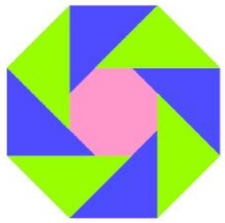
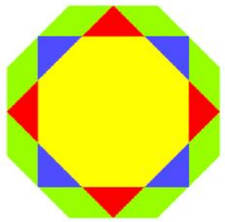
MARCH

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	U



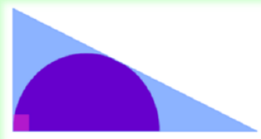


1 Let a and b be natural. If $a + b$ and $a^3 + b^3$ end in 3, what digit does it end in $a^2 + b^2$?

2

3 Rafael has three sons who call him regularly: one every three days, another every four days, and the last one every five days. The last day of 2022 was called by the three sons. How many days in 2023 will he not receive any phone calls from them?

4



In a right triangle of legs 5 and 12 cm, we inscribe a semicircle as in the figure, what is its radius?

5

6 A triangle and a trapezoid have the same area and height. If the base of the triangle is 18 cm, what is the length of the mid-parallel of the trapezoid?

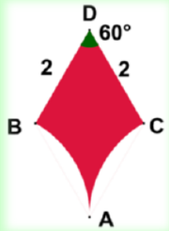
7 If a, b and c are non-zero reals such that $a + b + c = 0$, find the possible values of:

$$\frac{a}{|a|}+\frac{b}{|b|}+\frac{c}{|c|}+\frac{abc}{|abc|}$$

8 How many scalene triangles are there, with a perimeter less than 13, that have whole number sides?

9 How many trapezoids are there that have an area of 1400 cm², a height of 50 cm and a base multiple of 8?

10



11 In the attached figure DB = DC = 2 cm, ∠BDC = 60°, the length of the arcs BA and CA are one-sixth the length of a circle of radius 2 cm. Find the area of the coloured area.

12

13 In each box in the figure is written a number so that each of the three exchanges is the arithmetic mean of the two it has attached. Find the numbers written on each box.

	26			8

14 π day-1

15 What is the largest natural n such that 5^n is divisor of 98! + 99! + 100!?

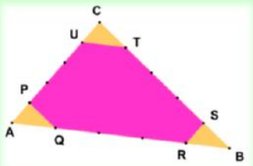
16 The median of a list of five naturals is 1 more than the mode and 1 less than the mean. What is the greatest possible difference between two numbers on the list?

17 We have several natural numbers. The product of the two smallest is 16 and the product of the two largest is 225. Can you find them?

18 In the rectangle of the figure, the lines r and s passing through the vertices A and C are perpendicular to the diagonal BD and divide BD into three segments of length 1 each. Find the area of the rectangle ABCD

19

20



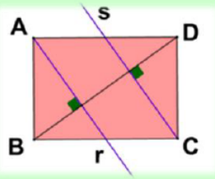
21 We generate a six-digit number N by repeating a three-digit number twice. Is N a multiple of 143?

22 For how many natural numbers n, less than 100, is it verified that n^n is a perfect square?

23

24 Consider 2023 dots, some blue and some green. We assign to each point a fraction whose numerator is the number of points of the other colour and the denominator is the number of points of its colour (including it). What is the sum of the 2023

25



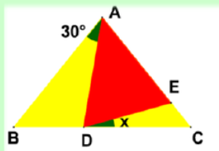
26

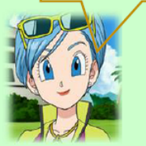
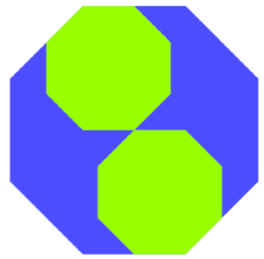
27 We have a triangle ΔABC. Each side has been divided into five equal parts (using Thales' procedure). Find the ratio between the area of ΔABC and that of the hexagon PQRSTU

28

29 Dani, some afternoons, helps deliver goods with his father. One afternoon they plan to travel 210 km. In the end it turns out that they have reached an average speed of 5 km/h more than they had anticipated and they have arrived an hour earlier than expected. What average speed have they reached?

30



In the figure: AB = AC; ∠BAD = 30°; AE = AD. Find x

31 What is the probability of obtaining a number that is odd and with all its digits different, if we randomly choose a number between 1000 and 9999?