sk8art

Grade Level:
high school

Subject Matter:
physics

Curricular Uses:
This lesson plan investigates the Law of Conservation of Angular Momentum.

Materials/Resources Required:
- internet access and computers

Evaluation:

Lesson Plan 15– Physics of a "Cat"

Overview:

This lesson plan investigates the physics involved in a "cat", or skateboarder, dropping through the air.

Learning Objectives:

- students will study skateboarding moves to investigate the physics involved in such moves

Procedures:

Introduction:
An object rotating about an axis tends to keep rotating about that axis. The resistance to change rotational motion is called the moment of inertia. Angular momentum is a product of the moment of inertia and the rotational velocity of an object. To visualize, think about ice skaters; they usually end their program with a spin. Their spin begins with their arms out, and as they want to go faster, they bring their arms in towards their body. As their arms are out, they are increasing their radius of rotation therefore creating a slower spin. Their arms out is a large moment of inertia and creates a small rotational velocity. When they bring their arms in, towards their axis of rotation, they are decreasing their radius of rotation, thereby speeding up. Arms in is a small moment of inertia and a large rotational velocity. These results are a consequence of the Law of Conservation of Angular Momentum; at all times, the angular momentum must remain the same. If one goes up, the other must go down.

Go to the website:
http://www.exploratorium.edu/skateboarding/trick_midair_activity.html
Do the activity located at the website. Please do not try this on your cat at home. Make certain you watch the upper body and the lower body.

Analysis/Questions:
1. Is your upper body following your lower body?
2. Name another example, not from skateboarding, of conservation of angular momentum.
3. What does this activity have to do with skateboarding?
4. Find two skateboarding moves that involve increasing/decreasing the moment of inertia therefore decreasing/increasing the rotational velocity.

Credit:

- http://set.lanl.gov/sports/skb8int.htm (Question 4)

Extended Activity:

see http://set.lanl.gov/sports/skb7int.htm (Questions 1-6)