Answer on Question #69208 – Physics – Mechanics | Relativity

An ice skater has a moment of inertia of 4.3 kg·m2 when her arms are outstretched. At this time she is spinning at 3.3 revolutions per second (rps). If she pulls in her arms and decreases her moment of inertia to 2.2 kg·m2, how fast will she be spinning?

Solution.

We use the law of conservation of angular momentum:

$$j_1 * \omega_1 = j_2 * \omega_2; \quad \omega = 2\pi f; \quad j_1 * f_1 = j_2 * f_2; \quad f_2 = \frac{j_1 * f_1}{j_2} = \frac{4.3 * 3.3}{2.2} = 4.3 * 1.5 = 6.45\, rps \approx 6.5\, rps.$$

Answer:

$f_2 \approx 6.5\, rps$