New Zealand Mathematical Olympiad Committee

February Problems

These problems are intended for students who might already have taken part in the September problems, or who are thinking of taking part in 2009. The difficulty will gradually increase over the course of the year, building up to problems comparable to those you will be asked to solve in the September problems for selection to the Christchurch camp in January.

I welcome you to try them, and to send me any solutions you find. I'll try to acknowledge these, and might include (with credit!) any particularly clever or nice solutions from you in the "official solutions". These will appear on the web in about two months time, or can be obtained from me by email earlier if you provide evidence that you've tried the problems seriously.

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1. Find the smallest three digit number N such that all the digits of $3 \times N$ are even.

2. Find all integer solutions to the equation $x^3 - y^3 = 91$.

3. In $\triangle ABC$, the median and altitude at A divide the angle at A into three equal parts. What are the angles of $\triangle ABC$?

4. A sequence of numbers is to be written down using, at each step, one of the two rules: if the number is a perfect square, you may next write down its square root; or, in any case, you may write down the result of tripling it and adding 1. If the first number is 33, can we reach 31? If the first number is 31, can we reach 33?

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http://www.mathsolympiad.org.nz