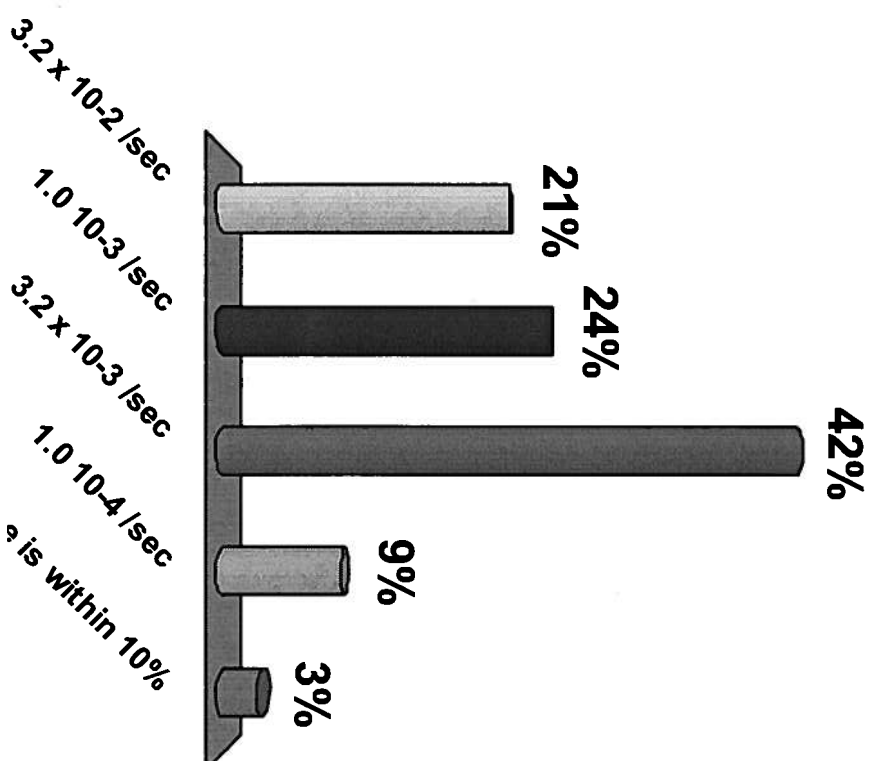


A cylindrical space habitat is made to rotate on its axis to simulate earth's gravity for the inhabitants. If its radius is 10^4 km, at what angular speed (in radians/sec) does it rotate?

- a) 3.2×10^{-2} /sec
- ✓ b) 1.0×10^{-3} /sec
- c) 3.2×10^{-3} /sec
- d) 1.0×10^{-4} /sec
- e) None is within 10%



The correct answer is (b),

$\omega = 1.0 \times 10^{-3}$ /sec; as follows,

- The rotation must produce an inertial pseudo-force = $Mg = 10^4 M \text{ kg-m/s}^2$.
- The centrifugal inertial pseudo-force at a distance R from the axis is
$$F_{\text{pseudo}} = MR \omega^2, \text{ outward.}$$
- Therefore $Mg = MR \omega^2$,
- or $\omega = (g/R)^{1/2} = 10 / (10^4 * 10^3)^{1/2} \text{ sec}^{-2}$
- $= (10^{-6})^{1/2} = 1 \times 10^{-3} / \text{sec}.$