

9th World Mathematics Team Championship 2018

Junior Level Individual Round 1

English Version

Instruction: This round has 15 questions (**20 minutes**).

Each question is worth 2 points.

No point penalty for submitting wrong answer.

Blank answer will be assigned 0.5 point.

1. Find $1 + 2 - 3 + 4 + 5 - 6 + 7 + 8 - 9 + \dots + 97 + 98 - 99$.

- A) 1684 B) 1724 C) 1584 D) 1592 E) 1846

2. If $1 - \frac{1}{1 + \frac{1}{1 - \frac{1}{1 + \frac{1}{2}}}} = \frac{p}{q}$ where p and q are relatively prime find $p + q$.

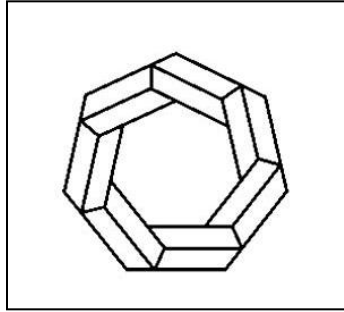
- A) 7 B) 6 C) 5 D) 4 E) 3

3. Compute

$(11 + 10 + \dots + 1) + (10 + 9 + \dots + 2) + (9 + 8 + \dots + 3) + (8 + \dots + 4) + (7 + 6 + 5) + 6$.

- A) 324 B) 284 C) 216 D) 188 E) 144

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4. Find $\frac{2^3 + 2^4 + 2^5}{3^2 + 4^2 + 5^2}$.

A) $\frac{28}{25}$

B) $\frac{14}{12}$

C) $\frac{11}{10}$

D) $\frac{6}{5}$

E) $\frac{27}{25}$

5. If $A(x, y) = \frac{x}{y} + \frac{y}{x}$, find $A(1,2) + A(1,3) + A(1,4) + A(2,3) + A(2,4) + A(3,4)$.

A) 12

B) $13\frac{1}{6}$

C) $13\frac{5}{6}$

D) $16\frac{5}{6}$

E) 15

6. The least common multiple of 300 and 2520 equals:

A) $2^4 \times 3^3 \times 5^2 \times 7$

B) $2^2 \times 3^3 \times 5^2 \times 7$

C) $2^2 \times 3^2 \times 5^2 \times 7^2$

D) $2^3 \times 3^2 \times 5^3 \times 7$

E) $2^3 \times 3^2 \times 5^2 \times 7$

7. Find $\left(1 - \frac{1}{2}\right)\left(1 - \frac{1}{3}\right)\left(1 - \frac{1}{4}\right)\dots\left(1 - \frac{1}{2018}\right)$.

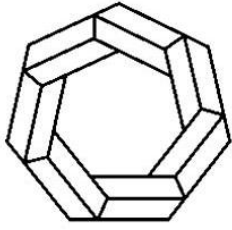
A) $\frac{1}{2017}$

B) $\frac{1}{2018}$

C) $\frac{2}{2017}$

D) $\frac{2018}{2017}$

E) $\frac{2017}{2018}$



9th World Mathematics Team Championship 2018

8. Find the product of the smallest and the largest of the fractions $\frac{9}{8}, \frac{4}{7}, \frac{13}{12}, \frac{5}{9}, \frac{2}{3}$.

- A) $\frac{13}{21}$ B) $\frac{13}{18}$ C) $\frac{3}{4}$ D) $\frac{5}{8}$ E) $\frac{9}{14}$

9. Find the value of $\frac{2 \times 33 \times 404 \times 5005}{6 \times 77 \times 808 \times 9009}$.

- A) $\frac{10}{63}$ B) $\frac{5}{126}$ C) $\frac{5}{84}$ D) $\frac{15}{196}$ E) $\frac{3}{216}$

10. Find the last digit of $1 \times 2 + 2 \times 3 + 3 \times 4 + \dots + 2017 \times 2018$.

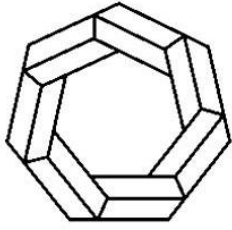
- A) 2 B) 4 C) 6 D) 8 E) 9

11. The greatest common divisor of 1452 and 2970 equals:

- A) 66 B) 242 C) 36 D) 6 E) 44

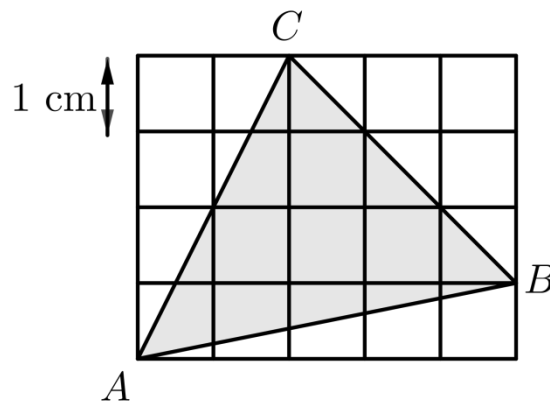
12. Find 2018-th digit after decimal point of the fraction $\frac{123}{7}$.

- A) 5 B) 7 C) 1 D) 4 E) 2



9th World Mathematics Team Championship 2018

13. Find the area of triangle ABC .



- A) 10 cm^2 B) 9.5 cm^2 C) 9 cm^2 D) 8.5 cm^2 E) 8 cm^2

14. For any two integers a and b , let $a \heartsuit b = a \times b + 3a$. Find $(2 \heartsuit 0) \heartsuit (1 \heartsuit 8)$.

- A) 112 B) 84 C) 200 D) 162 E) 76

15. If a, b, c and d are 3, 4, 5, 6 in some order find the least value of $\frac{a}{b} + \frac{c}{d}$.

- A) $\frac{1}{2}$ B) $\frac{4}{3}$ C) $\frac{19}{15}$ D) $\frac{6}{5}$ E) $\frac{9}{5}$