



# International Junior Math Olympiad

## GRADE 6

Time Allowed: 90 minutes

Name:

Country:

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### INSTRUCTIONS

1. Please DO NOT OPEN the contest booklet until told to do so.
2. There are 30 questions.  
*Section A:* Questions 1 to 10 score 2 points each, no points are deducted for unanswered question and 1 point is deducted for wrong answer.  
*Section B:* Questions 11 to 20 score 3 points each, no points are deducted for unanswered question and 1 point is deducted for wrong answer.  
*Section C:* Questions 21 to 30 score 5 points each, no points are deducted for unanswered or wrong answer.
3. Shade your answers neatly using a 2B pencil in the Answer Entry Sheet.
4. No one may help any student in any way during the contest.
5. No electronic devices capable of storing and displaying visual information is allowed during the exam. Strictly NO CALCULATORS are allowed into the exam.
6. No exam papers and written notes can be taken out by any contestant.



**SECTION A** – 10 questions**Question 1**

Calculate the sum:  $1 + 3 + 5 + \dots + 97 + 99$ .

- A. 2500
- B. 2200
- C. 5050
- D. 2350
- E. 4950

**Question 2**

Laura decorated each of her 24 cookies. She decorated 15 cookies with green colour and 13 cookies with blue colour. How many cookies were decorated with both green and blue colour?

- A. 4
- B. 3
- C. 5
- D. 6
- E. 2

**Question 3**

The letters in the word MATHEMATICIAN were put in a box. What is the chance of getting letter A?

- A. 3 out of 9
- B. 3 out of 10
- C. 3 out of 13
- D. 1 out of 11
- E. 3 out of 11

**Question 4**

What fraction of the square is shaded if the line inside divides the square into two equal parts?



- A.  $\frac{1}{2}$
- B.  $\frac{1}{3}$
- C.  $\frac{3}{8}$
- D.  $\frac{3}{5}$
- E.  $\frac{3}{4}$

**Question 5**

Mr. Cho received a container of fresh eggs. He sold  $\frac{1}{3}$  of the eggs in the morning and sold 320 eggs in the afternoon. At the end of the day, he found that  $\frac{1}{4}$  of the eggs were not sold. How many eggs did he receive in the beginning?

- A. 768
- B. 448
- C. 549
- D. 1224
- E. 1600

**Question 6**

Cindy saved \$15 in the first month, \$30 in the second month, \$45 in the third month, and so forth. The amount of money she saved in the last month was \$120. How much money did Cindy save in total?

- A. 210
- B. 300
- C. 350
- D. 420
- E. 540

**Question 7**

The value of  $\frac{1}{2 - \frac{1}{2 - \frac{1}{2 - \frac{1}{2}}}}$  is equal to \_\_\_\_\_.

- A.  $\frac{3}{4}$
- B.  $\frac{4}{5}$
- C.  $\frac{5}{6}$
- D.  $\frac{6}{7}$
- E.  $\frac{7}{8}$

**Question 8**

There are 37 numbers on a roulette wheel: 0 and the whole numbers from 1 to 36. What is the chance of getting a prime number?

- A. 10 out of 37
- B. 11 out of 37
- C. 12 out of 37
- D. 13 out of 37
- E. 14 out of 37

**Question 9**

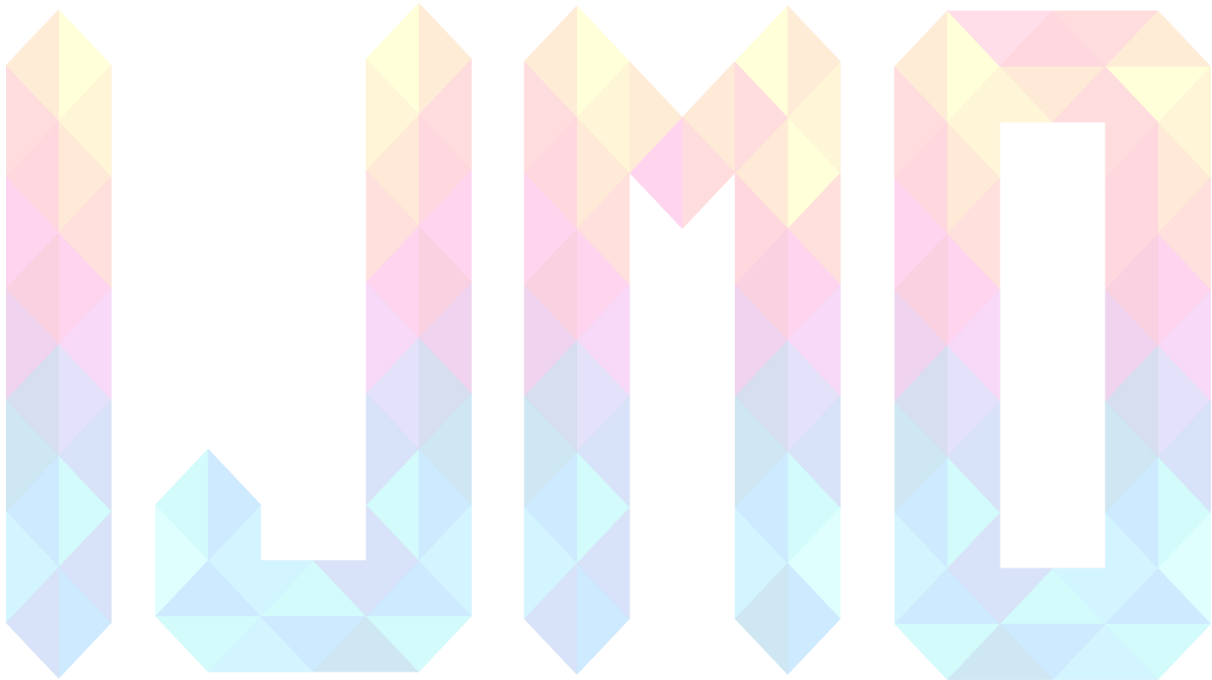
Round down  $S = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \dots + \frac{1}{2011^2}$  to the nearest whole number.

- A. 1
- B. 2
- C. 3
- D. 4
- E. Cannot be determined

**Question 10**

Harry and Terry are each told to calculate  $8 - (2 + 5)$ . Harry gets the correct answer. Terry ignores the parentheses and calculates  $8 - 2 + 5$ . If Harry's answer is  $H$  and Terry's answer is  $T$ , what is the value of  $H - T$ ?

- A. -10
- B. -6
- C. 0
- D. 6
- E. 10



**Section B** – 10 questions

**Question 11**

The 7-digit numbers  $74A52B1$  and  $326AB4C$  are multiples of 3. Which one of the following is the value of  $C$ ?

- A. 1
- B. 2
- C. 3
- D. 5
- E. 8

**Question 12**

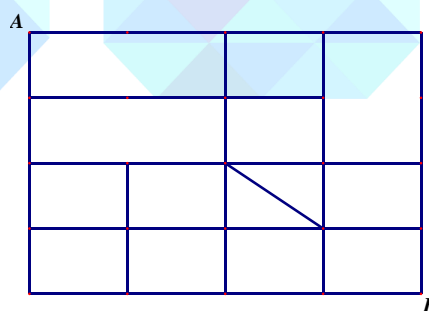
A tournament had six players. Each player played every other player only once, with no ties. If Helen won 4 games, Ines won 3 games, Janet won 2 games, Kendra won 2 games and Lara won 2 games, how many games did Monica win?

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

**Question 13**

What is the number of shortest paths from A to B?

- A. 4
- B. 5
- C. 6
- D. 8
- E. None of the above



**Question 14**

Sam has two identical wooden pyramids, each with a square base. He glues the two bases together to make a new bigger wooden shape. How many vertices are there in the new bigger shape?

- A. 6
- B. 7
- C. 8
- D. 9
- E. 10

**Question 15**

When you multiply Sophie's age and Sony's age, you get 36. If you add their ages together, you get 15. Sophie is older than Sony. How old is Sony?

- A. 12
- B. 3
- C. 4
- D. 5
- E. None of the above

**Question 16**

Students from Mrs. Hein's class are standing in a circle. They are evenly spaced and consecutively numbered starting with 1. The student with number 3 is standing directly across from the student with number 17. How many students are there in Ms. Hein's class?

- A. 28
- B. 29
- C. 30
- D. 31
- E. None of the above



**Question 17**

A "leap year" is a year which has 366 days including February 29 as an additional day. Any year that is divisible by 4 is a leap year, but a year that is divisible by 100 is a leap year only if it is also divisible by 400. How many leap years are there from 2000 to 2017?

- A. 3
- B. 4
- C. 5
- D. 6
- E. None of the above

**Question 18**

Jessica is an avid reader. She bought a copy of the best seller book *Math is Beautiful*. On the first day, Jessica read  $\frac{1}{5}$  of the pages plus 12 more, and on the second day she read  $\frac{1}{4}$  of the remaining pages plus 15 pages. On the third day, she read  $\frac{1}{3}$  of the remaining pages plus 18 pages. She then realized that there were only 62 pages left to read, which she read the next day. How many pages are in this book?

- A. 120
- B. 180
- C. 240
- D. 300
- E. 360

**Question 19**

Reverse the digits of 1746 and we get 6471, the new number is larger than the original number by 4725. How many four-digit numbers satisfy such condition?

- A. 16
- B. 17
- C. 20
- D. 21
- E. None of the above

**Question 20**

Every day at school, Jo climbs a flight of 6 stairs. Jo can climb using 1, 2 or 3 steps or a combination of any of them. How many ways can Jo climb the flight of 6 stairs?

- A. 13
- B. 18
- C. 20
- D. 22
- E. 24

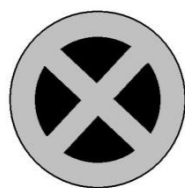


**Section C** – 10 questions**Question 21**

How many zeroes does the product  $1 \times 2 \times 3 \times \dots \times 2017$  end with?

**Question 22**

The radius of the traffic sign is 24 cm. Each of the dark piece is a quarter of a circle. The total area of the 4 quarters equals one-third of the light part of the sign. What is the radius of the circle formed by the 4 quarters?

**Question 23**

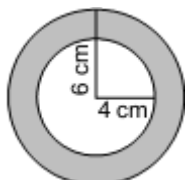
There were 16 teams in a volleyball league. Each team played exactly one game against each other team. For each game, the winning team got 1 point and the losing team got 0 points. There were no draws. After all games, the team scores form a sequence whose any consecutive terms have the same difference. How many points did the team in the second last place receive?

**Question 24**

The brothers Tom and Jason gave truthful answers to the question about the number of members their chess club has. Tom said: "All the members of our club, except five girls, are boys." Jason said: "Every six members always includes at least four girls." What is the least number of members in their chess club?

**Question 25**

Ahmad has two pendants made up of the same material. They are equally thick and weigh the same. One of them has a shape of a grey "annulus" formed by two circles with radius 6 cm and 4 cm (see the diagram). The second has the shape of a solid circle. What is the square of the radius (i.e. radius  $\times$  radius) of the second pendant?



**Question 26**

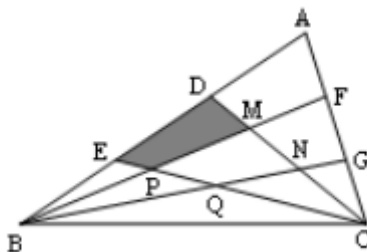
Let the operation  $*$  be defined by  $a * b = ab - a - b + 2$ . If  $7 * b = 13$ , what is the value of  $b$ ?

**Question 27**

A game consists of black and white pieces. The number of black pieces is 5 more than 3 times the white pieces. Seven white and 15 black pieces are removed each round. After several rounds, there are 3 white and 56 black pieces left. How many pieces were there in the beginning?

**Question 28**

As shown in the figure, the area of  $\triangle ABC$  is 42. Points D and E divide the side AB into 3 equal parts, while F and G divide AC into 3 equal parts. CD intersects BF and BG at M and N, respectively. CE intersects BF and BG at P and Q, respectively. What is the area of the quadrilateral EPMD?

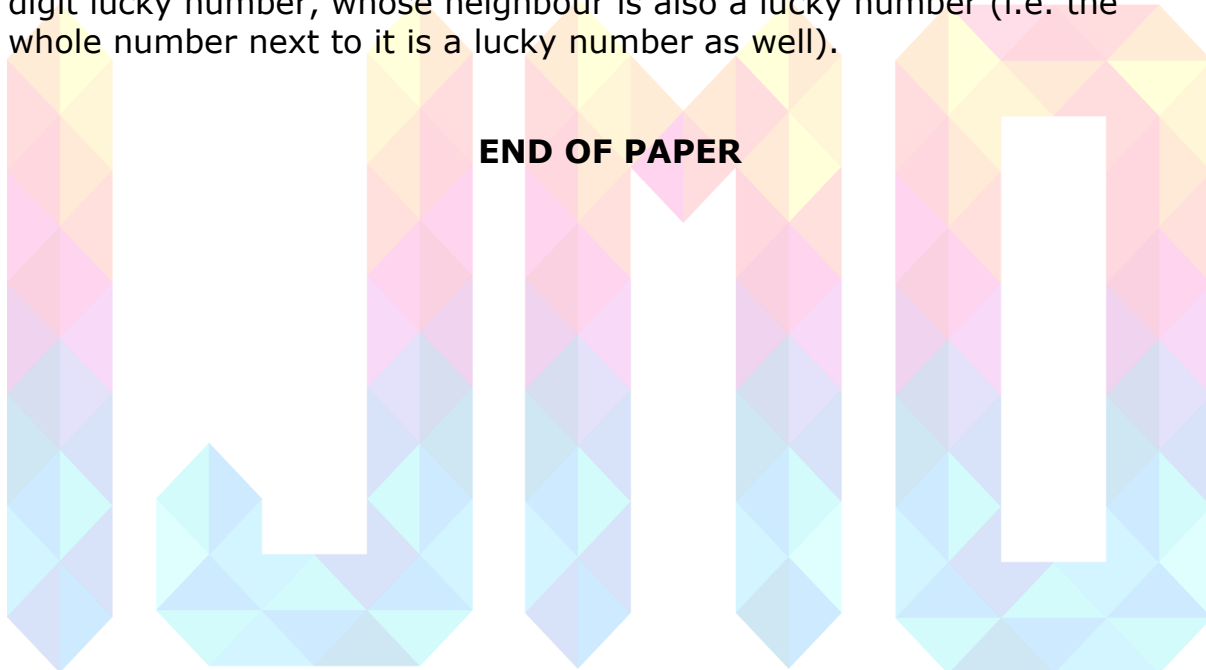


**Question 29**

Four players compete in a tournament. Each player plays exactly two games against every other player. In each game, the winning player earns 2 points and the losing player earns 0 points; if the game results in a draw (tie), each player earns 1 point. What is the minimum possible number of points that a player needs to earn in order to guarantee that he/she will be the champion (i.e. he/she has more points than every other player)?

**Question 30**

Let us call a whole number "lucky" if its digits can be divided into two groups so that the sum of the digits in each group is the same. For example, 34175 is lucky because  $3 + 7 = 4 + 1 + 5$ . Find the smallest 4-digit lucky number, whose neighbour is also a lucky number (i.e. the whole number next to it is a lucky number as well).



1	A
2	A
3	C
4	C
5	A
6	E
7	B
8	B
9	A
10	A
11	A
12	C
13	C
14	A
15	B
16	A
17	C
18	C
19	E
20	E
21	0502
22	0012
23	0001
24	0007
25	0020
26	0003
27	0213
28	0005
29	0011
30	1449

