

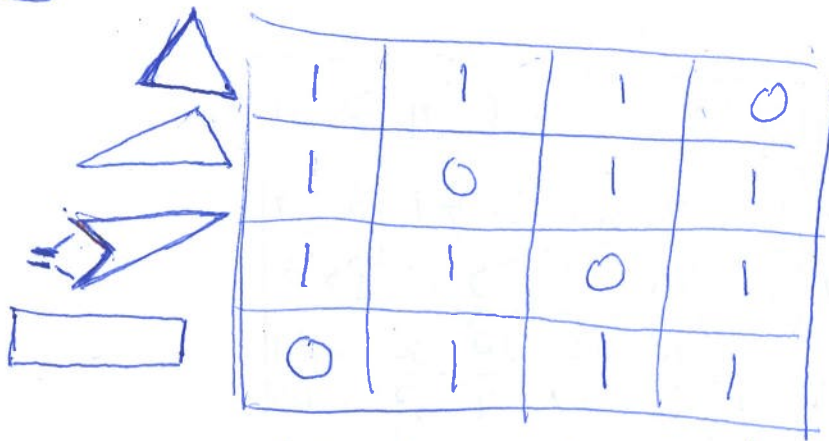
International mathematical Olympiad  
 "Formula of Unity" / "The Third Millennium"  
 2017/2018 year, final round

SOLUTIONS TO THE SECOND ROUND FOR PARTICIPANTS.

GRADE: ... **7** ... NUMBER: ... **53** ...

① There are 180 ways to cut a  $10 \times 10$  square into several rectangles such that the sum of their perimeters is equal to 398, because a  $10 \times 10$  square has got 100 little squares, and each square has got 4 ~~sides~~ <sup>sides</sup>, so, if I cut in 100 rectangles, the sum of their perimeters would be 400, and if I cut in 98 squares and a rectangle of two squares, the sum of the perimeters would be 398 and ~~then~~ there are 180 way to do this and cut the square in 99 ~~to~~ several rectangles

~~2~~ ③



the figure has an acute angle

some of the sides are equal

all of the angles are convex

not all of the sides are equal

5. The smallest possible sum of these numbers is 4,

1	2	3	1	3	1	3	1	2	1
2	3	1	3	1	3	1	3	1	3
<del>3</del>	1	3	1	3	1	3	1	3	1
1	3	1	3	1	3	1	3	1	3
3	1	3	1	3	1	3	1	3	1
1	3	1	3	1	3	1	3	1	3
3	1	3	1	3	1	3	1	3	1
1	3	1	3	1	3	1	3	1	3
3	1	3	1	3	1	3	1	3	1
1	3	1	3	1	3	1	3	1	3
3	1	3	1	3	1	3	1	3	1
1	3	1	3	1	3	1	3	1	3

But it would be 5 in the case if couldn't repeat numbers

1	3	54	7	59	13	66	21	75	31
2	53	6	58	12	65	20	74	30	84
52	5	57	11	64	19	73	29	83	39
4	56	10	63	18	72	28	82	38	91
55	9	62	17	71	27	81	37	90	45
8	61	16	70	26	80	36	89	44	96
60	15	69	25	79	35	88	43	95	49
14	68	24	78	34	87	42	94	48	99
67	23	77	33	86	41	93	47	98	51
22	76	32	85	46	92	46	97	50	100

## GRADE 7. NUMBER 3.

- ④ There is a bag that contains a bag with a bag inside because in the case that the limit is that one bag contains other it would be like this



and it would be more than 2018 candies so obviously it needs to be one bag that contains other that contains another one

- ② Ben has the winning strategy, because the next to the last move ~~was~~ would be the move of Ben and he ever ~~could~~ could put on a number the way Alex couldn't put a number in the last move to create a perfect square

