A diver initially jumping off a diving board with his body almost straight has a moment of inertia of 15.9 kgm^2 and makes 0.7 rev/s in this position . He then tucks his body into a somersault position. His moment of inertia in the tucked position is 4.1 kgm^2. What is the diver's angular frequency in this position?

Given:

Moment of inertia of diver in straight position:	$I_S = 15.9$ kgm^2
Angular frequency of diver in straight position:	$f_S = 0.7$ rev / s
Moment of inertia of diver in tuck position:	$I_T = 4.1$ kgm^2

Determine: angular frequency of diver in tuck position: f_T

Use the law of conservation of angular momentum: when **no** external torque acts on an object, there is **no** change in the angular momentum of the object.

Then:

$$L_S = L_T \text{ ----------(1)}$$

But:

$$L_S = I_S\omega_S$$
$$L_T = I_T\omega_T$$

Substituting for L_S and L_T in (1):

$$I_S\omega_S = I_T\omega_T \text{ ----------(2)}$$

Also: $\omega = 2\pi f$

Substituting for I_S, ω_S, and I_T in (2):

$$15.9 \times (2\pi) \times 0.7 = 4.1 \times (2\pi) \times f_T \text{ ----------(3)}$$

Rearranging & simplifying (3):

$$\mathbf{f_T = (15.9 \times 0.7) / 4.1 = 2.71 \text{ rev / s}}$$