Ans: to the q.no. 9

We know.

Angular momentum, $L = I\omega$

Torque. τ

$\therefore$ Rate of change of angular momentum.

$$\frac{dL}{dt} \propto \tau$$

$$\text{or, } \tau \propto I\frac{d\omega}{dt}$$

$$\text{or, } \tau = kI\frac{d\omega}{dt}$$

Here. k is a proportional constant.

In SI unit $k = 1$.

$$\therefore \tau = I\frac{d\omega}{dt} = I\alpha$$

$\therefore$ Newtons equation for rotating 1.5 kg mass.

$$\vec{\tau} = I\vec{\alpha}$$

$$\vec{\tau} = mr^2\vec{\alpha}$$

$$\vec{\tau} = 1.5\, r^2\vec{\alpha}$$

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Ans to the q no b

Given,

Mass $m = 1.5kg$

$\because$ object is rotating displacement $s = 0$

We know,

$$\text{Work}, W = \vec{F} \cdot \vec{s}$$
$$= \vec{F} \cdot 0$$
$$= 0$$

$\therefore$ No work will be done by the object.

Ans to the q no c

Given,

$m_1 = 1.5kg$

$m_2 = 2kg$

We know,

$T = m_2 g$

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∴ Effective force on m_2.

$$F = F_c - T$$

$$or,\ 0 = F_c - T$$

$$or,\ F_c = T$$

$$or,\ \frac{m_1 v^2}{r} = m_2 g$$

$$or,\ m_1 v^2 = m_2 g r$$

$$or,\ v^2 = \frac{m_2 g r}{m_1}$$

$$or,\ v = \sqrt{\frac{m_2 g r}{m_1}}$$

$$or,\ v = \sqrt{\frac{2 \times 9.8 \times r}{1.5}}$$

$$\therefore v = 3.61\sqrt{r}\ ms^{-1}$$

Ans: to-the-q-no-d

Let,

If speed of object 1.5 kg mass keeps decreasing, the 2 kg mass will fall down with 'a' ms^{-2} acceleration.

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So,
Initial velocity, $u = 0\ ms^{-1}$

We know,

$v = u + at$

or, $v = 0 + at$

$\therefore v = at$.

Thus the chart will be a straight line from the origin.

$\therefore$ A velocity time graph is given below: