

Flanders Junior Olympiad 2005

www.artofproblemsolving.com/community/c4671

by Peter

- 1 [we're 2005 while writing]
According to a legend there is a monster that awakes every now and then to swallow everyone who is solving this problem, and then falls back asleep for as many years as the sum of the digits of that year. The monster first hit mathlinks/aops in the year +234.

But guys, don't worry! Get your hopes up, and prove you're safe this year, as well as for the coming 10 years! :D

[wording slightly adapted from original wording]

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- 2 Starting with two points A and B, some circles and points are constructed as shown in the figure:-the circle with centre A through B
-the circle with centre B through A
-the circle with centre C through A
-the circle with centre D through B
-the circle with centre E through A
-the circle with centre F through A
-the circle with centre G through A
(I think the wording is not very rigorous, you should assume intersections from the drawing)

Show that M is the midpoint of AB .

http://www.mathlinks.ro/Forum/album_pic.php?pic_id=291

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- 3 Prove that 2005^2 can be written in at least 4 ways as the sum of 2 perfect (non-zero) squares.
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- 4 (a) Be M an internal point of the convex quadrilateral $ABCD$. Prove that $|MA| + |MB| < |AD| + |DC| + |CB|$.
- (b) Be M an internal point of the triangle ABC . Note $k = \min(|MA|, |MB|, |MC|)$. Prove $k + |MA| + |MB| + |MC| < |AB| + |BC| + |CA|$.
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