Jane Street®

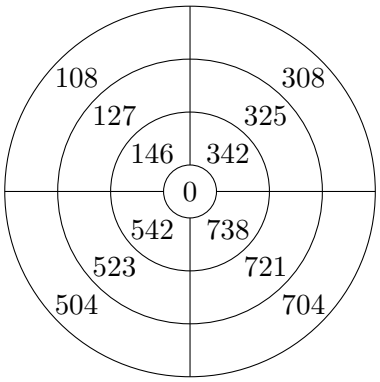
New Zealand Mathematical Olympiad Committee

Maths Workshop May 2025

mathsolympiad.org.nz/workshops/

Problems

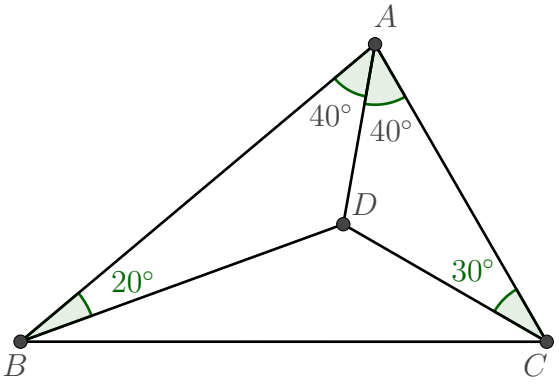
1. Select exactly 5 of the numbers on the dartboard so that their sum is exactly 2025. No number may be selected more than once.



2. Twenty-five boys and twenty-five girls are sitting in a circle. Is there guaranteed to be a person both of whose neighbours are girls?

3. How many positive integer solutions are there to the equation: $3x^2 - 5y^2 = 7$?

4. In the diagram below, $\angle DBA = 20°$ and $\angle ACD = 30°$ and $\angle BAD = \angle DAC = 40°$. Determine which length is larger: AC or BD.



5. How many odd numbers are there in the 100^{th} row of Pascal's triangle.

6. Suppose a and b are integers such that both $a + 3b$ and $3a - b$ are the squares of positive integers. What is the smallest possible value of these squares?