

MthT 430 Chapter 2a Projects

In class September 5, 2007

Formulas

- Prove the formula

$$1^2 + 2^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

Geometry

A solid cube with side length n cm is constructed from 1 cm^3 blocks.

- How many blocks are needed to construct the cube?
- How many blocks are visible from the exterior?

The Tower of Hanoi – Problem 26.

There is a puzzle – the Tower of Hanoi – consisting of three spindles, with n concentric rings of decreasing diameter stacked on the first. A ring at the top of the stack may be moved to another spindle, provided that is not placed on top of a smaller ring. ... Prove that the entire stack can of n rings can be moved onto spindle 3 in $2^n - 1$ moves, and that this cannot be done in fewer than $2^n - 1$ moves.

A Google search for *Tower of Hanoi* yielded many discussions of the *Tower of Hanoi* on the Internet:

- <http://www.cut-the-knot.org/recurrence/hanoi.shtml>

An Inequality – Problem 19.

- Prove the inequality (Bernoulli): If $h > -1$, then

$$(1 + h)^n \geq 1 + nh.$$