

# COUNTER INTUITIVE AND ABRACADABRA EVENTS

by

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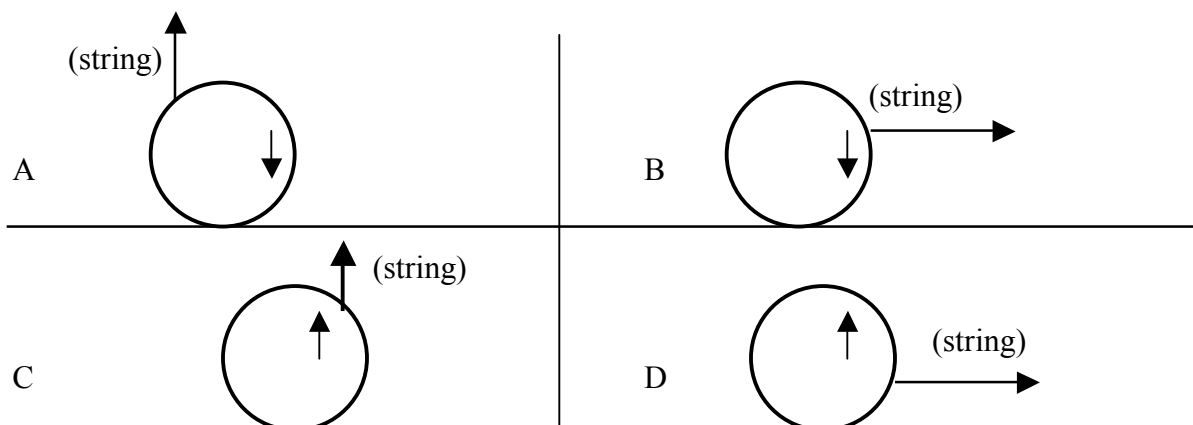
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Counter intuitive or discrepant events can be found everywhere in the world. They baffle and puzzle the novice, but we science teachers who know some of the basic theories and laws of science, *can* explain them...or can we?

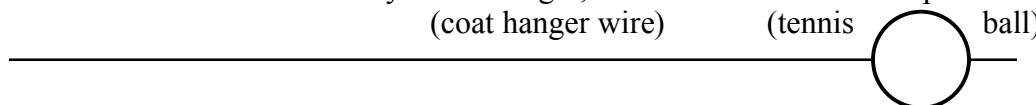
The following events seem to disagree what our intuition as well as the theories and laws of science. But they are not beyond the realm of a reasonable explanation. Can you explain why each one happens? Write on these pages. Get the EXPLANATION pages on the way out.

**1. THE GIANT YOYO.** A giant model of a YOYO is pulled by its string in various ways along a table top. Can you predict how it will react to the force applied through the string represented by the long arrow. The short arrow on the YOYO shows the direction in which string is wrapped. Draw prediction arrows on the above diagrams.



Hint: This deals with Newton's 1<sup>st</sup> and 2<sup>nd</sup> Laws of Motion.

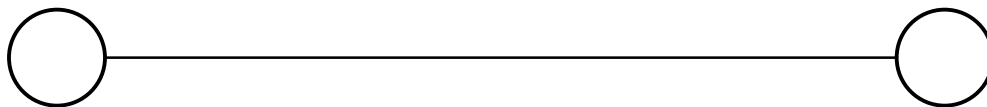
**2. A BALL ON A WIRE.** A coat hanger is straightened and inserted through hole in a tennis ball. If you were to balance it horizontally on one finger, where would the balance point be?



Suppose the ball and wire were now balanced vertically on one finger. What would be the best way to do this, **ball up**, or **ball down**? (predict)

Try it. What happened? Explain why this happened.

**3. TWO BALLS ON A WIRE.** Suppose you were to add another tennis ball to the other end of the wire. If you were to balance it horizontally on one finger, where would the balance point be?



Suppose you were to bend the wire at the horizontal balance point. Could you then balance both balls on the wire on one finger? Try it. What happened?

Could you re-bend the wire of the two-ball system to resemble a **letter of the alphabet** so that it would always be in balance on one finger? Do it!! Why does it balance better in this new configuration?

**4. MIRACLE GLUE AND EGG CARTON.** An egg carton full of eggs is instantly glued to the outstretched hand of a person and remains there, without falling and breaking any of the eggs. What kind of MIRACLE GLUE is this?

**5. VARIOUS CARTESIAN DIVERS.** Various Cartesian Divers will be shown beginning with the standard one made of a soda straw ballasted with paper clips in a capped soda bottle of water. What causes the diver to dive?

A variation of it will be shown with a soda straw diver at the bottom of a tall tube of water with a spigot in it. The spigot is opened and as the water drains what do you think will happen to the diver?

Why does this happen?

**6. THE ORANGE WITH A LIFE JACKET.** An intact orange is put into a container of water. What should it do?

The orange is peeled and again placed into the water. Now what will it do?

The peeling is again wrapped around the peeled orange and it is placed into water. What should it do now?

Explain why all of this occurs.

**7. BUOYANCY IN FREE FALL.** Buoyancy is one of the temporary forces found on Planet Earth. Suppose you have a tube sealed at both ends, which contains water, and an object that can float in the water. Suppose you invert the tube so that the floating object is at the bottom of the tube. As the floating object begins going upward, you release the tube and allow it to freely fall.

What will the floating object do while in free fall?

Explain why this happens.

**8. THE HANGING CHAIN.** Two chains are hung from a horizontal support such that the distance between the ends of each is the same as the maximum distance from the horizontal support to the lowest point of the chain. How will each of the chains appear?

What is name of this shape?

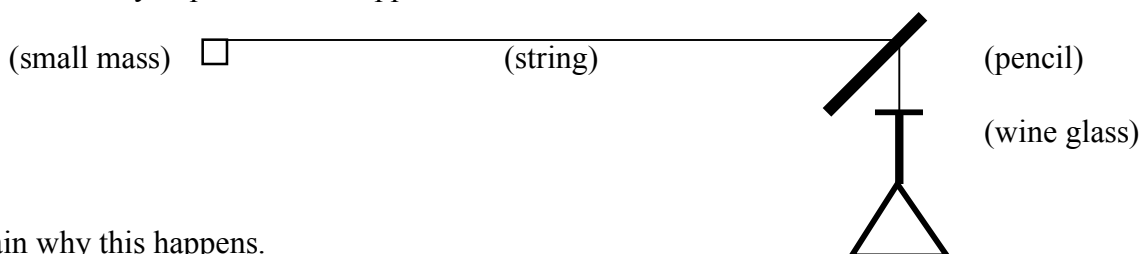
Why does this happen?

**9. COUPLED PENDULUMS.** Three pendulums are suspended from a string stretched between two supports. Two are identical in length. The other is shorter. The bobs are identical. One of the longer of the pendulums is set into motion. What do you predict that the other two will do?

What did you observe happening?

Explain why this happens.

**10. THE FALLING WINE GLASS.** A wine glass is suspended from a piece of string going over a held pencil. A small mass is attached to the other end of the string and is held parallel to the floor. If the string is released, the small mass is not enough balance the mass of the wine glass. What do you predict will happen?



Explain why this happens.

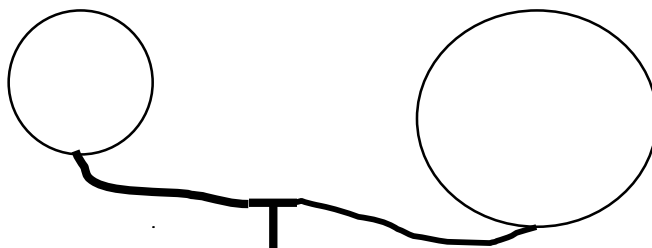
**11. SINGING WINE GLASSES.** Two identical wine glasses, one half filled with water, are made to sing by stroking the rims of each. How will the produced tones compare?

Explain why this happens.

Is there any other way to cause a wine glass to sing?

**12. THE LOST BEAKER.** A small beaker is placed into a larger one. A clear liquid is poured into the small one and soon overflows into the larger beaker. When the larger beaker is filled with the clear liquid, a curious thing happens to the small beaker. Observe and see if you can explain this.

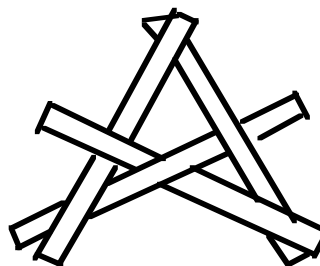
**13. THE TWO-BALLOON PARADOX.** Two balloons are joined by airtight tubing system and a T coupling. The balloons are each inflated to different sizes. When the air is allowed to pass back and forth between the balloons, what do you predict will happen?



Explain why this happens.

**14. THE KINETIKOS.** (A.K.A. Popsicle Stick Bomb) converts your muscular energy into potential mechanical energy. When the KINETIKOS is allowed to strike a hard surface, what will happen to the energy?

The Kinetikos--Interlock the four popsicle sticks as shown in the diagram to the right. Toss it and let it land on a hard surface. What do you predict will happen? Why does it happen?



**15. A WIDE RUBBER BAND.** Hold the rubber band slack, between your index fingers, against your forehead. How does it feel temperature wise? Now pull it rapidly while it is still against your forehead. What do you feel now?

Move the rubber band away from your forehead. Stretch it taut then move it to your forehead. How does it feel temperature wise? Now allow it to go slack while against your forehead. What do you feel now?

Explain why all of this happened.