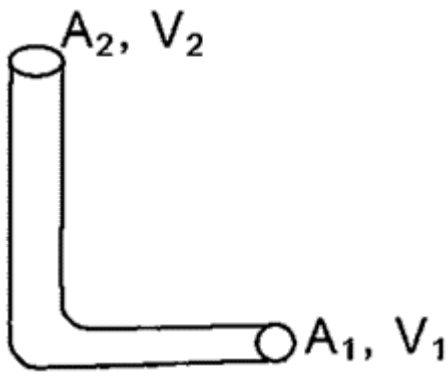


Examrace

AIIMS MBBS Entrance Test 2019 Physics Paper with Answer & Solutions 25 May First Shift Part 7

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Q-27: A liquid enter at point A_1 with speed $3.5 \frac{m}{s}$ and leaves at point A_2 . Then find out the height attained by the liquid above point A_2 .

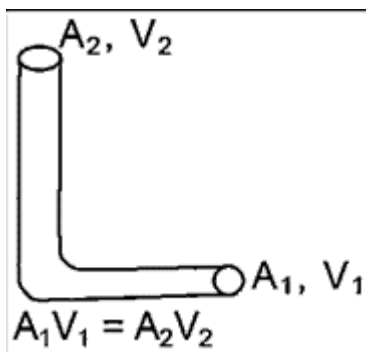


Options

- (1) 61.25 cm
- (2) 51.25 cm
- (3) 41.25 cm
- (4) 71.25 cm

Answer: (1)

Solutions:



$$A_1 = A_2 \Rightarrow V_1 = V_2 = 3.5 \text{ m/s}$$

Maximum height achieved

Using Bernoulli theorem

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$$P_{atm} + \frac{1}{2}\rho(3.5)^2 + \rho\rho g \cdot 0 = P_{atm} + \frac{1}{2}(\rho)(0)^2 + \rho gh$$

$$H = \frac{v^2}{2g} = \frac{3.5 \times 3.5}{20} = \frac{12.25}{20} = 0.6125m = 61.25 \text{ cm}$$

Q-28: If potential energy is given by $U = \frac{a}{r^2} - \frac{b}{r}$ Then find out maximum force. (Given a = 2, b = 4)

Options:

(1) $-\frac{16}{27}N$

(2) $-\frac{32}{27}N$

(3) $+\frac{32}{27}N$

(4) $+\frac{16}{27}N$

Answer: (1)

Solutions:

$$F = -\frac{du}{dr} = -\left[-\frac{2a}{r^3} + \frac{b}{r^2}\right]$$

$$= \frac{2a}{r^2} - \frac{b}{r^2}$$

$$\frac{dF}{dr} = \frac{6a}{r^4} + \frac{2b}{r^3} = 0$$

$$\Rightarrow \frac{6a}{r} = 2b$$

$$\Rightarrow F_{max} = \frac{2 \times 2}{\left(\frac{3}{2}\right)^3} - \frac{4}{\left(\frac{3}{2}\right)^2}$$

$$= \frac{4 \times 8}{27} - \frac{4 \times 4}{9} = \frac{32 - 16 \times 3}{27} = -\frac{16}{27}$$

Q-29: Find γ for the mixture of 11 gm CO_2 and 14 gm N_2 ?

Options:

(1) $\gamma_{mix} = \frac{7}{5}$

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(2) $\gamma_{mix} = \frac{10}{5}$

(3) $\gamma_{mix} = \frac{11}{8}$

(4) $\gamma_{mix} = \frac{4}{3}$

Answer: (1)

Q-30: The de-Broglie wavelength of electron in 3rd orbit of He^{+1} ion is approximately

Options:

(1) $2A^\circ$

(2) $3A^\circ$

(3) $4A^\circ$

(4) $5A^\circ$

Answer: (4)

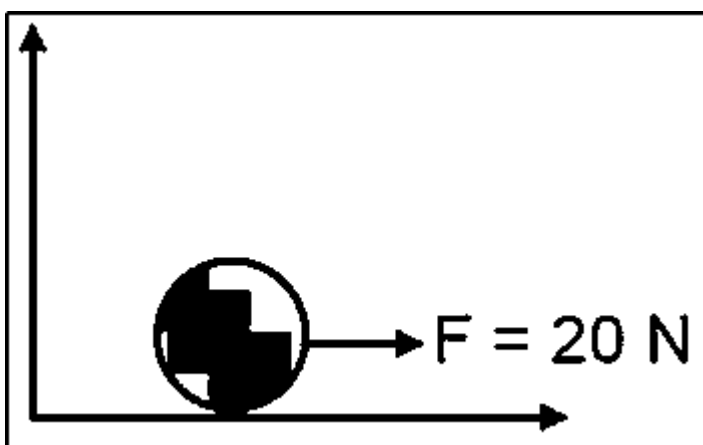
Solutions:

$$2\pi r = n\lambda$$

$$\lambda = (0.529A^\circ) \frac{n^2}{z} = 2\pi \times (0.529A^\circ) \frac{3}{2}$$

$$\lambda = 3\pi \times 0.529A^\circ \approx 5A^\circ$$

Q-31: Find ratio of acceleration and angular acceleration of com? If for the above diagram $m = 2kg$ and $r = 10cm$



Options:

(1) $\frac{1}{5}$

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$$(2) \frac{1}{10}$$

$$(3) \frac{1}{15}$$

$$(4) \frac{1}{20}$$

Answer: (4)

Solutions:

$$a = \frac{F}{m} - \frac{20}{2} = 10$$

$$\tau = I \propto$$

$$20 \times \frac{1}{10} = \frac{1}{z} \times 2 \times (0.1)^2 \times \propto$$

$$\propto = 200$$

$$\frac{a}{\propto} = \frac{10}{200} = \frac{1}{20}$$

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