Mr. Fish's
Phenomenal Physics

Teacher's Study Guide

About the Performer

John Lepiarz (aka "Mr. Fish") is a longtime professional circus performer. He toured for 7 years with the Big Apple Circus and has appeared on national television on HBO and ABC's *Great Circus Performances of the World*.' He has toured his own 2-man show, *The Funny Stuff Circus*, to Hong Kong, Taiwan, and all across the United States. A graduate of Oberlin College, Mr. Lepiarz is the proud father of three children and lives in Madison, New Jersey.

About the Performance

***Phenomenal Physics* helps students realize that science is interesting, fun, and something they can do. The program encourages exploration and experimentation. It develops curiosity and inspires children to seek more information for themselves. The performance demonstrates seemingly impossible circus tricks that actually have scientific explanations. Using student volunteers, Mr. Fish will demonstrate that:**

- **You cannot crush an egg in your hand**
- **You can put a needle through a balloon without it exploding**
- **You can make and throw your own boomerangs**
- **You can create a sonic boom**

Mr. Fish demonstrates these and many more scientific phenomena in a lively, fun, and entertaining way.

Themes:

- ***Aerodynamics***
- ***Creativity***
- ***Illusions***
- ***Knowledge***
- ***Logic***
- ***Mathematics***
- ***Nature***
- ***Phenomena***
- ***Physics***
- ***Science***

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Glossary

The terms below are used and / or explained in *Phenomenal Physics.*

aerodynamics — The study of flight through the air.

air pressure—An invisible force always pulling in all directions at the same time.

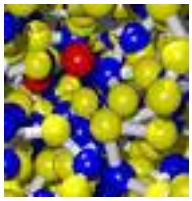
arch — A semi-oval structure that can be seen in bridges, churches, and the Roman Coliseum.

friction — The force that pushes against a moving object, causing it to stop

gravity—the downward pull on all objects toward the center of the

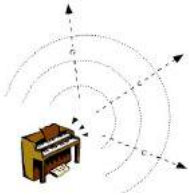
inertia — The resistance that an object has to having its motion

polymers — Substances made up of very large molecules that tend to stick together.

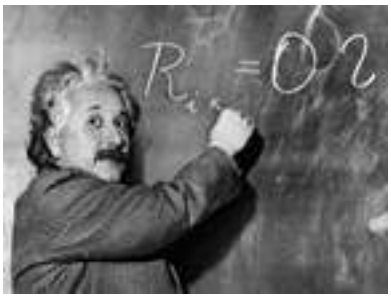


sonic boom — Created when an object travels faster than the

speed of sound — The length of a football field in less than one second.



velocity — The speed at which an object travels: distance divided by time.



Albert Enstein

SCIENTIFIC THEORY - Science does not assume it knows the absolute truth about the world. Rather, it assumes that we must *discover* the truth. Science presupposes a regular order to nature and assumes there are underlying principles according to which natural phenomena work. It assumes that these principles or laws are relatively constant, but does not assume that it can know for certain what these principles are or the actual order of any set of empirical phenomena. A "theory" is our *best guess at the time* with the observations and information generally accepted by most scientists.

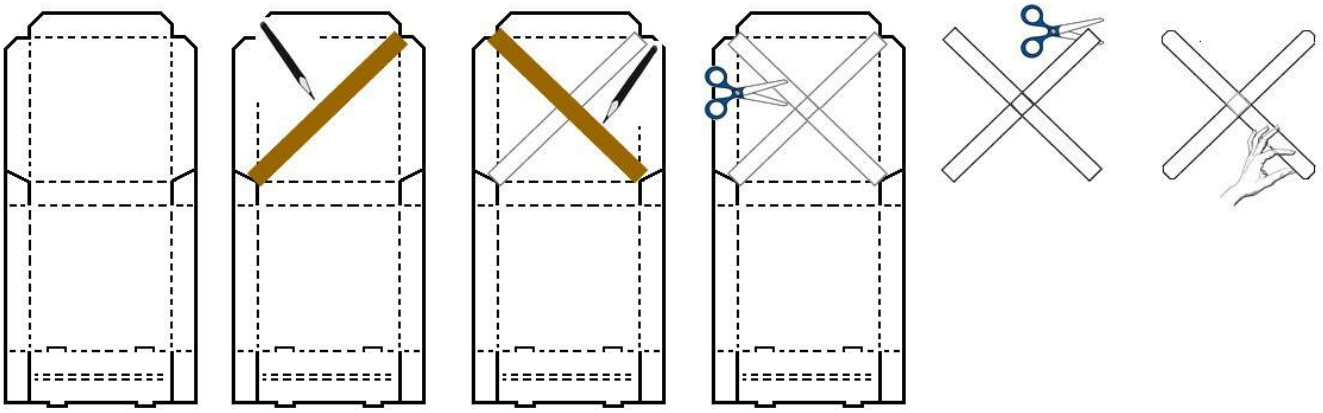
True Story: Albert Einstein and a friend were out walking on a cold, grey, cloudy day. Both were wearing hats and overcoats. It began to rain. Einstein immediately took off his hat and stuffed it inside his overcoat. His friend, noticing this, said, "Why did you take your hat off? It's beginning to rain!" Einstein replied: "If my hat gets wet, it will take hours to dry out. My hair I can towel dry in less than a minute!"

POST-SHOW ACTIVITY SUGGES-

Here are some activities in which you may wish to engage your students after they've seen *Phenomenal Physics*.

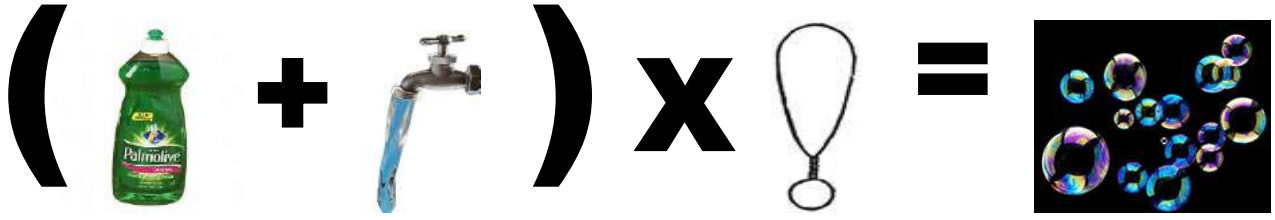
AERODYNAMICS: Make your own kid-safe, environmentally-friendly

1. Unfold a pizza box. **2. Trace around a ruler.** **3. Flip the ruler , and** **4. Cut out the X.** **5. Round off the ends of** **6. Bend the tips of the X**



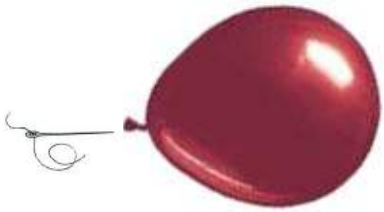
Flying Tips:
1. **Find an open area outdoors (or a gymnasium) and away from other people.**
2. **With your arm raised, hold the boomerang with the blades pointing up and down, and the curved tips pointing in to you.**
3. **Throw the boomerang with a quick snap of your wrist, using just a little force, like a baseball.**
4. **Adjust the folds to make the boomerang fly better.**

POLYMERS: Soap bubbles



To make bubbles, mix 1 part dishwashing liquid with 3 parts water. Make bubble wands out of light

AIR PRESSUE: Stick a needle in a balloon with it breaking



Blow up a balloon fully, let some air out to make it spongy, then tie the end. Insert a needle around

ARCHES: Test the strength of an arch by attempting to crush an

Place an egg in the palm of your hand. Wrap yor fingers around it. Keep your thumb extended. Squeeze as hard as you can. The egg will not break.

Make sure thumb is ex-

FRICTION, SPEED, AND INERTIA: Pull a paper out from under a cup

Put a piece of paper on a smooth table. Put a plastic plate on the paper, and then put a plastic cup on the plate. Pull the paper out using one quick, continuous motion.

CAUTION: Do not try this with a tablecloth, chair, and your little brother or sister. This should be attempted only by trained professionals like Mr.

RECOMMENDED RESOURCES

***EVERYDAY SCIENCE EXPLAINED*, published by The National Geographic Society. This hard bound book is one of the best and complete science books ever published for general audiences. It contains in-depth explanations of scientific principals, has an extensive vocabulary listing, and explains the history of scientific discoveries.**

Books by Janice Van Cleave, the author of numerous books that teach science to children. The subjects range from magnets to microscopes, geography to astronomy. Many are designed specifically to aid students in their work on science projects. For a complete list of all titles available, visit her web-

HOSTING THE PERFORMANCE—Mr. Fish will arrive at your school approximately one-half hour prior to show time. He can perform on your stage if it is well lit and has a dark, solid colour backdrop. Otherwise, he may perform at one end of the gym on the floor. He will need access to an electrical outlet, a changing room, and access to running water.

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