数学花园
探秘
MATHEMATICS GARDEN

2026 Spring Cup
Mathematical Olympiad

Date： 28 February 2026

Time Given： 1 hour 30 minutes

Level: Secondary Junior

Name: ____________

Parent’ s Phone Number: ____________

Instructions to Candidates

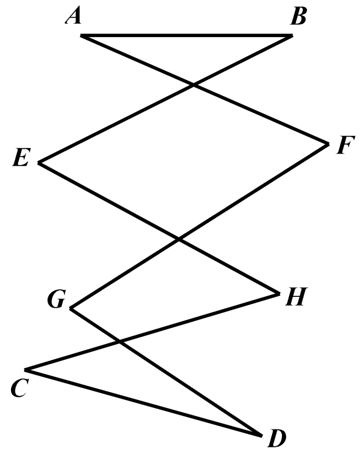
1. Do not open the booklet until you are told to do so.
2. Answer ALL 15 questions.
3. Write your answers in the answer sheet provided.
4. No steps are needed to justify your answers.
5. Questions 1-3 are worth 8 marks each.
6. Questions 4-14 are worth 10 marks each.
7. Questions 15 is worth 16 marks.
8. No marks will be deducted for wrong answers.
9. No marks will be given for unanswered questions.
10. No calculators or mathematical instruments are allowed.

I. ***Short Answer Questions(1) (8 marks each, 24 marks in Total)***

1. If $a = 3^{110}$, $b = 4^{88}$, $c = 5^{66}$, find the letter with the greatest value.

Ans: ________________

2. As shown in the figure, if $\angle E = 55°$, $\angle F = 56°$, $\angle G = 66°$, and $\angle A + \angle B = \angle C + \angle D$, find the value of $\angle H$.



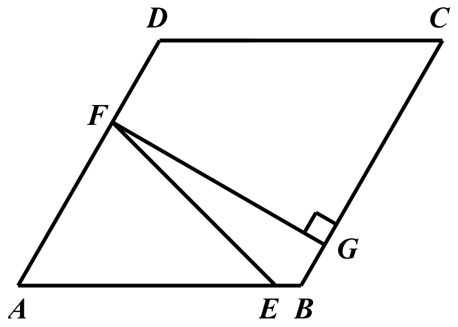
Ans: ________________

3. If real number a satisfy that $|2025 - a| + \sqrt{a - 2026} = a$, find the value of $a - 2025^2$.

Ans: ________________

II. ***Short Answer Questions(2) (10 marks each, 110 marks in Total)***

4. As shown in the figure, in rhombus $ABCD$, $AB = 6$, $DF = 2$, $\angle DAB = 60°$, $\angle EFG = 15°$, $FG \perp BC$, find the length of AE.



Ans: ________________

5. If rational number $a_1, a_2, a_3, \cdots, a_{2026}$ satisfy that $a_1 + a_2 + \cdots + a_{2026} = 0$, find how many different possible values of $\frac{a_1}{|a_1|} + \frac{a_2}{|a_2|} + \frac{a_3}{|a_3|} + \cdots + \frac{a_{2026}}{|a_{2026}|}$.

Ans: ________________

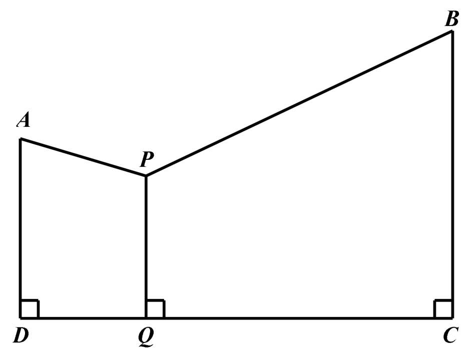
6. If $0 < a < 1$, and satisfy that $\left\lfloor a + \frac{1}{50} \right\rfloor + \left\lfloor a + \frac{2}{50} \right\rfloor + \ldots + \left\lfloor a + \frac{49}{50} \right\rfloor = 29$, ($\lfloor x \rfloor$ means the greatest integer less than or equal to x), find the value of $\lfloor 10a \rfloor$.

Ans: ________________

7. Given two distinct positive integers a and b such that $(3b - 1)$ is divisible by $(2a + 1)$ and $(3a - 1)$ is divisible by $(2b + 1)$. Find the value of $a + b$.

Ans: ________________

8. As shown in the figure. If $\angle A = \angle B$, AD, PQ, BC are all perpendicular to CD, $AD = 10$, $PQ = 8$, $BC = 13$, $CD = 24$, find the value of $PA + PB$.

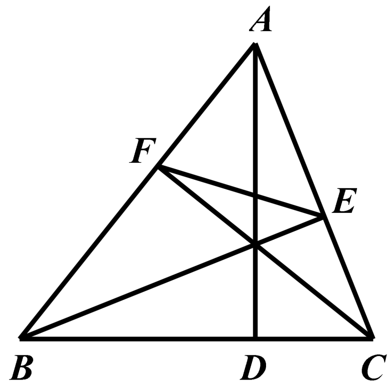


Ans: ________________

9. If real number x, y satisfy that $x \geq y \geq 1$ and $2x^2 - 2xy - 6x + y^2 = -9$, find the value of $x + y$.

Ans: ________________

10. As shown in the figure, AD, BE, CF are the three heights of triangle ABC, if $AB = 12$, $BC = 10$, $EF = 6$, find the length of BE.



Ans: ________________

11. Find the number of positive integer pair (x, y) that satisfy the following equation.

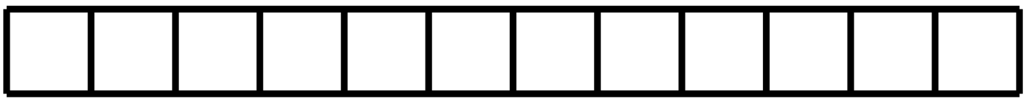
$$x\sqrt{y}+\sqrt{xy}-\sqrt{2026x}-\sqrt{2026y}+\sqrt{2026xy}=2026$$

Ans: ________________

12. If $m^2 = n + 5$, $n^2 = m + 5$, $m \neq n$, find the value of $m^5 - 2mn + n^5$.

Ans: ________________

13. Fill the 12 boxes shown in the diagram with consecutive positive integers 1, 2, 3, ... in ascending order. Each time you place a number, you must choose a box that is empty and whose adjacent boxes are also empty. Continue this process until no more numbers can be placed. How many different filling methods are there in total?



Ans: ________________

14. Let t be a real number. If a and b are the two non-negative real roots of the quadratic equation $x^2 - 4x + t - 1 = 0$, find the minimum value of $(a^2 - 1)(b^2 - 1)$.

Ans: ________________

III. ***Short Answer Questions(3) (16 marks)***

15. n balls numbered from **1** to n are placed into two boxes such that any two balls whose numbers add up to a perfect square must be placed in the same box. Each box must contain at least one ball. Find the maximum possible value of n that satisfies these conditions.

Ans: ________________