

Mathematical Olympiads in Peru

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WFNMC - 7

Introduction

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In 2004, thanks to an agreement with the Ministry of Education, the Olympiad was expanded significantly.

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Also there are two categories: **Alfa** (for public schools) and **Beta** (for private schools)

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Second Round

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- ① The Second Round is taken in each Unit of Education.
- ② Around 50000 students take this round.
- ③ The test consists of 10 problems with short answer, for two hours.

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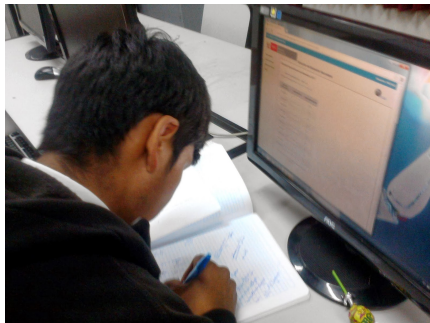
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Third Round

④ The test is online.



⑤ The number of classified students to the next round depends on the region's population.

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- 5 The best students of each level represent Peru at the **Rioplátense Mathematical Olympiad**, held every year in Argentina.

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- 4 During the decade the creation of problems for the Olympiad was established.
- 5 In recent years, around 20 books related with mathematical contests were published.

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- 3 ONEM's budget has been increasing over the years, but now it's still not appropriate for a Olympiad that involves more than 1 million students.
- 4 There is no scholarships program or incentives for ONEM's winners (about 100 students), however we believe that in the near future the Government will create scholarships related with mathematical olympiads.

Peru at international olympiads

Peru participates in the following international mathematical Olympiads:

- 1 International Mathematical Olympiad (IMO), since 1987.
- 2 Iberoamerican Mathematical Olympiad, since 1985.
- 3 Cono Sur Mathematical Olympiad, since 1993.
- 4 Rioplatense Mathematical Olympiad, since 2001.

Peru at international olympiads

Mathematical
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In the last 8 years Peru has improved significantly at international olympiads, we believe that ONEM has contributed to this improvement because having an event of this magnitude help to detect talent around the country.

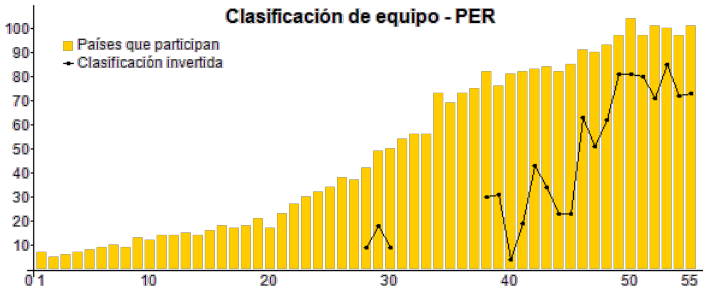
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For example, at the **Cono Sur Mathematical Olympiad**, Peru usually is in the top two; at the **Iberoamerican Olympiad**, Peru usually is in the top three.

Peru at international olympiads

IMO



In the last 8 years, Peru has achieved **3 gold, 18 silver and 18 bronze** medals at the IMO.

Peru at international olympiads

The best position of Peru, as a country, was 16th (out of 100 countries) in 2012.

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The best individual position of a peruvian student was 6th (Raúl Chávez Sarmiento) in IMO 2011.

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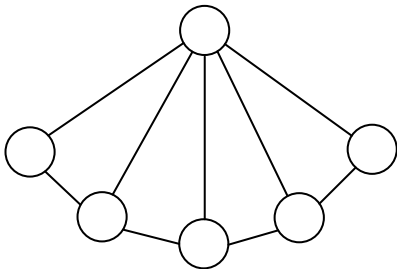
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Students that finished the program are now in:

- 1 USA (MIT, Berkeley).
- 2 Brazil (IMPA).
- 3 France (École Polytechnique).

Some ONEM problems

[First Round, Level 1, 2014] Write a positive integer inside each circle such that if two circles are joined by a segment, then these circles contain different numbers.



What is the smallest possible value of the sum of the six numbers?

A) 9

B) 10

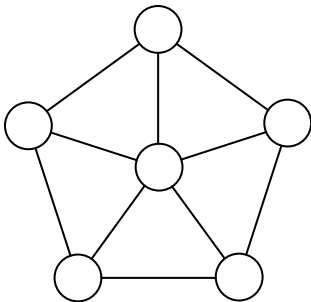
C) 11

D) 12

E) 13

Some ONEM problems

[First Round, Level 2, 2014] Write a positive integer inside each circle such that if two circles are joined by a segment, then these circles contain different numbers.



What is the smallest possible value of the sum of the six numbers?

A) 15

B) 16

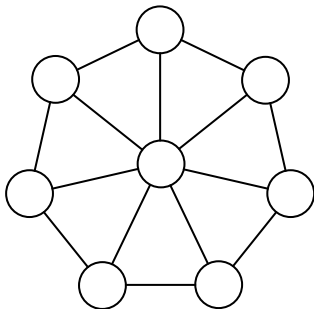
C) 12

D) 13

E) 14

Some ONEM problems

[First Round, Level 3, 2014] Write a positive integer inside each circle such that if two circles are joined by a segment, then these circles contain different numbers.



What is the smallest possible value of the sum of the eight numbers?

A) 15

B) 16

C) 17

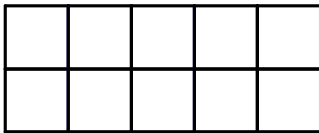
D) 18

E) 20

Some ONEM problems

[Second Round, Level 1, 2012]

Ten distinct numbers of the set $\{1, 2, 3, \dots, n\}$ are chosen, then these numbers are placed in the squares of a 2×5 board such that the product of the numbers in each row is a perfect square and the product of the numbers in each column is also a perfect square. Find the least value of n for which this situation is possible.



Some ONEM problems

[Third Round, Level 2, 2013]

The three digit number \overline{ABC} is a perfect square and the two digit number \overline{BC} is prime, find the greatest possible value of $A + B + C$.

Some ONEM problems

[Fourth Round, Level 1, 2009]

Let $k > 1$ be an integer. A positive integer N is called *bi-multiple* of k if N is multiple of k and the number obtained reversing the order of the digits of N is also multiple of k .

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[Fourth Round, Level 1, 2009]

Let $k > 1$ be an integer. A positive integer N is called *bi-multiple* of k if N is multiple of k and the number obtained reversing the order of the digits of N is also multiple of k . Mario writes on the blackboard a 7-digit number, all of their digits are positive. Prove that it is possible to delete three digits of this number such that the new 4-digit number is a bi-multiple of k , for some integer $k > 1$.

Some ONEM problems

[Fourth Round, Level 3, 2008]

In the coordinate plane, all the points with integer coordinates are painted in red, green or yellow (at least one point of each color). Prove that there exist three points X , Y and Z , painted in different colors such that $\angle XYZ = 45^\circ$.

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Thank you!