THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

2005 QAMT Problem-Solving Competition - Year 9 & 10 Paper

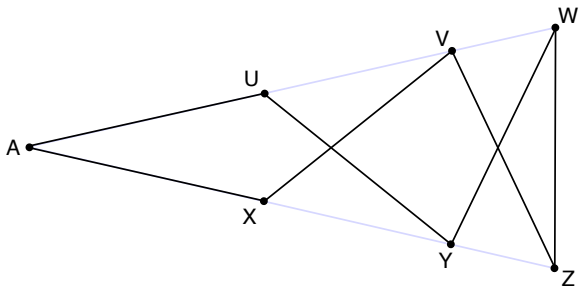
Question 1 Let a and b be integers, with $0 \leqslant a, b \leqslant 9$ and $a \neq 0$. Find all 6 digit numbers whose decimal representation is $a2005b$ that are exactly divisible by 13.

2 marks

Question 2 According to a survey, at least 70% of people like apples, at least 75% like bananas and at least 80% like cherries. What can you say about the percentage of people who like all three?

4 marks

Question 3 You have 7 matches of equal length, AX, XV, VZ, ZW, WY, YU and UA laid out as in the diagram. Find the angle at A.



3 marks

Question 4 Find all solutions of the equation

$$y^2 = x^6 + 17$$

where x and y are integers.

3 marks

Question 5 You have one rectangle of each of the following dimensions: 1×18, 2×16, 3×13, 4×11, 5×10, 6×9 and 7×7. Is it possible to arrange them into a single large rectangle? Explain.

4 marks

Question 6 Alice, Bob and Cathy take turns (in that order) in rolling a six sided die. If Alice ever rolls a 1, 2 or 3 she wins. If Bob rolls a 4 or a 5 he wins, and Cathy wins if she rolls a 6. What is the probability that Cathy wins?

4 marks