Problem №1

The maximum sum of the perimeters of rectangles cut from a 10x10 square is 400 (if we cut it into 1x1 squares). There is no way we can make this sum larger. The only way to make this sum 398 is by cutting the square into 98 1x1 squares and 1 2x1 rectangle. We can locate the 2x1 rectangle in ~~different~~ a single row or a single column. There are 9 different ways to locate the rectangle in every row (it may take the first and the second square, the second and the third one, the third and the fourth etc.). We can put it in all 10 rows. This makes in total $9 \times 10 = 90$ possibilities of the 2x1 rectangle's location. If we rotate the square 90° we will also get 90 possibilities. $90 + 90 = 180$ possibilities in total

Answer 180

Problem №2

Ben is the one who has the winning strategy.

If the first digit Alex places is not on the last square, Ben should write 2, 3, 7 or 8 on it, because there is no perfect square that ends by these digits. If Alex places 4 or 0 on the last square, Ben should place 1, 3, 5, 7 or 9 on the eighth square, because then the number would be able to be divided by 2, but not by 4, and 12 is not a perfect square $\Rightarrow$ the whole number will not be a perfect square. Analogically, if Alex places 6 on the last square, Ben must place 0, 2, 4, 6 or 8. If Alex places 5 on the last square, Ben should place any digit but 2 or 7 on the last but one square, because then the number would be able to be divided by 5, but not by 25. And if Alex places 1 or 9 on the last square, Ben should place 1, 3, 5, 7 or 9 on the last but one square because the perfect squares ending by 1 or 9 have an even last but one digit.

Problem №3

	The figure has an acute angle	some of the sites are equal	At least one of the angles is not 60°	the number of the figure's equal sites is not two
a square	0	1	1	1
a triangle with three equal sites	1	1	0	1
a triangle with two equal sites	1	1	1	0
an irregular equatrilateral	1	0	1	1

Problem №4

In order to make the amount of candy in every bag
different, first we will place the same amount in every
bag and then we will ~~w~~ take candies from one bag and
put them in another. When we equalise the amount
in the bags there will be 82 bags with 20 candies inside and
18 with 21. Let's consider it impossible to have a
bag inside another bag. Then it will be impossible
to have a bag with more than 41 candies, otherwise
there will be at least one empty bag. But if 41 is
the maximum amount of candy we can have only
41 bags with different number of candies. Now
Let's consider it impossible to have a bag inside a
bag that is inside another bag. It's impossible to
have a bag with more than 41 candies. If
we put a bag inside another bag, the maximum
amount of candies we can have in the bigger
bag is 81 (It can not be more, because then we
will have at least two bags with one piece of candy
inside). However, It is still impossible to have
100 bags with different amount of candies if
the maximum amount in a bag is 81 $\Rightarrow$ it is
impossible not to have a bag inside another
bag that is inside another bag.

Problem №5

y	x	y	x	y	x	y	x	y	x
x	y	x	y	x	y	x	y	x	y
y	x	y	x	y	x	y	x	y	x
x	y	x	y	x	y	x	y	x	y
y	x	y	x	y	x	y	x	y	x
x	y	x	y	x	y	x	y	x	y
y	x	y	x	y	x	y	x	y	x
x	y	x	y	x	y	x	y	x	y
y	x	y	x	y	x	y	x	y	x
x	y	x	y	x	y	x	y	2	2

The minimum sum is 4 and the numbers that are not coloured are 2 and 2. First of all, the uncoloured numbers are neighbours because otherwise there would be at least one more uncoloured number. If the numbers are equal they will definetley not be coloured. In the table, x represents a number less than the uncoloured ones and y represents a number larger than the uncoloured one. If x is larger than the uncoloured numbers, then if it is less than y, the x that neighbours the uncoloured numbers will also be uncoloured. If x is larger than y then the y neighbouring the uncoloured numbers would also be uncoloured. The minimum value of x is 1 => the minimum value of the uncoloured numbers is one.