Answer #350

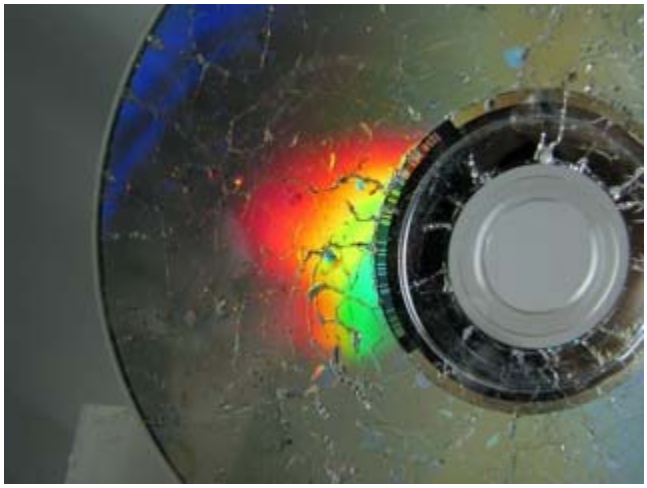
The answer is (c); sparks will fly from the CD, as can be seen by clicking your mouse on the photograph below.

The physics behind this phenomena is quite fascinating. Any electromagnetic wave, including the *microwaves* used in a microwave oven, contain both electric fields and magnetic fields as they propagate. (For a quick refresher, check out a model here.)

CDs, despite their outward appearance, aren't made entirely of plastic; indeed a thin metallic layer (usually comprised of aluminum, silver or gold) is used to act as a reflective surface necessary for the laser to read the data from the disc. Aluminum, silver, and gold are--needless to say--extremely effective conductors.

When the microwaves's electric fields brush past the surface of the CD, electric potentials are formed along the conductive film layer, pointing from the higher potential to the lower potential of the wave. The electric potential difference is so great that sparks fly across the surface as currents are created between them, the sparks in turn heating the surface of the CD.

Below is a closeup of the ~~destruction~~ phenomena. If only you could smell the sweet fragrance of burnt plastic through the web...



The "take home point" of this experiment is to demonstrably show that electromagnetic waves contain electric fields.

Question of the Week

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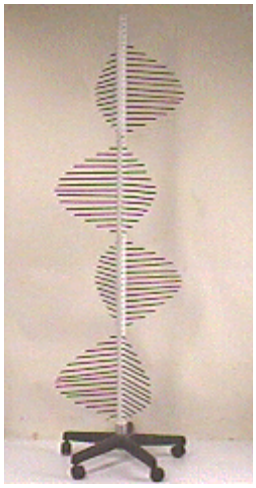
For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.



K8-01: ELECTROMAGNETIC WAVE - MODEL

PURPOSE: To show the relationship between the electric and the magnetic field vectors in a plane-polarized traveling electromagnetic wave.

DESCRIPTION: Red pegs represent the electric field vector and blue pegs represent the magnetic vector. The spatial relationship between these vectors and the direction of propagation can be seen. By moving the model along its axis the temporal aspect of the wave can be shown. Our wave has a wavelength of 0.81 meters, and a frequency of 370MHz, placing it between TV channels 13 and 14.

SUGGESTIONS:

REFERENCES: (PIRA 5N10.80)

EQUIPMENT: Electromagnetic wave model, as photographed.

SETUP TIME: 10 minutes.

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