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ASIA SANSU OLYMPICS(ASO) - SENIOR

7th September 2024



Trial Round, “**SENIOR**” Level R ìěHǵhĨĐèHěH

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

Organized in Asia(ex-Japan),

by



[Question 1]

There are many $1 \times 1 \times 1$ cm³ cubic blocks.

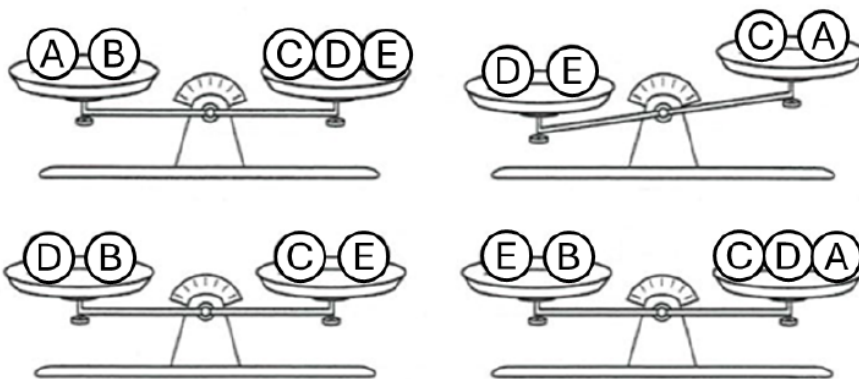
Mr. A and Mr. B each used some of these blocks to make a cube.

Mr. A used 98 more blocks than Mr. B.

How many building blocks did Mr. A use?

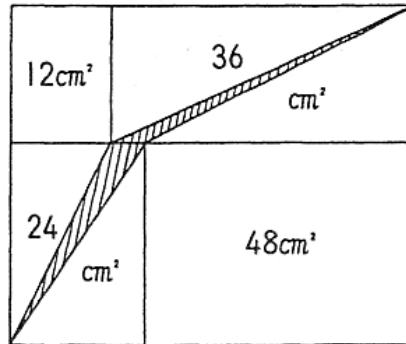
[Question 2]

You have one weight each of 1 grams, 2 grams, 3 grams, 4 grams, and 5 grams. You are using a balance scale to measure these weights. Because the balance scale is old, so even if the difference in weight between the left and right plates is within 1g, the scale will still balance. As shown in the four different weight configurations below, 3 out of the 4 given setups are balanced. Given this information, determine the exact weight (in grams) of each weight labeled A, B, C and D.



[Question 3]

A large rectangle has been divided into four smaller rectangles with areas of 12 cm^2 , 24 cm^2 , 36 cm^2 , and 48 cm^2 , as shown in the diagram. What is the area of the shaded diagonal part in cm^2 .



[Question 4]

The man tells lies on Monday, Tuesday, and Wednesday, and he tells the truth on other days.

The woman tells lies on Thursday, Friday, and Saturday, and she tells the truth on other days.

One day, they had the following conversation:

Man: "Yesterday, I was lying."

Woman: "Yesterday, I was lying too."

Now, on what day did they say this?

[Question 5]

There are 10 cards, each with a different number from 0 to 9 written on it. Some of these cards are removed, and the remaining cards are arranged in a row. The sum of the numbers on the first 7 cards from the left is 22, and the sum of the numbers on the first 6 cards from the right is 35.

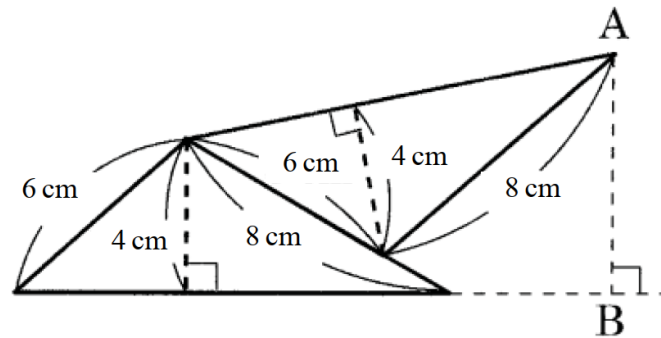
- (1) How many cards was/were removed ?
- (2) What is the numbers written on those cards.

[Question 6]

The figure shows two congruent triangles placed such that they share some part of one side.

The side lengths of each triangle are given as shown in the figure.

Determine the length of AB in cm.



[Question 7]

The math test scores were returned to three students. All three had different scores, and none of them scored 0 or the full score of 100 points. Each student was told by the teacher their rank among the three, but they didn't know the exact scores and ranking of the other two students. Therefore, they gave each other hints.

- Okabe said, "My score was a multiple of 10."
- Tanaka said, "My score was a multiple of 12."
- Morinouchi said, "My score was a multiple of 14."

At this point, Tanaka said, "Now I know everyone's scores. "

What was Tanaka 's score?

[Question 8]

There are four students in a class: Hirata, Kato, Sato, and Yamada. The seating numbers in the class follow English alphabetical order according to their surnames, starting from 1. There are no students with the same surname.

Use the hints (1) to (4) to determine the total number of students in this class.

- (1) The total number of students in the class is 60 or fewer, and Sato 's number is 42.
- (2) The number of students with a smaller number than Hirata is the same as the number of students with a larger number than Yamada.
- (3) Both Hirata 's and Yamada's numbers are multiples of 3.
- (4) The number of students with a larger number than Kato is three times the number of students with a smaller number than Kato.

[Question 9]

Six teams, labeled A through F, are playing a soccer league. By the time each team has played 15 or 16 matches, the rankings are as shown in the table below.

The rankings are determined by the win ratio (wins divided by total matches played).

Fill in the missing numbers (a) to (g) in the wins and losses columns.

Note that there are no draws.

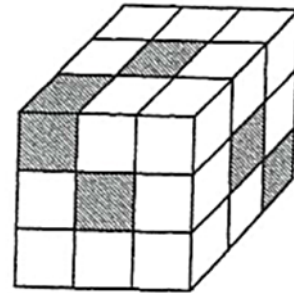
Rank	Team	Wins	Losses
1st	Team A	(a)	5
2nd	Team B	(b)	7
3rd	Team C	(c)	(f)
4th	Team D	(d)	(g)
5th	Team E	(e)	8
6th	Team F	4	12

[Question 10]

You have many $1 \times 1 \times 1$ cm³ cubic blocks, each of which has all its faces painted either black or white. You want to use 27 of these blocks to assemble a larger $3 \times 3 \times 3$ cm³ cube under the following conditions:

- Each outer face of the larger cube must have exactly 2 black squares, arranged in the same pattern on all six faces.

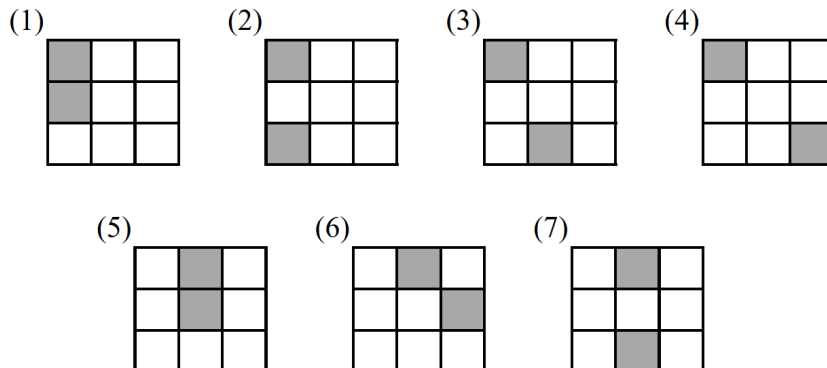
Example: The example on the right shows a $3 \times 3 \times 3$ cube where each face has the same pattern. In this case, it is possible to create this cube using either 8 black blocks or 9 black blocks.



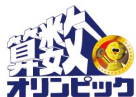
Example

You can create various types of cubes like this by arranging the blocks in different ways. The following questions ask about the cubes you can create. However, cubes that look the same when rotated or flipped are considered identical.

Question 1: Out of the following patterns, (1) to (7), which ones can be used to create a $3 \times 3 \times 3$ cube to achieve the above conditions? List all the numbers.



Question 2 : Determine the maximum and minimum numbers of small black blocks needed for the larger $3 \times 3 \times 3$ cubes you selected in Question 1.



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First Name _____ Last Name _____ ID _____

Question 1 (6 points)

Mr. A used _____ blocks.

Question 6 (12 points)

Length of AB = _____ cm

Question 2 (10 points)

A	B	C	D	E

Question 7 (10 points)

Tanaka 's score is _____

Question 3 (8 points)

Shaded area = _____ cm²

Question 8 (12 points)

Total number of students in this class
is _____

Question 4 (6 points)

What day did they say?

Please select the day by circle.

Monday Tuesday

Wednesday Thursday

Friday Saturday Sunday.

Question 9 (12 points)

(a)	
(b)	
(c)	
(d)	
(e)	
(f)	
(a)	

Question 5 (10 points)

(1) _____

(2) _____

Question 10 (14 points)

Question 1: _____ (6 points)

Question 2:

Max. number of small black blocks = _____

(4 points)

Min. number of small black blocks = _____

(4 points)



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First Name _____ Last Name _____ ID _____

Question 1 (6 points)

Mr. A used 125 blocks.

Question 2 (10 points)

A	B	C	D	E
4	3	1	2	5

All = 10

Otherwise = 0

Question 3 (8 points)

Shaded area = 5 cm²

Question 4 (6 points)

What day did they say?

Please select the day by circle.

Monday Tuesday

Wednesday Thursday

Friday Saturday Sunday.

Question 5 (10 points)

(1) 1 5 points

(2) 6 5 points

Question 6 (12 points)

Length of AB = $\frac{19}{3}$, $6\frac{1}{3}$ cm
6.333

Question 7 (10 points)

Tanaka 's score is 84

Question 8 (12 points)

Total number of students in this class

is 53

Question 9 (12 points)

(a)	<u>11</u>	3 points
(b)	<u>9</u>	1.5 points
(c)	<u>8</u>	1.5 points
(d)	<u>8</u>	1.5 points
(e)	<u>7</u>	1.5 points
(f)	<u>7</u>	1.5 points
(a)	<u>8</u>	1.5 points

Question 10 (14 points)

Question 1: 3, 4, 5, 6 (6 points)

1.5 point each

if answer too many--> -1 per

Question 2: incorrect answer. , no minus

score

Max. number of small black blocks = 10

(4 points)

Min. number of small black blocks = 4

(4 points)