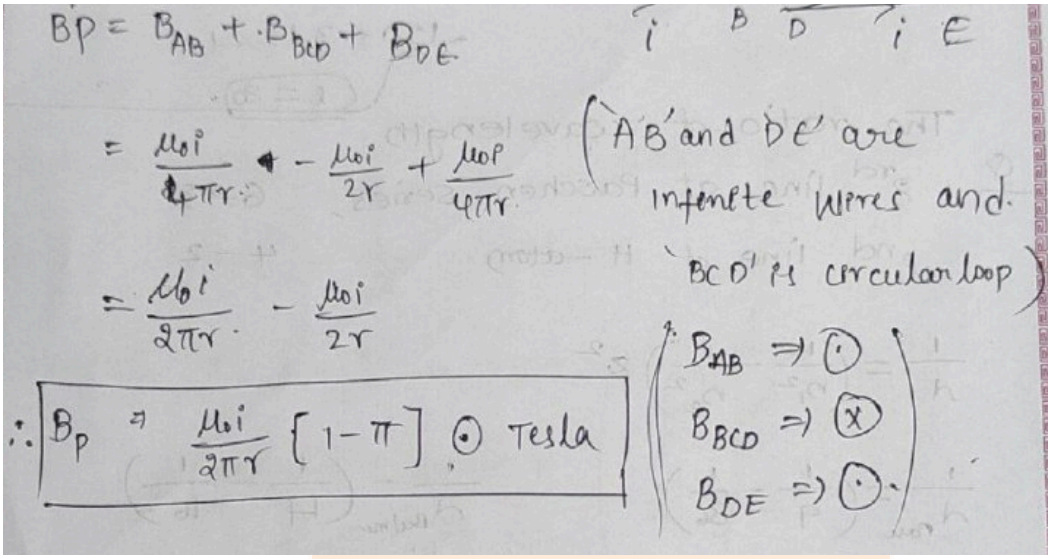
(a) 100√5 m
(b) 10√5 m
(c) 100 m
(d) 105 m
Answer: (a)
Solution:



Question: Current 'i' is passing through the given arrangement of conductors. Find 'B' at point 'P'.



Answer: ($B_P = \frac{\mu_0 i}{2\pi r}[1-\pi] \odot \text{Tesla}$ **)**
Solution:



Question: In isobaric expansion work is 100 J. Find heat given to the gas ($\gamma = 1.4$).

Options:

(a) 300

(b) 350

(c) 400

(d) 450

Answer: (b)

Solution: