

*Chain reaction*

# Chain Reaction

**Purpose**

To simulate a simple chain reaction

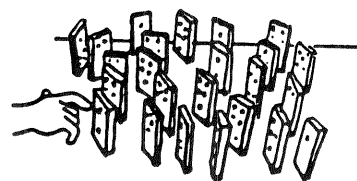
**Required Equipment and Supplies**

- 100 dominoes
- large table or floor space
- stop watch

**Discussion**

Give your cold to two people who in turn give it to two others who in turn do the same on down the line and before you know it everyone in class is sneezing. You have set off a chain reaction. Similarly, when one electron in a photomultiplier tube in certain electronic instruments hits a target that releases two electrons that in turn do the same on down the line, a tiny input produces a large output. When one neutron triggers the release of two or more neutrons in a piece of uranium, and the triggered neutrons trigger others in succession, the results can be devastating. In this activity we'll explore this idea.

Fig. A



**Procedure**

**Step 1:** Set up a strand of dominoes about half a domino length apart in a straight line. Gently push the first domino over, and measure how long it takes for the entire strand to fall over (just like those television commercials).

**Step 2:** Arrange the dominoes as in Figure A, so that when one domino falls, another one or two are toppled over. These topple others in chain reaction fashion. Set up until you run out of dominoes or table space. When you finish, push the first domino over and watch the reaction. Notice the number of the falling dominoes per second at the beginning versus the end.

**Summing Up**

1. Which reaction, wide-spaced or close-spaced dominoes took a shorter time?

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2. How did the number of dominoes being knocked over per second change for each reaction?

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3. What caused each reaction to stop?

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4. Now imagine that the dominoes are the neutrons released by uranium atoms when they fission (split apart). Neutrons from the nucleus of a fissioning uranium atom hit other uranium atoms and cause them to fission. This reaction continues to grow if there are no controls. Such an uncontrolled reaction occurs in a split second and is called a *nuclear explosion*. How is the domino chain reaction similar to the nuclear fission process?

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5. How is the domino reaction dissimilar to the nuclear fission process?

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