

Electromagnetic Field Demo

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This is a powerful demonstration that will help your students understand radio waves and perhaps be better able to visualize how radio waves travel. For this demonstration you will need a length of common copper pipe and PVC pipe and a very strong slug magnet. Try www.gaussboys.com as a source of magnets. Their number 10 magnet, a cylinder about 5/8 inch in diameter is a good size. The pipes should be sufficient diameter to allow the magnet to pass through, 3/4 inch pipe should work.

Talk with the students about the concept of magnetism and magnetic fields. Talk with the students about electric current. Demonstrate that the magnet is in fact a magnet by having it stick to a ferrous metal. Demonstrate that the magnet does not stick to the copper or PVC pipe and explain why.

Pose the question. Have the students predict what will happen then have each drop the magnet through the pipe to test their hypothesis. (the magnet falls slowly through the copper pipe, falls right through the PVC) Discuss what the students observe.

What you are demonstrating is the two fundamental principles of electronics:

1. Any time a magnetic field moves, it causes electrons with the vicinity of the field to move.
2. Any time an electron moves, it creates a magnetic field.

So what is happening is that the moving magnet (field) causes electrons in the copper to move. Those moving electrons in the pipe in turn create an opposing magnetic field that prevents the magnet from falling right through. The magnet falls right through the PVC because the PVC is an insulator...no electrons allowed to move therefore no opposing magnetic field.



Note: The rare earth magnet needed for this demonstration can be purchased from www.gaussboys.com.