LGS GROUP OF COLLEGES
A PROJECT OF LAHORE GRAMMAR SCHOOL

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Subject: Physics
Class: 11th Roll No. 3
Test No. W-5 Date: 18-11-21

	A	B	C	D
1	○	○	○	○
2	○	○	○	○
3	○	○	○	○
4	○	○	○	○
5	○	○	○	○
6	○	○	○	○
7	○	○	○	○
8	○	○	○	○
9	○	○	○	○
10	○	○	○	○
11	○	○	○	○
12	○	○	○	○
13	○	○	○	○
14	○	○	○	○
15	○	○	○	○
16	○	○	○	○
17	○	○	○	○
18	○	○	○	○
19	○	○	○	○
20	○	○	○	○

Marks Obtained

QNO-1

For sphere:

$$K.E_{linear} = \frac{1}{2}mv^2$$

$$K.E_{rot} = \frac{1}{2}I\omega^2$$

$$I = \frac{2}{5}mr^2$$

$$K.E_{rot} = \frac{1}{2}\left(\frac{2}{5}mr^2\right)\omega^2$$

$$= \frac{2}{10}mr^2\omega^2$$

$$= \frac{1}{5}mr^2\omega^2 \qquad \because v^2 = r^2\omega^2$$

$$K.E_{rot} = \frac{1}{5}mv^2$$

$$K.E_{total} = K.E_{linear} + K.E_{rot}$$

$$= \frac{1}{2}mv^2 + \frac{1}{5}mv^2$$

$$= \frac{5+2mv^2}{10} = \frac{7mv^2}{10}$$

$$= \frac{7}{10}mv^2$$

According to law of conservation of angular momentum
P.E at top = K.E at bottom

$$mgh = \frac{7}{10}mv^2$$

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

Taking sq. root on both sides

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

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

QNO-2

$$V = \sqrt{gR}$$

$V = ?$, $g = 9.8\ ms^{-2}$, $R = 6.4 \times 10^6\ m$

$$V = \sqrt{(9.8)(6.4 \times 10^6)}$$

$$= 7919.59\ ms^{-1}$$

$$= 7.919 \times 10^3\ ms^{-1}$$

Critical velocity = $7.9\ kms^{-1}$

QNO-3

Weight at rest = $W = mg$

Weight while moving upward = $2W$

$a = g$

$$T - W = mg$$

$$T = W + mg$$

Apparent weight is more (>) than real weight.

$$T = W + W$$

$$\boxed{T = 2W}$$

QNO-4

$v = 1.01 \ kms^{-1}$

$R = 390400 \ km$

$T = ?$

$$T = \frac{2\pi R}{v}$$

$$= \frac{2 \times 3.14 \times 390400}{1.01}$$

$$= 2427437.624 \ s$$

Converting sec into days

$$= \frac{2427437}{60 \times 60 \times 24}$$

$$\boxed{T = 28 \ days}$$

1440

86400

QNO-5

$$\Lambda = R + h$$

$$\Lambda - R = h$$

$$42300 - 6400 = h$$

$$35900 \ km = h$$

$$\boxed{h = 36000 \ km}$$

QNO-6

$S = 2.50 \ m$

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

$r = ?$

$$S = r\theta$$

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

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

$$= 378787878.8$$

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

QNO: 7

$r = 3.85 \times 10^{8}$ m

$R = 1.74 \times 10^{6}$ m

$$\frac{L_o}{L_s} = ?$$

For orbital motion $I_o = mr^2$

For spin motion $I_s = \frac{2}{5} mR^2$

$$\frac{L_o}{L_s} = \frac{I_o w}{I_s w}$$

$$\frac{L_o}{L_s} = \frac{mr^2}{\frac{2}{5} mR^2}$$

$$= \frac{5 r^2}{2 R^2}$$

$$= \frac{5 (3.85 \times 10^8)^2}{2 (1.74 \times 10^6)^2}$$

$$= \frac{7.411125 \times 10^{17}}{6.0552 \times 10^{12}} = 1.22395 \times 10^{17-12}$$

$$\boxed{\frac{L_o}{L_s} = 1.22395 \times 10^{5}}$$