



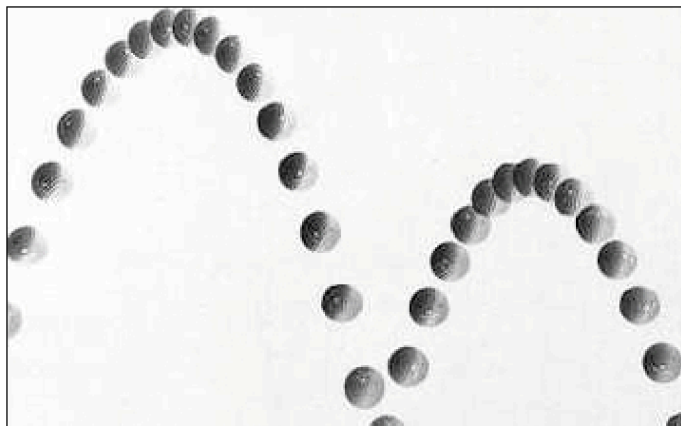
# Current Algebra PoW

The Math Forum's PoWs provide non-routine constructed response problems. The Algebra problems target concepts typically learned in an Algebra I class. Memberships and mentoring options are available at the individual, class, school, and district levels.

## The Bouncing Ball – posted April 6, 2009

A rubber ball is dropped from a height of 27 feet onto a concrete floor. Each time it hits the floor, it bounces back up to a height  $\frac{2}{3}$  of the height from which it fell.

1. Calculate the height of each of the first four bounces.
2. Find a formula that gives the height of the  $n$ th bounce.
3. Use your formula to find the height of the 12th bounce to the nearest inch.



**Extra:** Suppose a different ball is dropped from 40 feet, and on its tenth bounce it reaches a height of 1 foot. What percent of the height from which it fell does that ball bounce back up each time it hits the floor?

**Extension:** Tell if you agree or disagree with the following statement and explain why. Support your opinion with any relevant mathematical ideas.

*Since the original ball always bounces back up to  $\frac{2}{3}$  of the height from which it fell, it can never actually stop bouncing. Even as the bounces get very small, there is always some height from which it falls and so it always bounces back up  $\frac{2}{3}$  of that height. Thus, it never stops bouncing.*

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