



THAILAND INTERNATIONAL MATHEMATICAL OLYMPIAD FINAL ROUND 2020 – 2021

Primary 5

Time allowed: 120 minutes

Question Paper

Instructions to Contestants:

1. Each contestant should have ONE Question-Answer Book which CANNOT be taken away.
2. There are 5 exam areas and 6 questions in each exam area. There are a total of 30 questions in this Question-Answer Book. Each question carries 5 marks. Total score is 150 marks. No points are deducted for incorrect answers.
3. All answers should be written on ANSWER SHEET.
4. NO calculators can be used during the contest.
5. All figures in the paper are not necessarily drawn to scale.
6. Write down the answer in the simplest form. If the calculation result is a fraction, please write down the answer as a proper or mixed fraction, decimal figure is also accepted. Marks will NOT be given for incorrect unit.
7. This Question-Answer Book will be collected at the end of the contest.

DO NOT turn over this Question-Answer Book without approval of the examiner.

Otherwise, contestant may be DISQUALIFIED.

All answers should be written on the ANSWER SHEET.

Open-Ended Questions (1st ~30th) (5 points for correct answer, no penalty point for wrong answer)

Logical Thinking

1. There are 14 chickens more than rabbits in a farm. The animals have a total of 130 legs. How many chicken(s) is / are there?
2. According to the pattern shown below, find the value of $B - A$.

2	3	4	5	6	7	8	9	10
		9	12	15	18	21	24	27
				36	A	54	63	72
						135	B	189
								486

3. It requires 15 people to take 49 days to complete a task. How many day(s) is / are needed for 21 people to finish the same task?
4. Alice's brother's age this year adds 13, then divided by 4, minuses 6 and multiplies by 7. The result will be 84 years old. How old is Alice's brother this year?
5. There are 48 blue balls, 22 red balls and 27 green balls in a bag. At least how many ball(s) should be picked up to ensure there are 4 blue balls and 8 green balls?
6. All grade 5 students were born in year 2016 at a school. If there must be 8 students with the same date of birth, at least how many grade 5 student(s) is / are there?

Arithmetic

7. Find the value of
$$8 - \frac{2}{5 - \frac{3}{6 - \frac{1}{2 - \frac{1}{4}}}}$$
.
8. Find the value of $47 + 59 + 71 + \dots + 179 + 191$.
9. Find the value of $2021432 \times 2021 - 2021442 \times 2020$.
10. Find the value of $\frac{356 \times 968 - 1068}{4632 + 83 \times 772}$.
11. Using method $S = 2S - S$, find the value of $S = 107 + 214 + 428 + \dots + 3424 + 6848$.

12. Find the value of $\frac{1}{13 \times 15} + \frac{1}{15 \times 17} + \frac{1}{17 \times 19} + \dots + \frac{1}{33 \times 35} + \frac{1}{35 \times 37}$.

Number Theory

13. If a 10-digit number $\overline{20216A893B}$ is divisible by 36 and $A < 5$, find the value of $A + B$.

14. Find the number of all positive factors of 588.

15. Find the unit digit of A if

$$A = \underbrace{2468 \times 2468 \times 2468 \times \dots \times 2468}_{2021's} \times \underbrace{106 \times 106 \times \dots \times 106}_{2022's} \times \underbrace{22 \times 22 \times \dots \times 22}_{2023's}.$$

16. Define the operation symbol:

$$4 \oplus 2 = \frac{4^2 - 2^2}{4 - 2}$$

$$5 \oplus 3 = \frac{5^2 - 3^2}{5 - 3}$$

$$9 \oplus 6 = \frac{9^2 - 6^2}{9 - 6}$$

Find the value of $(6 \oplus 3) \times (8 \oplus 5)$.

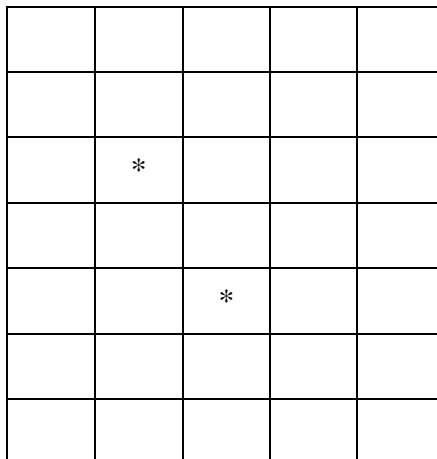
17. The sum of 13 consecutive odd numbers is 1183. Find the largest number.

18. The sum of A and B is 693. A is 62 times of B . Find the value of A .

Geometry

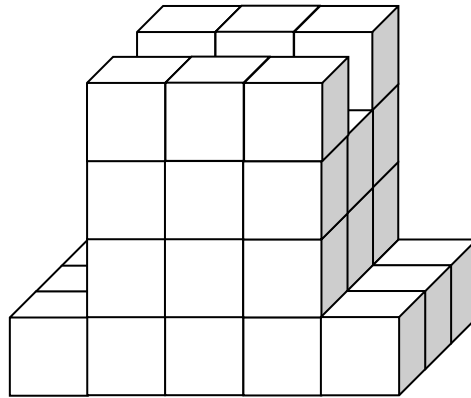
19. Now there are 11 points. How many quadrilateral(s) can be formed?

20. How many rectangle(s) with both 2 "*" is / are there in the figure below?

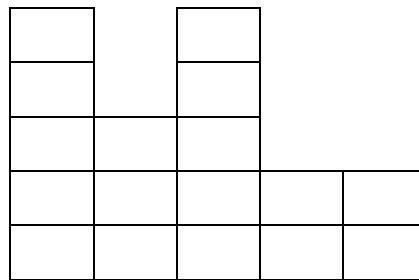


All answers should be written on the ANSWER SHEET.

21. The area of a rectangle is 1288. If the sides of the rectangle are integers, how many different value(s) of the perimeter of this rectangle is / are there?
22. 39 small cubes with side length 1 are combined. According to the pattern shown below, find the surface area.



23. How many side(s) does a regular polygon with a 156° interior angle have?
24. How many rectangle(s) is / are there in the figure below?



Combinatorics

25. A flight of stairs has 12 steps. Andy can go up for 1 step or 3 steps each time. The 6th step cannot be stepped on as it is destroyed. How many way(s) is / are there for Andy to go up the stairs?
26. Numbers are drawn from 85 integers from 36 to 120. At least how many number(s) is / are drawn at random to ensure that there are two numbers whose sum is 116?
27. 4 identical brown vases, 3 identical white vases and 3 identical purple vases are put from left to right. How many different permutation(s) is / are there?
28. Now there are infinitely many rooms. If 3927 students are needed to separate into these rooms evenly, how many way(s) is / are there?
29. Choose 3 digits, without repetition, from 1, 2, 3, 4, 5, 6 to form 3-digit numbers. How many number(s) can be divisible by 9?
30. There are 6 students passing the balls in an order. Andy holds the ball first. After 5-time pass, Andy still holds the ball now. How many way(s) is / are there?

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