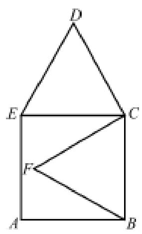
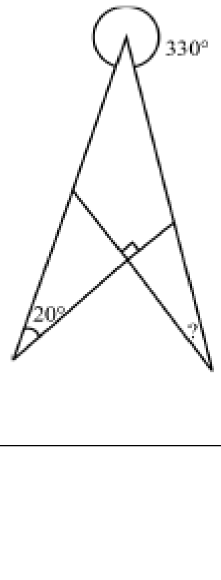
Contest for 10.E and 9.B

26.05.2015

General Instructions
Remember that all answers to each problem should be written on the sheet provided with a whole number between 0000 and 9999, or at least with a sequence of 4 figures. You must always write 4 digits, for example by including the initial zeros as in: 0002.
If the answer is not an integer number, indicate its integer part. The integer part of a real number x is the largest integer less than or equal to x.
If the required amount is a negative number, or if the problem has no solutions, write 0000.
If the answer is a number greater than 9999, or if it is not uniquely determined, write 9999.
When calculating, it may be useful to consider the following approximate values: $\sqrt{2}$ = 1,414 $\sqrt{3}$ = 1,732 $\sqrt{5} = 2{,}24$, $\pi = 3{,}14$

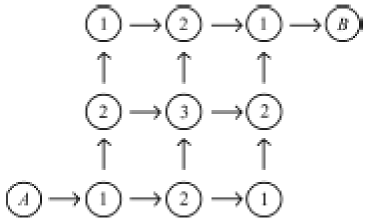
n.	**Questions**
1	**LENGHT** *ABCE is a square and BCF and CDE are equilateral triangles. If AB is of length 1, what is the length of FD. The answer is the solution multiplied by 1000.* 
2	**AGE** *My teacher said that the product of his age and his father's age was 2010 in the year 2010. In what year my teacher born?*
3	**ANGLE**  *What is the value of angle marked with a question mark?*

4 **INTEGERS**

How many integers are there, such that the sum of their digits is 2015 and the product of their digits is 2?

5 **FROM CIRCLE TO CIRCLE**

In the figure we have to go from circle A to circle B following the arrows. On each walk we compute the sum of all numbers we passed through: How many different sums can we get?

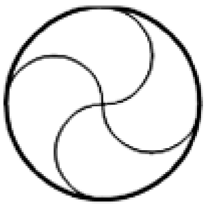


6 **TUESDAYS**

Three Tuesdays of a month coincided with even dates. What day of a week was the 21st day of this month? The answer is a number: Monday = 1, Tuesday = 2, ...

7 **CIRCLE**

A circle of radius 4 cm is divided into four congruent parts by arcs of radius 2 cm as shown.

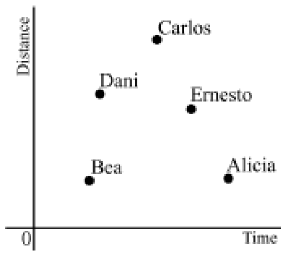


What is the perimeter of one of the resulting parts?

8 **SCATTER GRAPH**

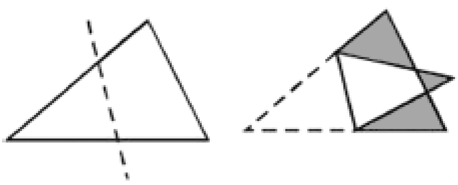
The scatter graph shows the distance run and time taken from some time-trials run by 5 students. Who was the fastest?

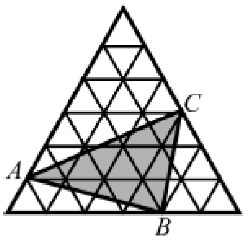
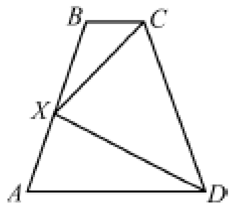
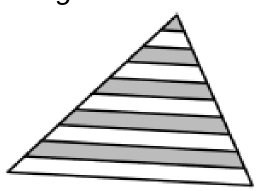
Answer: Alicia =1, Bea =2, Carlos = 3, Dani = 4, Ernesto = 5



9 **FOLDED TRIANGLE**

A triangle is folded along the dotted line to obtain a figure as shown in the picture. The area of the triangle is 1.5 times that of the resulting figure. Given that the total area of the three shaded regions is 1. Find the area of the original triangle.

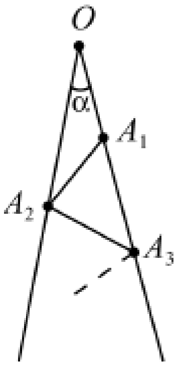


10	**SUPERMARKET** *In a supermarket trolley park, there are two lines of tightly-packet trolleys. The first line has ten trolleys and is 2.9 m long. The second line has twenty trolleys and is 4.9 m long.*  *What is the length of one trolley measured in cm?*
11	**BIG TRIANGLE** *The big equilateral triangle consist of 36 smaller equilateral triangles with area 1 cm^2*  *each. Find the area of ABCΔ.*
12	**ISOSCELES TRAPEZOID** *In an isosceles trapezoid ABCD, X is the midpoint of the lateral side AB, BX = 1,* *and $CXD\measuredangle = 90^{o}$. Find the perimeter of trapezoid ABCD.* 
13	**PARALLEL LINES** *Lines parallel to the base divide each of the other two sides of the triangle shown into 10*  *equal segment. Which percentage of the area of triangle is grey?*
14	**INTEGERS2** *For how many integers n ($1 \le n \le 100$) is the number n^n a perfect square?*
15	**OCTOPUS** *Six-, seven- and eight – legged octopus serve the underwater king. Those who have got 7 legs always lie, but those with 6 or 8 legs – always tell the truth. One day four octopuses met. The blue one said: “Altogether we’ve got 28 legs”, the green one said: “Altogether we’ve got 27 legs”, the yellow one said: “Altogether we’ve got 26 legs”, the red one said: “Altogether we’ve got 25 legs”. How many legs has the red octopus got?*

<table>
<tr><td>16</td><td>

SEGMENTS

In the figure, $\alpha\angle=7^o$, and the segments OA_1, A_1A_2, A_2A_3, ... are all equal. What is the greatest number of OA_1, A_1A_2, A_2A_3, ... equal segments that can be drawn in this way?



</td></tr>
<tr><td>17</td><td>

SEQUENCE

In a sequence the first 3 elements are 1, 2, and 3. From the 4th element on the next element is calculated from the previous 3 elements, the third was substracted from the sum of the 1st and the 2nd one: 1, 2, 3, 0, 5 -2, 7, …. What is the 2015th element of the sequence?

</td></tr>
<tr><td>18</td><td>

PENTAGON

On each side of a pentagon there is a natural number such that adjacent numbers never have a common divisor greater than 1 and non adjacent numbers always have a common divisor greater than 1. There are several possibilities, but one of the following numbers will never occur on any of the sides of the pentagon. Which one is it?

162; 18; 19; 21; 22

</td></tr>
<tr><td>19</td><td>

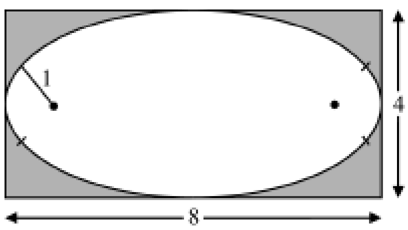
AVERAGE

How many 3-digit integers have the property that their central digit is the average of the other two?

</td></tr>
<tr><td>20</td><td>

OVAL

An oval is built by four arcs of circles. The arcs on the left and right are the same and also the arcs above and below. The oval has vertical and horizontal line of symmetry. The oval fits exactly in a rectangle of length 4x8. The radius of the little arcs is 1. What is the radius of the big arcs?



</td></tr>
</table>