42 Points | Advanced Math Training Program

By the end of our Level 1 Course the students should be able to solve the following problems.

Level 1. Sample Problems

1. A two digit number is divided by the sum of its digits and the quotient is 3 and the remainder is 2. Find all such numbers.

2. What is the last digit of the number

$$7^{7^7}$$

3. How many numbers n smaller than 1000 satisfy the following two properties: n is even and n gives remainder 1 when divided by 5?

4. There are 2 girls and 7 boys in a chess club. A team of four persons must be chosen for a tournament, and there must be at least 1 girl on the team. In how many ways can this be done?

5. Find the area of the quadrilateral formed by the vertices $(0, 0)$, $(4, 1)$, $(5, 3)$, $(-1, 5)$?

6. The sides of the triangle ABC are given as $AB = 5$, $BC = 5$ and $AC = 6$. What is the value of the inradius of the triangle ABC?

7. Let p be an integer number, such that p, $2p + 1$ and $4p + 1$ are prime numbers. Find the sum of all such numbers p.

8. Leo goes on a train to visit his grandmother. For some reason the train goes at $1/4$ of its usual speed and it takes an extra 24 minutes. What is the original time of the trip t in minutes when the train was going at a usual speed?

9. Points D, E and F belong to the sides BC, AC and AB of the triangle ABC, such that the lines AD, BE and CF are concurrent at O and $AF : FB = 2 : 3$ and $AE : EC = 3 : 4$. Find the ratio $BD : DC$.

10. Determine the value of

$$\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + ... + \frac{1}{98 \cdot 99} + \frac{1}{99 \cdot 100}$$