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

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

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?

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

Question 4  Find all solutions of the equation

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

where x and y are integers.

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

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?