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MATHEMATICS ENRICHMENT CLUB.

Problem Sheet 12, August 20, 2019

1. Let $n!$ denote the factorial of n. That is,

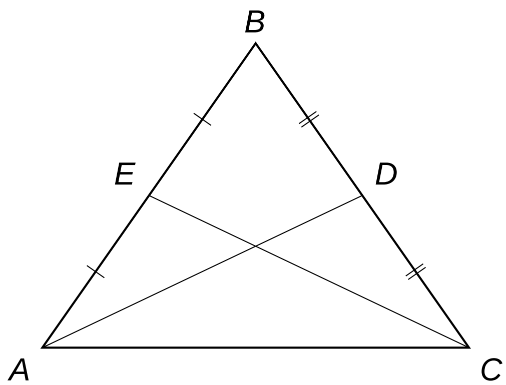
$$n! = n \times (n-1) \times (n-2) \times \dots \times 2 \times 1.$$

   Find the largest integer n, such that $1 + 2! + 3! + \dots + (n-1)! + n!$ is a perfect square.

2. Let $a_1, a_2, \dots, a_{100}$ be a sequence of consecutive positive integers. Find the minimum value of $\sqrt{\ }$

Senior Questions

1. Let ABC be a triangle. Let D and E be the feet of the medians from A to BC and B to AC, respectively.



Prove that if $CE = AD$ then $\triangle ABC$ is isosceles.

2. Express

$$\sum_{n=1}^{25} \frac{2n - 1}{n(n+1)(n+2)}$$

as a fraction of two co-prime positive integers.