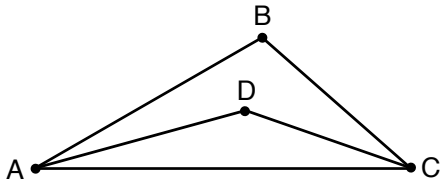
THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

2006 QAMT Problem-Solving Competition - Year 8 Paper

All questions have equal value.

Question 1
The game of Scrabble gives values to letters: A = 1, B = 3, C = 3, D = 2, E = 1, F = 4, G = 2, H = 4, I = 1, J = 8, K = 5, L = 1, M = 3, N = 1, O = 1, P = 3, Q = 10, R = 1, S = 1, T = 1, U = 1,V = 4, W = 4, X = 8, Y = 4, Z = 10. The value of a word is the sum of the values of the letters. For example, ONE $= 1 + 1 + 1 = 3$. The name of which positive integer has Scrabble score equal to itself?

Question 2
In triangle ABC, angle ABC is 120°. Point D is chosen in the triangle so that line DA bisects angle BAC and line DC bisects angle BCA. What is the angle ADC?



Question 3
Which fraction x with $\frac{1}{10} < x < \frac{1}{9}$ has smallest (positive) denominator?

Question 4
What are the last two decimal digits of 61^{2006}?

Question 5
In front of you is a pile of coins, containing between 1500 and 3000 coins. If you divide it into groups of 7, 11 or 13 each time you have 4 coins left over. How many coins are in the pile?

Question 6
Suppose $x^3 - x - 1 = 0$. Show that $x - 1 = \frac{1}{x^4}$.