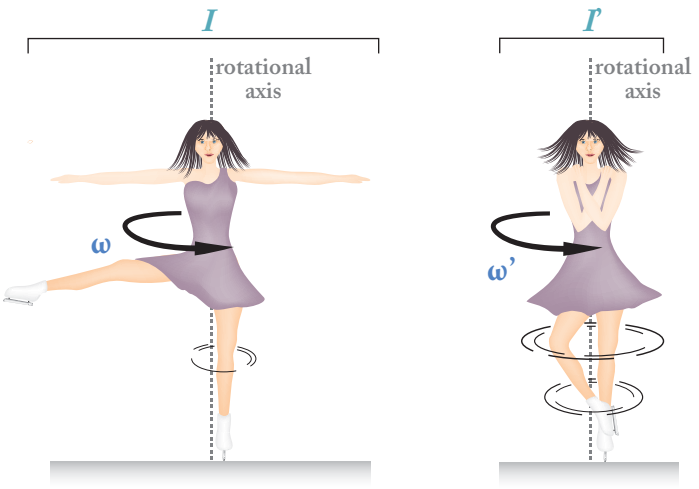
Figure Skating

One of the figure skating moves that makes us "ooh" and "aah" is the spin, where the skater rotates in one spot at a dizzying speed. The skater starts the spin with her arms out, and when she tucks them into her body, she goes even faster.

This is due to the law of **conservation of angular momentum**. It's harder to make a mass rotate around an **axis** that's far away than it is to make a mass rotate around an axis that's close. When a skater tucks her arms in, their mass is closer to the axis, so it's easier to rotate—this is called decreasing the **moment of inertia**. Because angular momentum is conserved, her rotation speed must then increase.



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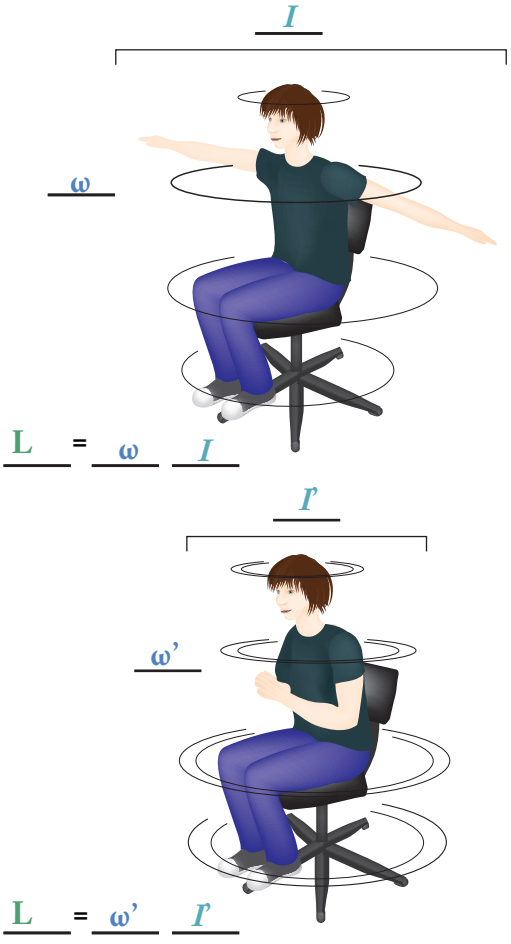
I : moment of inertia
ω : angular velocity

Label the diagram for the variables:
L : angular momentum
I : moment of inertia
ω : angular velocity



Try This!

1. Set a swiveling chair in an open room, making sure that while sitting in the chair with your arms and legs extended, you won't hit anything.

2. Sit in the chair and begin spinning by pushing off the floor with your foot. Fully extend your arms outward. Keep kicking until you get a good spinning velocity going.

3. Pull in your arms, holding them tightly to your chest. What happens? Why?

Explanation: The speed of rotation increases because of the law of conservation of angular momentum. This happens because the mass of your arms is closer to the rotational axis, decreasing the moment of inertia.

4. Extend your arms outward again. What happens now? Why?

Explanation: The speed of rotation decreases because the moment of inertia increases as the mass gets farther from the rotational axis.

→ You can repeat the experiment with light weights in your hands, like dumbbells or books, to see an even greater effect!