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Class : 11<sup>th</sup> (A)

Subject : PHYSICS

(1)

Let the sphere starts from the top of inclined plane of height  $h$  and reaches the bottom with speed  $v$ .

According to law of conservation of energy.

PE at top = KE at bottom

$$mgh = \frac{1}{2}mv^2$$

$$10gh = v^2$$

$$\frac{10}{7}gh = v^2$$

Taking ' $\sqrt{\quad}$ ' on b.s.

$$\sqrt{v^2} = \sqrt{\frac{10}{7}gh}$$

$$v = \sqrt{\frac{10}{7}gh}$$

(6)

Given:

$$S = 2.50 \text{ m}$$

$$\theta = 6.6 \times 10^{-9} \text{ m}$$

Date: \_\_\_\_\_

Required:

$$r = ?$$

Formula:

$$S = r \theta$$

$$r = \frac{S}{\theta}$$

$$r = \frac{2.50}{66 \times 10^{-9}} \quad \frac{2.5}{6.6} \times 10^9$$

$$r = 0.37 \times 10^8$$

$$r = 3.8 \times 10^8 \text{ m}$$

(7)

Given:

$$r_0 = 3.85 \times 10^8 \text{ m}$$

$$r_s = 1.71 \times 10^6 \text{ m}$$

Required:

$$\text{Spin angular mom} = L_s = ?$$

$$\text{Orbital angular mom} = L_o$$

Formula:

$$L_s = I_s \omega_s$$

$$L_o = I_o \omega_o$$

$$\frac{L_s}{L_o} = \frac{I_s \omega_s}{I_o \omega_o}$$

Date: \_\_\_\_\_

$$I\omega = I\omega_0 = \omega$$

$$I_s = \frac{2}{5} m r^2$$

$$I_0 = \frac{2}{5} m r_0^2$$

$$\frac{I_s}{I_0} = \frac{I_s \omega_s}{I_0 \omega_0} = \frac{\frac{2}{5} m r^2 \omega}{\frac{2}{5} m r_0^2 \omega}$$

$$\frac{I_s}{I_0} = \frac{r^2 \omega}{r_0^2 \omega} = \frac{2 (1.74 \times 10^4)^2}{5 (3.85 \times 10^8)^2}$$

$$= \frac{2 \times 1.74 \times 1.74}{5 \times 3.85 \times 3.85} \times \frac{10^{12}}{10^{16}}$$

$$= 0.0817 \times 10^{12-16} = 0.0817 \times 10^{-4}$$

$$= 8.17 \times 10^{-6}$$

$$\frac{I_s}{I_0} = 8.2 \times 10^{-6}$$

(2)

$$v = \sqrt{gR}$$

$$v = \sqrt{9.8 \times 6.4 \times 10^6}$$

$$v = \sqrt{62.72 \times 10^6}$$

$$v = 7.9 \times 10^3 \text{ m/s}$$

$$v = 7.9 \text{ km/s}$$

Hence Proved

(5)

$$r = \left[ \frac{GMT^2}{4\pi^2} \right]^{1/3}$$

Date: \_\_\_\_\_

$$G = 6.673 \times 10^{-11} \text{ Nm}^2/\text{kg}^{-2}$$

$$M = 6 \times 10^{24} \text{ kg}$$

$$r = 3.14$$

$$T = 24 \text{ hr} = 86400 \text{ sec}$$

$$r = 42.3 \times 10^6 \text{ m}$$

$$r = R + h$$

$$h = r - R$$

$$h = 42.3 \times 10^6 - 6.4 \times 10^6$$

$$h = 35.9 \times 10^6 \text{ m} = 3.59 \times 10^7 \text{ m}$$