



 Coron Island

PHILIPPINE INTERNATIONAL MATH AND SCIENCE OLYMPICS NATIONAL ROUND 2022



PIMSO Math

GENERAL INSTRUCTIONS

- ① You have 90 minutes to finish the test.
- ② You may write your solutions on the TEST BOOKLET.
- ③ Write your answers on the ANSWER SHEET.
- ④ After the test, you must SUBMIT to the proctor both the TEST BOOKLET and the ANSWER SHEET.
- ⑤ This test covers FOUR (4) CATEGORIES namely: ARITHMETIC & NUMBER THEORY, LOGICAL ANALYSIS, GEOMETRY, and COMBINATORICS.
- ⑥ There is a total of thirty (30) questions in this test. Each correctly answered question will be marked five (5) points. No point shall be deducted for incorrect answer.
- ⑦ You are NOT ALLOWED to use any calculating device during the test proper.
- ⑧ Any form of cheating is a ground for DISQUALIFICATION.

BEGIN HERE:

1. N is a 4-digit number such that all digits are divisible by a common whole number that is not 1, but all digits are also different from each other. What is the maximum possible value of N ?
2. "A" is 102 more than 51 and "B" is 72 less than 99. What is the remainder when A is divided by B?
3. What is the minimum 3-digit number such that the tens digit is divisible by the ones digit, the tens digit is higher than the hundreds digit by 2, and the sum of the hundreds and the ones digits is 10?
4. What three consecutive odd integers have a sum of 249?
5. Sequence S begins with 1, followed by terms which are the results of multiplying 2 to the preceding number. What is the 11th term of the sequence?

6. Given the problem in #5, if S is a series, what would be its sum up to its 11th term?

7. It is Leta's birthday today. She is 5 years older than Leo. If you multiply their ages the product is 176. Find the sum of their ages.

8. Cecilia, Dina, Elena, and Fiona are cousins with different ages who live in the same house. When a new neighbor asked them who is the oldest, they answered:

Cecilia: I am the eldest.

Dina: I am not the youngest.

Elena: I am neither the eldest nor the youngest.

Fiona: I am the youngest.

Given that one of them is not telling the truth, who is the oldest of the four cousins?

9. It is Leta's birthday today. She is 5 years older than Leo. If you multiply their ages the product is 546. Find the sum of their ages after 3 years from today.

10. What is the missing number?

10 (19) 9

12 (23) 11

14 (27) 13

16 (?) 15

11. What is the next number in the series?

16 21 12 18 10 17 8 ___

12. A clock shows 4:30 AM. If the minute hand points in the direction of west, then in which direction is the hour hand pointing?

13. Simplify $18,007 - 17,009 + 16,011 - 15,013 + 14,015 - 13,017 + 12,019$.

14. Find the number R if $R > F$ and $(R \times F \times 23) = 12,121$.

15. If F is a counting number between 0 and 10, R is a whole number and $R > F$, find F if: $11 + (R \times 22) = (F \times 6) + (F \times 27)$ and $R - F = 1$

16. Simplify:

$$19,109 + 18,098 + 17,087 + 16,076 + 15,065 - 14,059 - 13,048 - 12,037 - 11,026 - 15$$

17. Simplify:

$$14,111 + 13,212 + 12,313 + 11,414 + 10,515 + 9,616 + 8,717 + 7,318 + 6,419 + 5,520 + 4,621 + 3,722 + 2,823 + 1,924$$

18. Simplify:

$$211 + 212 + 213 + 214 + 215 + 216 + 217 + 218 + 219 + 220 + 221 + 222 + 223 + 224$$

19. Trevor conditions himself every morning by walking 10 full laps along a circular track for exactly an hour a day. If the diameter of the track is 60 meters, how many kilometers would he have walked in 10 days? (Use $\pi=3.14$)

20. Trevor is joined by his friend, William, in his morning exercise. They both begin at the same point and time, then they walk towards opposite directions along a circular track with a radius of 100 meters. If the rate of Trevor's pacing is twice as fast as William's, how many meters would Trevor have walked by the time William reaches the opposite side of the starting point on the circle? (Use $\pi = 3.14$)

21. If you have 50 smaller equilateral triangles with side length equal to 1 cm each, how many larger equilateral triangles with side length 5 cm can you form by putting the smaller triangles all together side by side?

22. How many cubes with side lengths of 1 cm each will you need to build a larger cube with a side length of 4 cm?

23. This type of polyhedron has 2 triangular bases and 3 rectangular sides.

24. How many whole small squares with width 2 cm can you cut out from a rectangle with a length of 14 cm and a width of 13 cm?

25. How many counting numbers from 1 to 100 are not divisible by 2, 3 and 5?

26. February 2, 2022 or 2-2-22 (2222) is a four-digit palindrome but is not divisible by 4. How many 4-digit numbers are palindromes and divisible by 4? (Note: A palindrome is a number that is reversible. For example, 1221 and 32123 are palindromes)

27. Ian can only choose to join two international mathematics competitions from a list of five mathematical Olympiads: PIMSO, SIMSO, CISMO, Copernicus and Fermat. How many ways can this be done?

28. If Jin, J-Hope, Jimin, Jungkook, Suga, V and RM are to be seated in a circular table, how many seating arrangements are possible?

29. How many ways can we arrange the letters of UKRAINE?

30. How many integers from 1 to 2,222 are odd?

-END OF TEST-

Thank you for participating in the PIMSO National Round!

