

23rd edition of the Pan African Mathematics Olympiad

Abuja: 20 August - 29 August, 2015

Second Day: 25 August 2015

Duration : 4 h 30

4. For a positive integer n denote $d(n)$ its greatest odd divisor. Find the value of the sum $d(1008) + d(1009) + \dots + d(2015)$.

5. There are seven cards in a hat, and on the card k there is a number 2^{k-1} , $k = 1, 2, \dots, 7$. Solarin picks the cards up at random from the hat, one card at a time, until the sum of the numbers on cards in his hand exceeds 124. What is the most probable sum he can get?

6. Let $ABCD$ be a quadrilateral (with non-perpendicular diagonals).

- The perpendicular from A to BC meets CD at K .
- The perpendicular from A to CD meets BC at L .
- The perpendicular from C to AB meets AD at M .
- The perpendicular from C to AD meets AB at N .

1. Prove that KL is parallel to MN .

2. Prove that $KLMN$ is a parallelogram if $ABCD$ is cyclic.
