The Eighth International Young Mathematicians' Convention

IYMC-Mathematica 2018

2nd to 5th December 2018

Organised by: City Montessori School, Gomti Nagar Campus-1, Lucknow, India

International Young Mathematicians' Convention

Junior level

Individual Contest

Time limit: 90 minutes

Information:

- You are allowed 90 minutes for this paper, consisting of 8 questions to which only numerical answers are required.
- Each question is worth 10 points. No partial credits are given. There are no penalties for incorrect answers, but you must not give more than the number of answers being asked for. For questions asking for several answers, full credit will only be given if all correct answers are found.
- Diagrams shown may not be drawn to scale.

Instructions:

- Write down your name, your contestant number and your team's name on the answer sheet.
- Enter your answers in the spaces provided on the answer sheet.
- You must use either a pencil or a ball-point pen which is either black or blue.
- You may not use instruments such as protractors, calculators and electronic devices.
- At the end of the contest, you must hand in the envelope containing the question paper, your answer sheet and all scrap papers.

Team:____________ ***Name***:________________ ***No.***: ____________ ***Score:***_________

For Juries Use Only

No.	1	2	3	4	5	6	7	8	Total
Score									
Score									

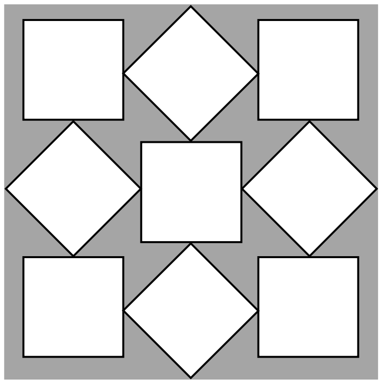
1. A farmer sold each of his peaches at a different price, the last one was sold for \$2.30. He computed that the average price of peaches was \$2.45. However, a customer returned a rotten peach and agreed buying it at a reduced price of \$1.58. The farmer re-computed the average price, which became \$2.42. What is the minimum number of peaches the farmer could have sold?

2. Let S be a set of 6 integers taken from $\{1, 2, 3, \ldots, 12\}$ such that if a and b are both elements of S where $a < b$, then b is not a multiple of a. Find the total number of distinct S that satisfies the said conditions.

3. In a chess tournament, each player will play with every other player exactly once. A win is worth two points, a draw is worth one point, and a loss is worth zero. Two gifted students from an elementary school took part in a chess tournament at a nearby university and the combined score of both elementary school students is 13. If the scores of each university student are all the same, then what is the score that each university student got in the tournament?

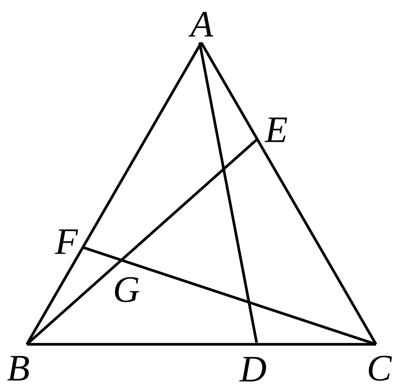
4. How many ordered pairs (m, n) of positive integers are there which satisfy the equation $m^2 - 2m = n^2 + 4n + 2018$?

5. There are nine small squares, each with an area of 3 cm^2, are enclosed inside a larger square as shown in the diagram. If all the squares that are touching each other are coinciding with the midpoint of the side of the other square, then find the area, in cm^2, of the shaded region.



6. How many ways can a student schedule 3 mathematics subjects – Algebra, Geometry and Number Theory – in a seven-period school day if any one of these subjects is not allowed to be taken in consecutive periods?

7. In the figure, ABC is an equilateral triangle where E is a point on CA, F is a point on AB and G is a point of intersection of BE and CF. If triangle BCG has the same area as quadrilateral $AEGF$, then determine the measure, in degrees, of $\angle EGF$.



8. There are six tokens having different weights namely 1g, 2g, 4g, 8g, 16g, and 32g. How many different ways can we get a weight of 21g using a regular two-sided weighing scale? (Note: Each token may be placed on either pan of the balance, and it is not necessary to use all the tokens in each weigh).