

Racing Bowls

Teacher's Guide

The Initial View (Introducing the Activity)

The kids need a wide board for the taped bowls to race down side by side. If the board is longer than 4-5', that's ok! The rims of the cereal bowl need to be fairly flat, see the diagram. Don't hold the board at too steep of an angle, 10 degrees or so works pretty well.

Take a Deeper View! (More Science)

Rotational Kinetic Energy is the science term which is what this activity's about. Sounds complicated, but it's really not bad. Think of a figure skater starting to do their spin on one skate with their arms out. They have a certain amount of this rotational kinetic energy (an object's energy moving in a circle). When they bring their arms in, they start to spin faster, just like your bowls did when their **Mass** (how much **Matter** they have) was closer to their middle. So why do they go faster if they only have a certain amount of energy? You cannot destroy energy, that's the **Law of Conservation of Energy**, but you can use it in different places. When the skaters move their arms closer to their middle, they change where part of their mass is located. This makes them spin faster! When they put their arms back out, they slow down again! However they don't lose any energy! With their arms out it just takes more energy to swing them! The same thing happened with your bowls, only they can't compete for a gold medal!!!! The steel balls' locations is just like moving the skater's arms! It changes where their mass is located!

More and Bigger Views! (Additional Classroom Ideas)

1. Try the activity again using larger wheels or bowls and heavier weights.
2. Watch a videotape with figure skaters and watch for what we learned!
3. Is it easier or tougher to swing a long bat compared to a shorter one? (tougher) Which one could hit the ball farther, given the same bat speed? (the longer one) Explain what's happening.
4. Are bigger tires easier or tougher to move? (tougher) Tell why you think this.
5. Research how gyroscopes work with their spinning wheels!
6. Look at various spinning objects and find their **Center of Rotation**. For smoothly turning wheels, it will be easy! The point where they are spinning best is the center of rotation.
7. An out of balance tire is *trying* to turn around their center of rotation, but can't. Explain why the tire store puts those little tire rim weights when they "balance" a tire? If you've ever driven a car with a tire out of balance, you can attest to this science!
8. Research the wheel's history. When do they think it was invented? How have they been changed over the years? Write about what you've learned.
9. Investigate the Olympic sport of "hammer-throwing". Compare this to your bowls.
10. See how slow you can make the "outside" bowl turn by adding more weights in different places. Compare this activity to small wheel bicycles and large wheel bicycles!
11. Make a list of things which spin, move in a straight line, and move in a curved path.
12. Visit a tire store to find out how best to care for tires to increase gas mileage, make the tires last longer, and always remain safe. Make a set of safety posters to put in local stores to remind people of good tire care!
13. Compare this activity with the gears and chain on a bicycle!!

Answers

1. (still the "inside" bowl, but not by as big of margin)