

MP-1 Pre-Enrollment Sample Problems

Hua Xia's Math Program strives to stimulate and encourage a student's mathematical thinking and understanding of mathematical concepts and their relations to each other. We view problem-solving as a means to an end, a journey rather than a finite end-point, to cultivate students' skills in thinking mathematically.

The following is a sample problem set designed to gauge a student's interest in Math Program Level 1 (MP-1). It is expected that a 3-to-4th grader will likely not solve all the problems before taking the program. Parents should use the problem set, only to measure a student's readiness for, and interest in, learning mathematical concepts and skills taught in MP-1. In particular, instead of focusing solely on the correctness of a student's answer to each problem, parents are strongly encouraged to ask their child how and why he or she got the answer (regardless of whether it is correct or not).

Problem 1:

$$99 + 99 = ?$$

How did you get the answer (without a calculator or a pencil-and-paper)?

Problem 2:

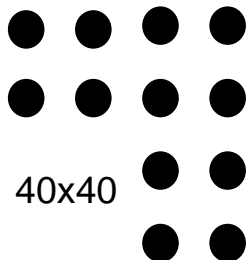
$$1+2+3+4+5+6+7+8+9+10 = ?$$

Have you heard of Gauss?

Problem 3:

Suppose you know 40^2 (meaning $40 \times 40 = 1600$). What is 41^2 (that is, 41×41)?

The following picture about "perfect squares" may help (or may not):



Problem 4:

What is the remainder r when 100 is divided by 3?

Such a remainder can be expressed in a "modular" equation: $100 = r \pmod{3}$.

Can you find out the answer without trying to do “division”?

Problem 5:

If $A = 1 \pmod{5}$, and $B = 2 \pmod{5}$ (meaning when A and B are divided by 5, they have remainder 1 and 2, respectively),

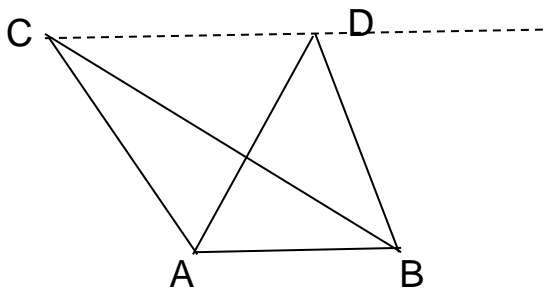
what is the remainder $A \times B$ when divided by 5 (or $A \times B = ? \pmod{5}$)?

Problem 6:

Lines AB and CD are parallel.

Do the following two triangles (ABC and ABD) have the same area? If yes, why?

Must they have the same perimeters?

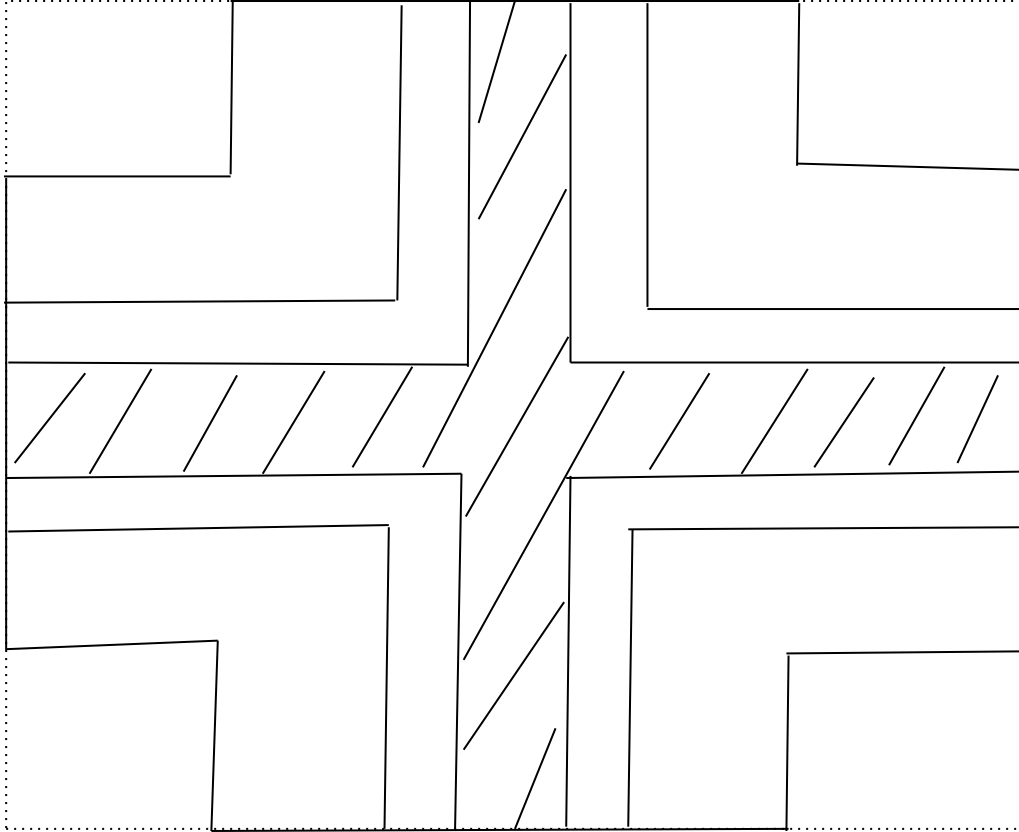


Problem 7:

A closed Rectilinear shape can only have right-angled corners, as if cut off from a rectangle. For example, the following shows 3 nested rectilinear “+” shapes, with the “smallest” cross shaded.

Does the cross at the center (shaded) have the same perimeters as the other two larger crosses? If so, why?

So, is it true that a shape having a smaller area must have a smaller perimeter as well?



Problem 8:

What is 1 divided by $\frac{1}{2}$? That is, $\frac{1}{\frac{1}{2}} = ?$

Could you explain how you got the answer?

Problem 9:

A rabbit is trying to climb up to the top of a 10-step staircase in many hops. In each hop, the rabbit can only hop 1 or 2 steps up. How many different ways can the rabbit climb to the top?

Have you heard of the Fibonacci sequence?

Problem 10:

For three letters, A, B, C, how many 3-letter words (not necessarily English words in the dictionary) can you make, without repeating letters?

For example, ABC is a word, as well as CBA. But since repeating is not allowed, you cannot do AAB.