PROBLEM SECTION

You are invited to submit solutions to any or all of the following problems, accompanied by your name, school and year or form. Solutions of these problems will appear in the next issue of **Parabola**; your solution(s) may be used if they are received in time.

Hint: Some of the following problems are similar to, or based on, problems from this year's School Mathematics Competition. Solutions to the competition problems will be found elsewhere in this issue of **Parabola**.

Q.923 On an island there are 50 brown, 57 green, 62 yellow and 68 red frogs. Whenever three frogs of three different colours meet they change immediately into two frogs of the fourth colour. Later on it is observed that all frogs on the island have the same colour. Which colour, and what is the maximum possible number of frogs on the island at this stage?

Q.924 A billiard table has dimensions $a \times b$, where a and b are integers. There is a pocket at each corner, and another halfway along each side of length a. A ball is hit from one of the centre pockets at an angle of 45° to the side of the table. If the ball keeps travelling, how many times will it hit a wall before falling into a pocket?

Q.925 Show that in order to write an odd number as a sum of its divisors (without repetitions), at least 9 divisors must be used.

Q.926 If n is the number whose digits are a two followed by 1994 threes, find the digits of n^2.

Q.927 Five line segments are given, such that any three of them will form a triangle. Show that at least one of these triangles is acute-angled.

Q.928 Prove that if x, y, z are real numbers and $x + y + z = 1$, then $xy + yz + zx \leq \frac{1}{3}$.

Q.929 (a) At the upper left hand corner of an 8×8 chessboard is a counter which may be moved at most 4 squares horizontally to the right or at most 3 squares vertically downwards (not both in the same turn). Two players alternately move the counter and the winner is the first player to reach the lower right hand corner. Which player has a winning strategy?

(b) The same, except that the first player to reach the corner is the loser.

Q.930 Six points are located inside, or on the boundary of, a 3×4 rectangle. Show that two of them are separated by a distance $\sqrt{5}$ or less.

Problem Solvers

In our last issue we inadvertently omitted to list Belinda Gotley as a problem solver. Belinda of Year 8, All Saints Anglican School, Merrimac solved Questions 907, 909 and 912.

For this issue Lisa Gotley solved Questions 913, 914, 915, 916, 917, 918 and the 1st part of 922. This was a very fine achievement. Justin Kong and Trevor Kwok of Form 4, Sydney Grammar School also sent in solutions. Justin included solutions to Questions 913 and 915, whilst Trevor solved Question 913.