

New Teacher Workshop -- Goodie Bag Notes

Stefanie Finander

1. **GALAXY WAND** (brightly colored plastic tube with fiber optics sticking out) It's like a flashlight with a bunch of fiber optics. It's great when you're talking about total internal reflection and optical fibers. Try to get them to figure out where the colors come from (there's a multicolored filter under the fibers).

[*Oriental Trading Company (800) 228-2269, Item #KM-23/95 \$9.95 per dozen.*]

2. **HOPPER POPPER** (marble colored hemisphere) (a.k.a. Eye Popper)

Turn it inside out and place it on the table. Voila! Spring-type potential energy turns into kinetic energy, which turns into gravitational potential energy. Try handing them to lab groups and asking them to calculate the speed of the hopper popper the moment it leaves the table.

[*Oriental Trading Company (800) 228-2269, Item #KM-16/454 \$2.95 per dozen.*]

3. **GLOW IN THE DARK SPRING TOY** (plastic slinky)

An apparatus you can use twice! Use it to demonstrate all kinds of waves. You can do great transverse pulses if you get a student to hold the other end and extend it about 2 meters. You can do longitudinal pulses if you stretch it across a long table or the floor and compress five or six coils together and then let go. You can make transverse standing waves with one end in each hand -- this would be closed at both

ends, $f = \frac{nv}{2l}$. You can make transverse standing waves open at one end $f = \frac{nv}{4l}$

($n = 1, 3, 5, 7, \dots$) by dangling it vertically and turning gently in circles [thanks, Paul Doherty]. THEN you can use it again later to demonstrate phosphorescence.

[*Oriental Trading Company (800) 228-2269, Item #KM-9/449 \$9.95 per dozen.*]

4. **PULL-BACK RACE CAR**

Put the car on the table. Push down so the wheels contact the table well and make the car go backwards. Let go. Have the students measure this velocity and then ask them to do some calculations and put a mark on the floor where the car will land when launched off the lab table. For more-advanced students, just let them watch you launch the car off a platform of a given height and measure where it lands and then put the mark on the floor where it will land when launched off the lab table [thanks, Clarence Bakken].

[*Oriental Trading Company (800) 228-2269, Item #KM-5/233 \$9.95 per dozen.*]

5. **SLIDE FLUTE**

You can use this to demonstrate that the frequency of the note depends on the length of the air cavity. It's very easy to play. For more advanced physics of music you can discuss how the fipple hole works. It's open at one end, so $f = \frac{nv}{4l}$

($n = 1, 3, 5, 7, \dots$)

[*Oriental Trading Company (800) 228-2269, Item #KM-12/180 \$2.95 per dozen.*]

6. BUBBLES

Besides the fact that your students will be amazed that you're blowing bubbles at them, it's about thin-film interference. If they look carefully they will see swirls of magenta, cyan, and yellow due to the destructive interference of green, red, and blue. You can even calculate the thickness of the soap film.

[Oriental Trading Company (800) 228-2269, Item #KM-12/635 \$3.95 per dozen.]

7. SQUEEZE ROCKET

This is loads of fun and safe for use indoors. I'm sure there are a few labs to be done on projectile motion, in addition to fun demos.

[These are from Oriental Trading Company (800) 228-2269, Item #KM-16/450 \$7.95 per dozen. The name brand is D&L Company, (800) 632-8869. They'll give you a nice discount if you fax them a letter on school letterhead.]

8. YO-YO

What goes down usually stays down, right? So why does the yo-yo come back up? Most people will say because it's spinning. But try it with a string tied to a rock. You can discuss the role of friction in the spinning, in regular yo-yo-ing and in "sleeping."

[Oriental Trading Company (800) 228-2269, Item #IN-39/1284 \$5.95 per 2 dozen.]

9. WHIZZERS (small brightly colored cylinders)

Blow into the large end—they're sirens! The frequency of the sound is determined by the rotation of the small disk with holes.

[Oriental Trading Company (800) 228-2269, Item #IN-39/578 \$4.95 per 6 dozen.]

Some fun items we did NOT include:

1. DOMINOES

You can find many uses for these but there's a lab in Conceptual Physics which has the students line them up and knock them over and measure the (constant) velocity.

[Oriental Trading Company, Item #IN-27/689 \$1.95 per 28, Item #IN-27/781 \$5.95 per 250.]

2. SAXOFLUTE

It's a recorder that you can design yourself. There is a mouthpiece, a bell, many pieces of curved pipe, and three pieces of straight pipe with finger holes. You can change the length (changing the pitch), change the shape (which shouldn't change the pitch), cover and uncover the holes, try it with and without the bell. If you leave out the straight pieces and the bell, you can cover the end with your hand and have a pipe closed at one end.

[Learning Express. Item #1CQA4170, \$7.99. Find your nearest store at www.learningexpress.com or call the store in Belmont (650) 654-4644 – they said they'd be happy to ship them to you.]

3. WHIRLING WHISTLE TUBE (long, corrugated plastic tube)

It's a musical instrument that anyone can play. Grasp one end and whirl the other end around in circles. Try different speeds and you can get the harmonic series (for a pipe open at both ends, $f = \frac{nv}{2l}$).

[Exploratorium Store (415) 561-0360.]

4. ENERGY BALL (looks like a ping-pong ball)

When you hold it in your hand, it lights up and makes a sound. Ask the students to help you figure out what turns it on. (You have to make an electrical connection between the metal pieces.) Test the conductivity of different objects by using them to bridge the gap. Have one person touch one contact and another touch the other and notice that it doesn't turn on unless the two people are touching. Maybe the whole class will want to hold hands to complete the circuit. Since there is so little current, it's safe to use with even the smallest physics students

[American Science and Surplus, (847) 982-0870, Item #89911, \$4.50 each]

6. HAPPY AND UNHAPPY BALLS

They look the same, but one bounces and the other doesn't. Discuss elastic and inelastic collisions. Discuss why things bounce in the first place. If you get them really cold (like ice water), the unhappy ball bounces and the happy one doesn't.

[Arbor Scientific, (800) 367-6695]

7. EYE POPS

This is a new item from Arbor Scientific [(800) 367-6695] that they say is really fun and demonstrates Bernoulli's principle.