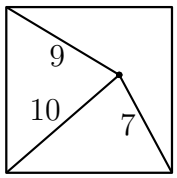
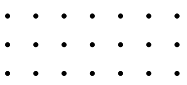
Problems, February 2011

Problem 1. The distances from a point inside a square to 3 consecutive vertices of the square are 9, 10, and 7 as shown. Find (exactly) the area of the square.



Problem 2. Some of the 21 dots are coloured blue, and the rest red. Show that there are 4 dots, all of the same colour, which are the vertices of a rectangle with horizontal and vertical edges.



Problem 3. Find all integers n such that $2^n - 15$ is a perfect square. Of course, proof is needed that the list is complete.

Problem 4. How many ordered triples (x, y, n) are there such that x and y are positive integers, n is an integer greater than 1, and $x^n - y^n = 2^{144}$?

http://www.pims.math.ca/education/math_problems/
http://www.math.ubc.ca/~adler/problems/