

SPACE - Spin Fast, Spin Slow



Credit: humbliceous.blogspot.com

Do you know, planetary orbits are slightly squashed circles (ellipses) with the Sun quite close to the centre?



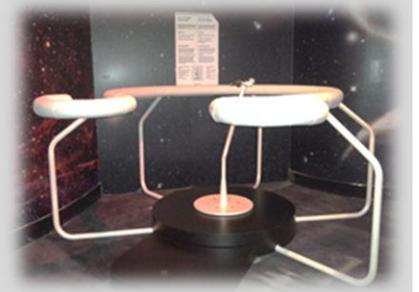
[Credit: davidturnswood.com/portfolio.html]



[Credit: Project Gutenberg Public Domain]

*Why does a figure skater spin faster when she pulls in her arms?
 Why do spinning tops take a long time to fall over?
 Why do athletes use rotating technique in hammer throw?
How are all this connected?*

Check out the **Stellar Platform** exhibit:
 Don't worry it's safe, as long as your friend doesn't push you when you're spinning!



What you just experienced is **angular momentum**. The same happens to a figure skater, spinning tops & the hammer throw.

Which of the following has or use angular momentum? [Put a **✓** against your choice].

• Springboard diving	_____
• Ballet pirouette	_____
• Swimming	_____
• Marathon	_____
• Frisbee	_____
• Boomerang	_____
• Spinning gyroscope	_____
• Gymnastics - asymmetric bars	_____
• Acrobats	_____
• Spinning a basketball on your finger	_____
• Freestyle skiing / aerial freestyle	_____



Freestyle skiing



Springboard diving



DO YOU KNOW?

1. An object in motion has **momentum** (object mass x velocity)
 - Momentum remains constant unless acted upon by an external force.
 - The heavier something is & the faster it goes, the more momentum it will have.
2. **Angular momentum** applies to a body rotating around a fixed object.
 - Depends on angular velocity (rotations per unit time about a particular axis direction), mass & where the mass is located.
 - Angular velocity of the object changes with the location (or distribution) of its mass.
 - For a constant momentum, mass nearer the axis will rotate faster than the same mass farther from the axis.
3. **Law of Conservation of Angular Momentum**
Angular momentum will stay constant as a system changes its configuration.

Example

- *Figure skater* pulling in or stretching arms to spin more quickly or slower.
- If the *Sun's rotation* slowed down, the Earth's rotation would speed up. As the Earth's rotation speeds up, the Earth's orbit would gradually spiral away from the Sun.

TO EXPLORE

Create spinning tops with everyday objects

Yes, its easier to buy one but don't you think its more fun to make your very own?

What you need

- Round recyclable plastic lids
- Skewer or sharpened pencil
- Hot glue gun or plasticene
- Washers or coins

What to do

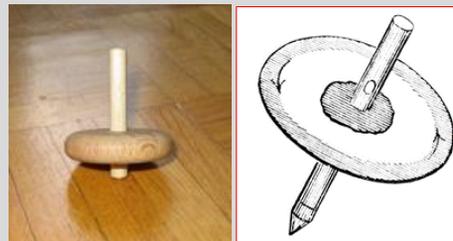
- Take your plastic lid & weight it with coins.
- Poke a skewer or pencil through the middle of the plastic lid.
- Decorate & spin it!

Note:

- You can use anything that is laying around your home.
- Explore with different sized tops & its position along the skewer or pencil.
- Observe what causes it to spin faster or slower, and when it becomes unstable.

What is going on

- The top balances on a tiny point & experiences minimal amount of friction.
- As friction slows the top: it becomes unstable, wobble, tip sideways & spin in a wider arc – trying to conserve its angular momentum.
- It eventually comes to a stop



Watch these!

- Figure Skating : <http://youtu.be/BeMoig-AJzk>
Boomerang : <http://youtu.be/ml2ne6YzUuM>
Freestyle skiing : <http://youtu.be/C-rZ5rfBtO8>
Gyroscope : <http://youtu.be/DsOU0WEc6OU>

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