Physics 101- Chapter 12
Quiz No. 6

Name: Key	ID:	Sec: 29

A **disk A** of mass = 2 Kg, and radius = 30 cm rotates with angular velocity = w rad/s. Another **disk B** of mass = 1 Kg and radius = 10 cm rotates with angular velocity = 20 rad/s in opposite direction is dropped onto disk A. The final angular velocity of the two disks together is 17.9 rad/s in same direction. Calculate w.

$$\Delta \vec{L} = 0$$

$$\vec{L}_i = \vec{L}_f$$

$$\sum I_i w_i = \sum I_f w_f$$

Notice: $I_{\text{of Disk}} = \frac{1}{2} M r^2$

$$\left[\tfrac{1}{2} \times 2 \times (0.3)^2 \times w\right] + \left[\tfrac{1}{2} \times 1 \times (0.1)^2 \times -20\right] = \left[\left[\tfrac{1}{2} \times 2 \times (0.3)^2\right] + \tfrac{1}{2} \times 1 \times (0.1)^2\right] \times 17.9$$

$$0.09w - 0.1 = (0.09 + 0.005) \times 17.9$$

$$0.09w = 1.7005 + 0.1$$

$$w = \frac{1.8005}{0.09} = 20 \text{ rad/s}$$