

Angular Momentum - YouTube | [Video questions 1 - 4](#)

Equation: $L =$ _____ in terms of v , $L =$ _____

Units _____

Rotational Momentum is _____ during interactions

1. You spin a ball of mass 0.18 kg that is attached to a string of length 0.98 m at $\omega = 5.2$ rad/s in a circle. What is the ball's angular momentum? **Answer $0.90 \text{ kgm}^2/\text{s}$**

2. A student is standing, with her arms outstretched, on a platform that is rotating at 1.6 rev/s. She pulls her arms in and the platform now rotates at 2.2 rev/s. What is her final moment of inertia (I) in terms of her original moment of inertia (I_0)?
Answer: $I = 0.73I_0$

3. An LP record is spinning on an old-fashioned record player with an angular velocity of ω . The record changer drops an identical record on top of the spinning record. What is the new angular velocity of both records (assume the record player doesn't add additional torque to keep the records spinning at the original ω)? **Answer $\omega = \omega_0/2$**

4. Calculate the angular momentum of a ballet dancer who is spinning at 1.5 rev/sec. Model the dancer as a cylinder ($I = \frac{1}{2} MR^2$) with a mass of 62 kg, a height of 1.6 m, and a radius of 0.16 m. **Answer $7.5 \text{ kgm}^2/\text{s}$**

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5. A student of mass 42 kg is standing at the center of a merry-go-round of radius 3.4 m and a moment of inertia of $840 \text{ kg}\cdot\text{m}^2$ that is rotating at $\omega = 1.8 \text{ rad/s}$. The student walks to the outer edge of the merry-go-round. What is the angular velocity of the merry-go-round when he reaches the edge? **Answer:** 1.1 rad/s
6. A ball of mass 0.14 kg attached to a string of length 0.64 m is spun in a circle with $\omega = 4.9 \text{ rad/s}$. What is the ball's angular momentum? **Answer:** $0.28 \text{ kgm}^2/\text{s}$
7. A platform is rotating at 2.2 rev/s and a student is standing in the middle of it with his arms at his side. He extends his arms straight out and the platform now rotates at 1.4 rev/s. What is his final moment of inertia (I) in terms of his original moment of inertia (I_0)? **Answer:** $I = 1.6I_0$

8. ~~A potter spins his wheel at 0.98 rev/s. The wheel has a mass of 4.2 kg and a radius of 0.35 m. He drops a chunk of clay of 2.9 kg directly onto the middle of the wheel. The clay is in the shape of a pancake and has a radius of 0.19 m. Assume both the wheel and the chunk of clay can be modeled as solid cylinders ($I = \frac{1}{2} MR^2$). What is the new tangential velocity of the wheel and the clay? **Answer:** 1.8 m/s~~

9. What is the angular momentum of a roller skater who is spinning at 1.5 rev/seconds? Model the skater as a cylinder ($I = \frac{1}{2} MR^2$) with a mass of 81 kg, a height of 1.8 m, and a radius of 0.18 m. **Answer:** 12 kgm²/s

10. A student of mass 59 kg is standing at the edge of a merry-go-round of radius 4.2 m and a moment of inertia of 990 kg-m² that is rotating at $\omega = 2.1$ rad/s. The student walks to the middle of the merry-go-round. What is the angular velocity of the merry-go-round when he reaches the middle? **Answer:** 4.3 rad/s