CYPRUS MATHEMATICAL SOCIETY
REGIONAL COMPETITION
NOVEMBER 2026

GYMNASIUM C'

Date: 07/11/2026 *Time: 10:00-12:00*

INSTRUCTIONS

1. Solve all the problems, fully justifying your answers.
2. Each problem is worth 10 points.
3. Write with blue or black ink (shapes can be drawn with pencil).
4. The use of corrective liquid (Tipp-Ex) is not allowed.
5. The use of a calculator is not allowed.

PROBLEMS

Problem 1

Let x a positive real number such that $x+\frac{1}{x}=3$. Calculate the expressions below:

(i) $A=x^2+\frac{1}{x^2}$ **(ii)** $B=x^3+\frac{1}{x^3}$ **(iii)** $\Gamma=x^5+\frac{1}{x^5}$

Problem 2

If the positive integer α is divided by 3, it leaves a remainder of 1. Prove that the number

$$A=\frac{\alpha^2+\alpha}{2}-1$$

is a multiple of 9.

Problem 3

If $x\geq 2$, prove that the expression

$$A=\sqrt{x+2\sqrt{x-1}}-\sqrt{x-2\sqrt{x-1}}$$

is independent of x.

Problem 4

In the adjacent figure, A, Γ, Δ are points of a circle, and B is a point inside the circle such that the segment AB is parallel to the segment $\Gamma\Delta$, and the segment $B\Gamma$ is perpendicular to the chord $\Gamma\Delta$.

If $AB=1$ cm, $\Gamma\Delta=2$ cm, and $B\Gamma=6$ cm, determine the area of the circle.

