APPARATUS NOTES

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This department in collaboration with the Committee on Apparatus of the AAPT will welcome the submission of brief communications reporting new equipment, techniques, or materials of interest to teachers of physics. Notes on new applications of older apparatus, measurements supplementing data supplied by manufacturers, information which, while not new, is not generally known, procurement information, and news about apparatus under development are suitable for publication in this section. Neither the *American Journal of Physics* nor the Editors assume responsibility for the correctness of the information presented. Submit materials to: Bruce G. Eaton, Department of Physics, University of Minnesota, 116 Church St. SE, Minneapolis, MN 55455.

Domino "chain reaction"

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We have developed a simple and dramatic demonstration of exponential growth, as in a nuclear chain reaction. The apparatus utilizes the fact that a domino can knock down another one which is about $1\frac{1}{2}$ times larger in all dimensions. Since the gravitational potential energy of an upright domino is proportional to the fourth power of its size, a very small amount of input energy can be amplified quickly to knock down an impressively big domino.

Our set, shown in Fig. 1, was made from standard thicknesses of commercial acrylic sheet, so that only the edges had to be machined. The larger ones are most cheaply made by laminating thinner sheet. Table I gives the dimensions used for our dominos. The dominos were sandblasted so as to have a uniform appearance, and are set up on a smooth surface, spaced so that each domino is approximately its own width from the next larger one.

It is easy to calculate that about 0.024 μJ of input energy is required to topple the first domino. (This can be supplied by nudging it with a long wispy piece of cotton batton.) It is also easy to show that domino number 13 releases about 51 J of energy when it topples—an amplification factor of about 2 billion. A simple calculation shows that if the series were continued, domino number 32 could be the twin towers of the World Trade Center!

Fig. 1. Photo of dominos in mid-fall.

Table I. Dimensions for dominos in set.

Domino number	Thickness (mm)	Thickness (in.)	Width (mm)	Width (in.)	Height (mm)	Height (in.)
1	1.19	(3/64)	4.76	(3/16)	9.53	(3/8)
2	1.59	(1/16)	6.35	(1/4)	12.70	(1/2)
3	2.38	(3/32)	9.53	(3/8)	19.10	(3/4)
4	3.18	(1/8)	12.70	(1/2)	25.40	(1)
5	4.76	(3/16)	19.10	(3/4)	38.10	(1 1/2)
6	6.35	(1/4)	25.40	(1)	50.80	(2)
7	9.53	(3/8)	38.10	(1 1/2)	76.20	(3)
8	12.70	(1/2)	50.80	(2)	102	(4)
9	19.10	(3/4)	76.20	(3)	152	(6)
10	25.40	(1)	102	(4)	203	(8)
11	38.10	(1 1/2)	152	(6)	305	(12)
12	50.80	(2)	203	(8)	406	(16)
13	76.20	(3)	305	(12)	610	(24)

