

Skater Spin

Spin just like a skater - without the ice.

WHAT TO DO

Sit with your legs crossed on the rotating pad. Spread your arms straight out as wide as you can while a volunteer spins you, then bring your arms together to your chest and you will spin faster.

WHAT'S HAPPENING?

The momentum of a moving object depends on both its mass and its velocity. The higher an object's velocity, the more momentum it has, and given the same velocity a more massive object will have more momentum than a less massive one. This is also true for objects that are spinning (rotating), and we call this angular momentum, which also depends on both its angular velocity (how fast it's spinning), and its mass. But for angular momentum it's also very important where all of the mass is positioned, which we call it's moment of inertia (think of it as angular mass).

As you spin with your arms wide you have some amount of angular momentum, and as long as friction doesn't slow you down, and your mass stays the same (i.e. you don't suddenly get heavier), your angular momentum remains constant. If you bring your arms into your chest you don't change your total mass, but you do change the *position* of some of your mass, and this makes your moment of inertia go down. Now the only way that your angular momentum can remain constant (which it must) is if your angular velocity also goes up, and this makes you spin faster. Spread your arms out again and you slow down, exactly the same way the ice skaters do it.