

THE DEMONSTRATION CORNER

ONE-MINUTE EXPERIMENTS

by

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Something wonderful happened in my Physics 21 class just before Christmas last year. There was excitement, wonder, great mutual support, and just plain fun as one hundred and twelve students demonstrated 52 experiments in 52 minutes.

Are you familiar with the idea of the one-minute paper? At the end of the class, students are asked in one minute or less to write down the best thing, or the worst thing, or the obscurest thing that happened that day. It is one way of getting a read on the mood of the class, and finding out what went well and what didn't. In Physics 21, *Physics for Non-Scientists*, most students are from the Faculties of Arts or Social Science and are taking the course because they have to take at least one course from the Faculty of Science. This is not a lab course, but I have wondered how to encourage everyone to try some experiments at home, perhaps in the kitchen using the materials from the grocery store, such as plastic wrap or aluminum foil. Then came the idea of a One-Minute Demonstration.

I challenged the students to do a One-Minute Experiment at the last lecture before Christmas, either in pairs or alone. Would this experiment work? Could we really do demonstrations at the rate of one every minute? Would they be interesting? Would we see an aluminum can filled with steam collapse 52 times?

This occasion was a highlight of my teaching career, an hour that I shall always treasure. Cans collapsed. Volcanoes erupted. Lasers lit. Rainbows glowed. Prisms parsed light into colour. Battleships floated in bathtubs. Pennies sank. Balloons popped. Aeroplanes flew. Paper bridges collapsed in the wind. Bubbles drifted over us all.

To get started, I made a list of 50 experiments. A trip to any science or children's museum will turn up a book or two of suggestions. I happened to use *Science Is* by Susan Bosak, published by The Communications Project, 164 Tomlinson Circle, Markham, Ontario L3R 9K2, and *Science Wizardry for Kids*, Margaret Kenda & Phyllis Williams, published by Barrons 1992. Both of these are marvelous books.

1. Find the Invisible Spaces between molecules. 1 Cup of water + 1 cup of rubbing alcohol does not equal 2 cups.
2. Prove that the invisible molecules are moving. Leave a glass several hours. Put in a drop of food colouring. After several hours, the water is all 1 colour.
3. Prove that molecules move faster when hot. Repeat the above with hot and cold water.
4. Make a model of the water molecule.
5. Make models of other molecules or crystal structures.
6. Make a volcano out of baking soda, vinegar and food colouring.
7. Make an acid-base indicator from red cabbage.
8. Use it to test for acids and bases.
9. Does (your favourite pop) really dissolve teeth?
10. Burn a candle inside a glass inverted and sitting in water.
11. Put some steel wool inside an inverted glass sitting in water. Leave it a week.

12. Put vinegar, salt, copper pennies and a nail into a glass and let it sit for a while.
13. Make a pinhole camera.
14. Show that water expands when it freezes.
15. Find the freezing point of salt water.
16. Hang a piece of wire over an ice-cube and show the wire goes through the cube.
17. Grow a crystal.
18. Make a kaleidoscope.
19. Explain how a mirror works.
20. Why does a mirror reflect left to right, but not upside down?
21. Demonstrate how light bends when it enters water.
22. Put out a candle with a sound wave.
23. Make music with bottles filled to different depths with water.
24. Make waves on a string or on water or in air.
25. Make a musical instrument.
26. Make a battery from a paper clip, copper wire and a lemon.
27. Make static electricity.
28. Use a prism to make a rainbow.
29. Use a fine net curtain to make a rainbow.
30. Look at different street lights with your prism or your fine net curtain.
31. Split up the colours in a felt marker. Use paper towel with one end in water. Drape the towel over the edge of the glass, and colour it just above the water level. (This is *chromatography*.)
32. Float a needle on water.
33. Explain why battleships float, but pennies sink.
34. Make a cardboard boat to hold lots of pennies.
35. Blow a big bubble.
36. Blow a little bubble.
37. Use a piece of paper to demonstrate lift.
38. Make a paper aeroplane. Explain how you improved its design.
39. Make a kite and fly it class.
40. Make a parachute.
41. Make a windmill.
42. Do an experiment on centre of mass.
43. Do an experiment on levers.
44. Do an experiment on tension in strings.
45. Make a sundial.
46. Make a pendulum. Use different masses and lengths.
47. Make a coupled oscillator. We have a few film loops on this.
48. Compare how quickly a glass of water (the *Oceans*) and an identical glass of sand (the *continents*) heat up.
49. Compare how quickly a black covered glass of water heats up compared to a white covered glass.
50. Build a wind vane.

If you try the One-Minute Experiment, please let me know how you find the experience.

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Submissions describing demonstrations will be gladly received by the column editor.