

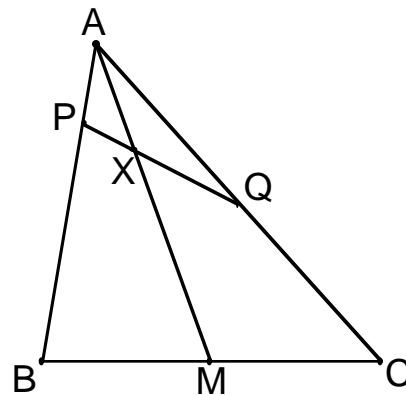
WISCONSIN MATHEMATICS SCIENCE & ENGINEERING TALENT SEARCH

PROBLEM SET I (1995-96)

OCTOBER 1995

1. Ten points are chosen on a circle and all of the chords determined by these points are drawn.
- How many chords are there?
 - Assume that no three of these chords intersect at a common point inside the circle. How many points inside the circle lie on two chords?

2. In $\triangle ABC$, points P and Q are chosen on sides \overline{AB} and \overline{AC} respectively, and segment \overline{PQ} is drawn meeting median \overline{AM} at X . If $AP = \frac{1}{4}AB$ and $AQ = \frac{1}{2}AC$, determine the ratio PX/PQ , and prove that your answer is correct.



3. For which integers $n \geq 2$ is $(n - 1)!$ not a multiple of n ? (Recall that $k!$ is the product $1 \cdot 2 \cdot 3 \cdots (k - 1) \cdot k$.)

4. For which real numbers a does the equation

$$|x - 1| - |x - 2| + |x - 4| = a$$

have exactly three solutions?

5. Suppose that S is a set consisting of three positive integers and that the sum of every two members of S is a square. (For example, S could be $\{5, 20, 44\}$ or $\{10, 54, 90\}$.) Prove that S contains at most one odd number.

You are invited to submit a solution even if you get just one problem

RETURN TO:

MATHEMATICS TALENT SEARCH
Dept. of Mathematics, 480 Lincoln Drive
University of Wisconsin, Madison, WI 53706

DEADLINE
November 1
1995

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(PLEASE DETACH)

LAST NAME FIRST GRADE

SCHOOL TOWN

HOME ADDRESS TOWN ZIP CODE

PROBLEM	SCORE
1	
2	
3	
4	
5	

PROBLEM SET I