31th ASIA MATHMATICS OLYMPIAD (AMO)

12th June 2022

Trial Round, "**SENIOR**" Level

Instructions

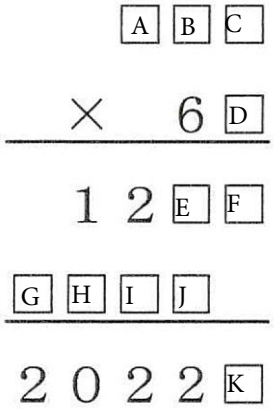
- Do not open problem paper before getting permission
- Write down your answers in the blank provided in answer sheet. Anything located outside blank will not be considered.
- Any question related to problem content or meaning is not allowed except missing typing.
- If student is in bad condition, please raise your hand and inform jury.
- Exit from examination room before time up is prohibited.
- When the time is up, put down pencil immediately and leave answer sheet on the table before leaving room.

Examination period 90 minutes

[Question 1]

12 June 2022 (12/06/2022) is the competition date of the trial round of 2022 Asia Mathematical Olympiad of 2022.

Fill in one digit number in ☐ to complete multiplication below. *(Write your answer in the order of A to K with the value for A starting from left to right)*

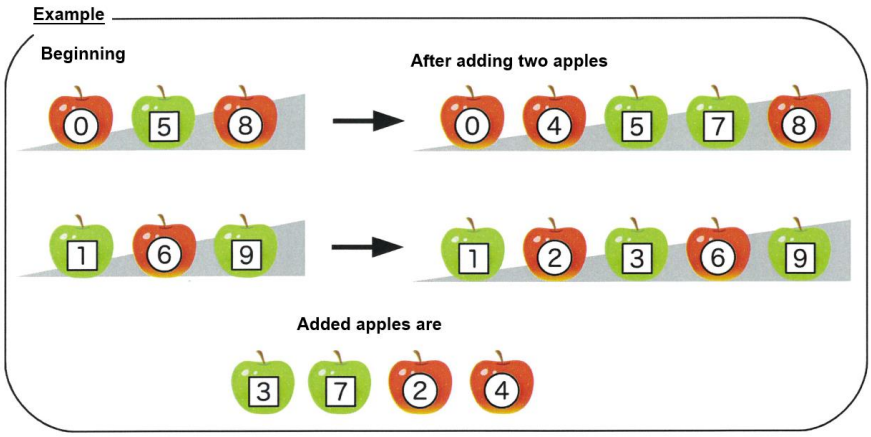


[Question 2]

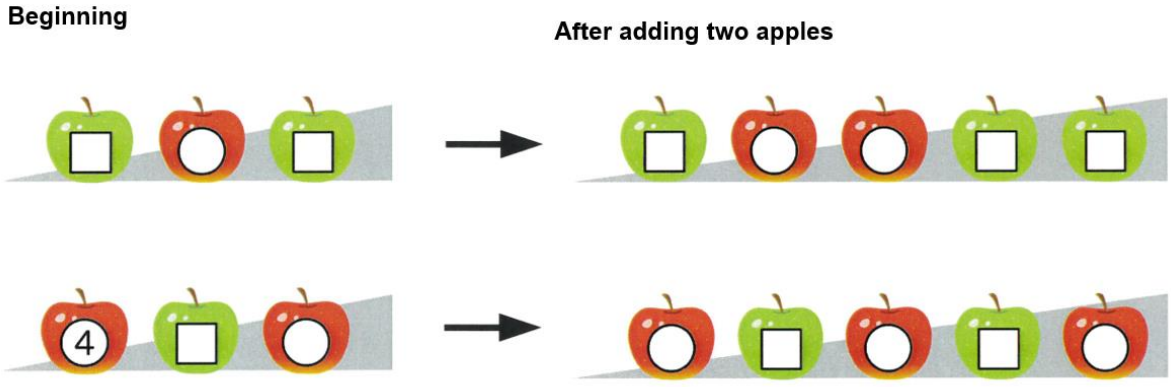
As shown in the figure on right-hand side, 10 apples are labelled by numbers 0 to 9. Let 's arrange all 10 apples according to below rules.

Rules

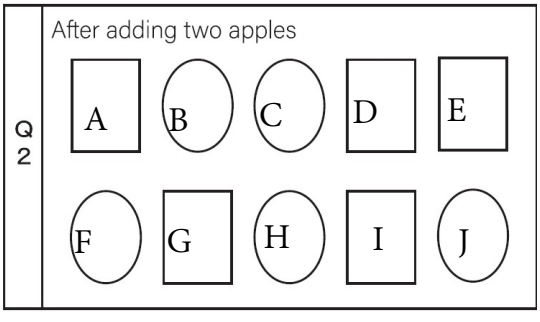
1. The numbers on apples are arranged in ascending order from left to right.
2. At the beginning, there are two rows of apples. Each row contains three apples.
3. Add two apples in each row following the 1st rule.



Write the numbers from left to right of each row after adding two apples ○ or two apples □ are added? *Please state the values of the numbers from A to J in the following format A= , B =*

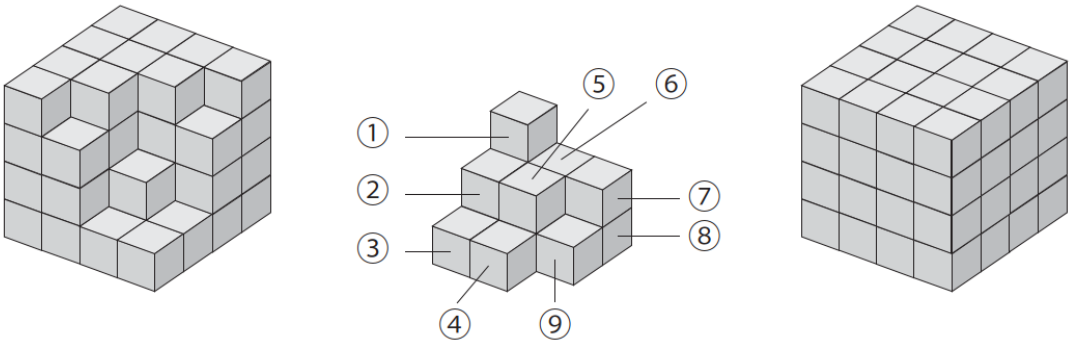


Added apples are



[Question 3]

We need to make Cube C by combining Solid A and Solid B together. However, we need to remove a small cube from Solid B before making Cube C. Which number from ① to ⑨ from Solid B must be removed?



A B C

[Question 4]

A is an integer which be used for below calculation.

$$A \times (A+1) \times (A+2) \times (A+3)$$

1. Please select only one number in below list that is the result of the above calculation.

A	5762	B	9023	C	12566	D	47783	E	52314
F	73075	G	93024	H	98914	I	102774	J	123891

2. From the result in 1, what is A?

[Question 5]

There are 10 cards labeled 1 to 9 and a remaining card ? will be labeled one number chosen from 1 to 9

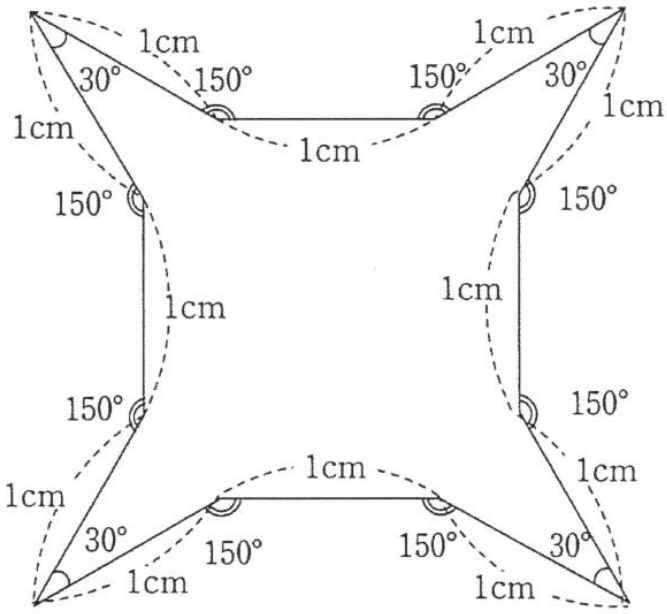
Please use these 10 cards once to form one, two, three and four digits numbers satisfying below equation.

$$\square+\square\square+\square\square\square+\square\square\square\square-612=2022$$

What is the number in ? card ?

[Question 6]

The area of this shape is equal to the summation of X times the total area of an equilateral triangle whose side is 1cm long and Y times the total area of a square whose side is also 1cm long. What are the integers X and Y?



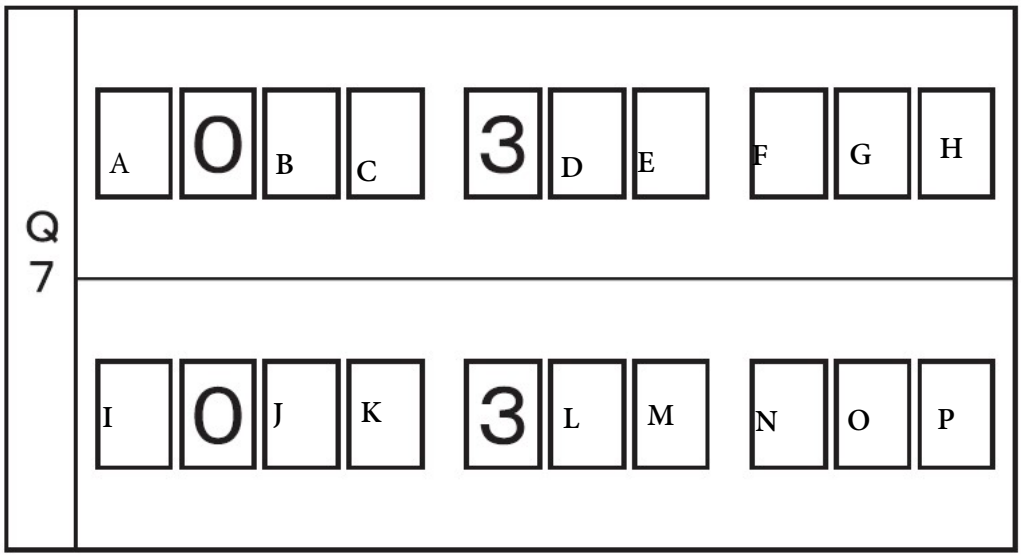
6X=

6Y=

[Question 7]

There are ten cards with the numbers 0 to 9 on them. Use all ten cards at once to make three perfect square numbers.

Please find two sets of perfect square numbers satisfying this figure.



[Question 8]

Five students named A B C D and E attended Math and English competitions. Below are the responses from these five students according to the results of the competitions.

A My Math score is lower than D's but higher than B's. When comparing to each student, my score is higher in at least one subject.

B My English score is lower than C's. When comparing to each student, my score is higher in at least one subject.

C My Math score is lower than A's. When comparing to each student, my score is higher in at least one subject.

D My both Math and English scores are higher than E's.

E When comparing to A, B and C, my score is higher in at least one subject.

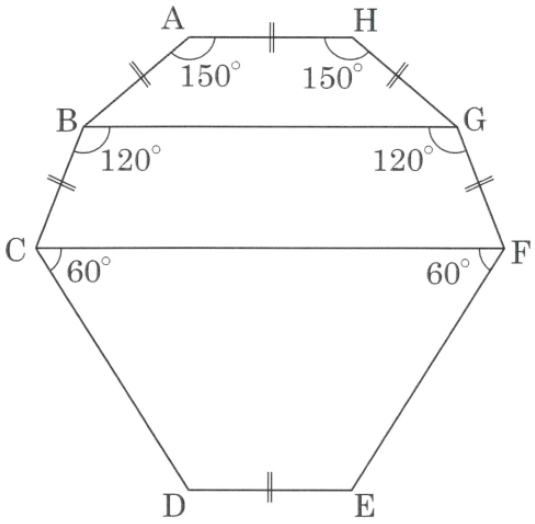
Please rank all 5 students' scores for both Math and English from highest to lowest.

Pls write your answers as Math : followed by English

Q8	Math				
	English				

[Question 9]

Below shape is formed by combining trapezoids ABGH, BCFG and CDEF. AH, BG , CF, DE are all parallel. The lengths of AB, BC, DE, FG, GH, HA are all equal. The measurement of the angles are as shown. If the area of the trapezoid ABGH is equal to 60 cm^2. What are the areas of trapezoids BCFG and CDEF. (figure is not-to- scale)



[Question 10]

Write the numbers from 1 to 2022 from left to right on the first row. In the next row, write the sum of two adjacent numbers in the above row. Repeat the step until the last row contains only one number. What is the "units digit" of the number in the last row?

Row 1 1 2 3 4 5 · · · · · · · · · · · · 2018 2019 2020 2021 2022

Row 2 3 5 7 9 · · · · · · · · · · · 4037 4039 4041 4043

Row 3 8 12 16 · · · · · · · · · · · · 8076 8080 8084

Row 4 20 28 · · · · · · · · · · · · · · 16156 16164

. ·

. · · · · · · · · · · · · · · · · ·

. · · · · · · · · · · ·

?