

MONSTER SCIENCES

Making science fun!

AN EXPERIMENT ABOUT

FORCES

TRICK BALL

What you will need:

- A ping pong ball
- A flat headed pin
- A marker
- A pen and paper

What you will do:

- 1 Roll the ping pong ball across the table. Watch what happens.
- 2 Take the marker and write the number 1 on the ball. Then turn it over and write the number 2 exactly opposite the number 1. Now turn it side on, and write the number 3 halfway between the 1 and 2 on one side and the 4 opposite the 3. Now there should be 2 spaces left at the top and bottom to put the numbers 5 and 6.
- 3 Roll it again 20 more times and write down the number that is closest to the top of the ball when it comes to a stop.
- 3 Now push a pin into the ball at the number 1 so that the head of the pin is flat against the surface of the ball. **BE VERY CAREFUL - THE PIN IS SHARP! TRY NOT TO PUT A DENT IN THE BALL.**
- 4 Now roll the ball across the table 20 times and write down the number that is closest to the top of the ball. **IS IT DIFFERENT TO WHAT IT DID BEFORE YOU PUT THE PIN INTO IT?**

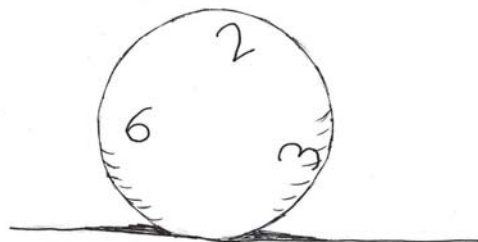
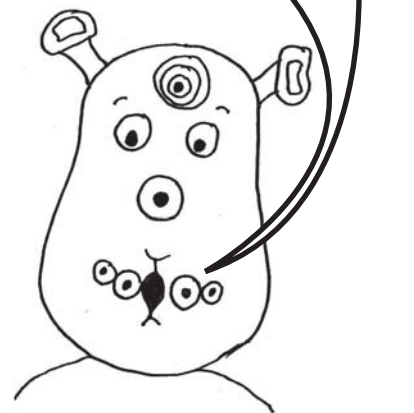
What is going on?

Before the pin goes into the ball, it's center of gravity is exactly in the middle of the ball so it is ballanced when it rolls and can stop anywhere. But once you put the pin into it, the weight of the pin changes the center of gravity and the ball reacts differently when you roll it.

Monster Challenges:

- What would happen if you put another pin in at the number 2? What about if you put it at the number 4?
- Find out what a "loaded dice" is. Can you explain why they are banned?
- Turn the ball into a magic trick - convince your friends you have put a spell on the ball to make it always stop in the same place!

Amaze your Friends with this trick ball!



TEACHING NOTES:

Monster Sciences Experiment: Forces F05

Topic: Forces - moving the center of gravity

Suitable for Ages: 8 -12+

Key Concepts:

The location of the center of gravity of an object affects how it moves.

Resources:

- Experiment Description Forces F05 – one copy per student
- Investigation Report IR01 - one copy per student
- ping pong balls, flat head pins, markers, pens and paper

Lesson Notes:

Putting the numbers on the ball is hard to describe so I always demonstrate it first and then step the kids through it one number at a time. You will need to remind them to be very careful with the pin and show them how to push it carefully into the ball so that they don't dent it.

I always do this experiment in pairs or small groups so that they can discuss their observations and discoveries.

Remind students to listen carefully to instructions, and to OBSERVE their experiment.

As a class discuss the experiment prior to undertaking it, and students should complete the sections of their Investigation Report IR01 from "Title to "Hypothesis".

What should happen in this experiment, and why?

Without the pin the ball should roll freely and stop with a random number at the top of the ball. Once the pin goes in at the number 1, the ball should roll in an arc and stop with the pin at the bottom and the number 2 at the top. This is because the center of gravity has been moved from the center of the ball to the side by the weight of the pin.

Follow up questions:

- What would happen if we half filled the ping pong ball with water?
- If a soccer ball had a nail in it, how would it affect the game? What about a tennis ball?