

3 Points questions

1) Which of the following numbers is a multiple of 3?

- A) 2009 B) $2+0+0+9$ C) $(2+0) \cdot (0+9)$ D) 2^9 E) $200-9$

2) Helen wrote in a sequence some numbers in the table. Each number, from the third and beyond, is equal to the sum of the previous two numbers in the sequence. The fourth number in the sequence is 6 and the sixth is 15. What is the first number in the sequence?

;	;	;	6	;	15
↑	↑	↑	↑	↑	↑
1st	2 nd	3rd	4th	5th	6th

- A) 0 B) 1 C) 2 D) 3 E) 4

3) In a Marathon race many athletes participated and 2009 finished. The number of people that John has won is triple than the number of people that had won John. In what place has John been classified in the race?

- A) 503 B) 501 C) 500
D) 1503 E) 1507

4) What is the value of the product $\frac{1}{2} \cdot \frac{2}{3} \cdot \frac{3}{4} \cdot \frac{4}{5} \cdot \frac{5}{6} \cdot \frac{6}{7} \cdot \frac{7}{8} \cdot \frac{8}{9} \cdot \frac{9}{10} \cdot 1000$?

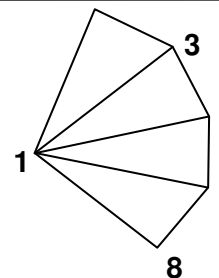
- A) 250 B) 200 C) 100 D) 50 E) none of the previous

5) We write 2009 times the number 2009, one next to the other, so that a long number is formed. To this long number we add those digits which form an odd number and for which their next number in the sequence is an even number. What is the value of the sum we will find?

20092009 ... 2009
2009 φορές
2009 times

- A) 2 B) 9 C) 4018 D) 18072 E) 18081

6) The figure shows four triangles which have some common vertices. On each vertex there is a number. We see the numbers in three of the vertices while in the other three vertices the numbers are invisible. It is known that the sum of the three numbers on the vertices of each of the four triangles is the same in all cases. What is the sum of the invisible numbers?

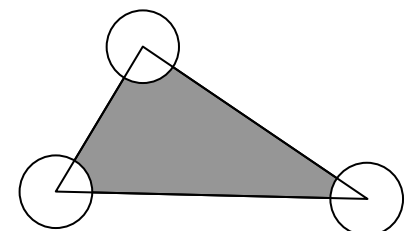


- A) 11 B) 12 C) 14 D) 19
E) none of the previous

7) A robot knows how to calculate. If someone gives it the number a and then the number b the robot gives the result $a+b+ab$. One day Nikos gave the robot the number 5 and then the number 3. Maria gave the number 2 and then a second number. If the answer that the robot gave to Nikos was the same as the answer it gave to Maria, then what is the second number that Maria gave to the robot?

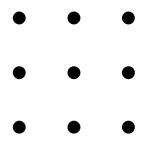
- A) 3 B) 6 C) 7 D) 10 E) 12

8) The area of the triangle is 80 m^2 . The marked circles have the vertices of the triangle as centres with radius 2 m. What is the area of the shaded region?



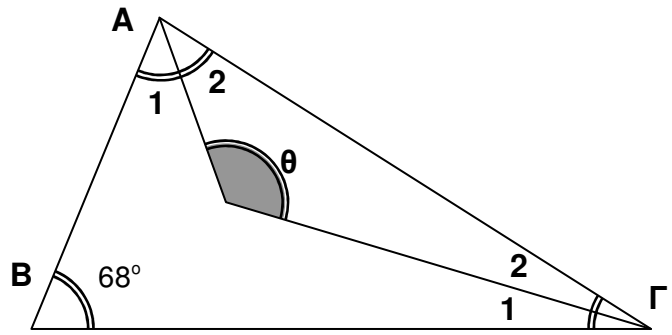
- A) 76 m^2 B) $80 - 2\pi \text{ m}^2$ C) $40 - 4\pi \text{ m}^2$
D) $80 - \pi \text{ m}^2$ E) $78\pi \text{ m}^2$

9) What is the smallest number of dots that have to be removed from the figure such that from the remaining ones there will be no three dots on the same line?



- A) 1 B) 2 C) 3 D) 4 E) 7

10) An angle of the triangle ABC (see figure) is 68° . The angles A_1, A_2 are equal and the angles Γ_1, Γ_2 are also equal. How many degrees is angle θ ?



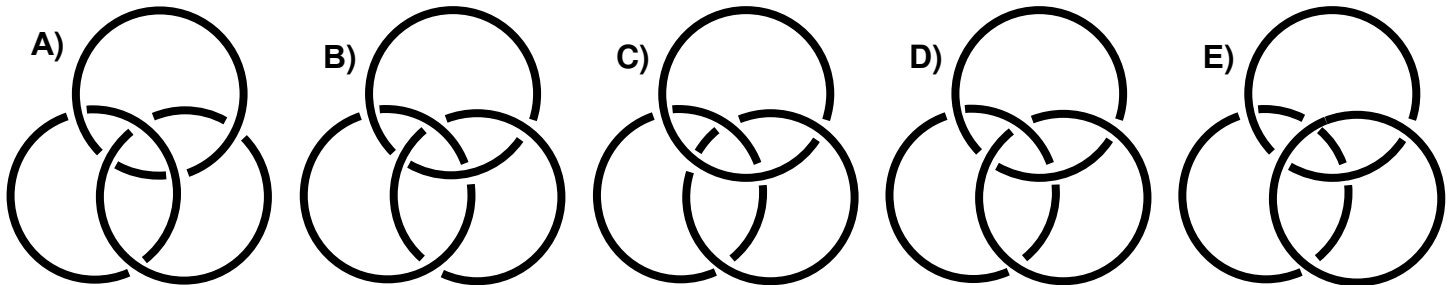
- A) 120° B) 124° C) 128°
 D) 132° E) 136°

4 point questions

11) At each test, the mark can be 0, 1, 2, 3, 4 or 5. After 4 tests, the Mary's average is 4. One of the sentences cannot be true. Which is it?

- (A) Mary got only the mark 4.
 (B) Mary got the mark 3 exactly twice.
 (C) Mary got the mark 3 exactly 3 times.
 (D) Mary got the mark 1 exactly once.
 (E) Mary got the mark 4 exactly twice

12) The Borromean rings have the surprising property that the three of them cannot be separated without destroying them but once one of them is removed (regardless which one), the other two are not linked anymore. Which of the following figures shows the Borromean rings?



13) In an island there are 7 inhabitants. Some of them speak the truth always and the rest speak lies always. One day these 9 people were standing in a queue. Each one of the last two said that the person standing in front of him is a liar. The first in the queue said that all others are liars. How many of the 7 inhabitants are liars?

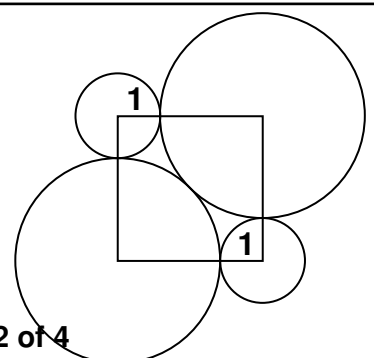
- A) none B) 3 C) 4 D) 6 E) we cannot determine it

14) How many natural numbers from 1 to 50 inclusive have the property that their square and their cube have the same number of digits?

- A) 0 B) 3 C) 4 D) 9 E) more than 9

15) Around the vertices of a square we draw 2 large circles and 2 small circles. The large circles are equal and tangent to each other and to both of the small circles of radius 1. What is the radius of a large circle?

- A) $\frac{2}{9}$ B) $\sqrt{5}$ C) $1 + \sqrt{2}$
 D) 2,5 E) $0,8\pi$



16) The difference between \sqrt{N} and 10 is smaller than 1. How many such natural numbers N exist?

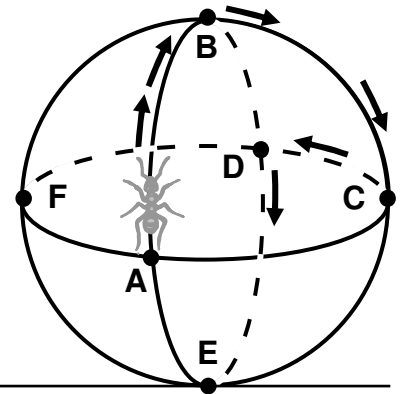
- A) 19 B) 20 C) 39 D) 40 E) 41

17) We want to colour the squares in the grid using colours **A**, **B**, **C** and **D** in such a way that neighbouring squares do not have the same colour (squares that share a vertex are considered neighbours). Some of the squares have been coloured as shown. What are the possibilities for the shaded square?

A	B			
C	D			
		B		
B				

- A) only B B) only C C) only D
 D) either C or D E) it is not possible

18) Three equal size large rings are joined vertically together so that they form the three dimensional figure shown. A ladybird is moving along the rings at the outer surface. Begins from point A and moves upwards. When it moves about 1/4 of the circle, it arrives at an intersection B. There it turns right until the next intersection C, 1/4 of the circle next. There it turns left until the next intersection D, 1/4 of the circle next. It continues in the same way, turning right, left, right, left...alternating from intersection to intersection at every 1/4 of the circle. How many quarter-circles will it move until it reaches again the point A from where it started?



- A) 6 B) 9 C) 12 D) 15 E) 18

19) A decimal number of the form $1,0\dots0,1$ (with zeros between two 1) is greater than $\frac{20009}{20008}$ and smaller than $\frac{2009}{2008}$. How many zeros are there between the two 1?

- A) 1 B) 2 C) 3 D) 4 E) 5

20) If $\alpha = 2^{25}$, $\beta = 8^8$ και $\gamma = 3^{11}$ then which one is valid?

- A) $\alpha < \beta < \gamma$ B) $\beta < \alpha < \gamma$ C) $\gamma < \beta < \alpha$ D) $\gamma < \alpha < \beta$ E) $\beta < \gamma < \alpha$

5 points questions

21) How many six digit numbers are there, which consist of the digits 1, 2, 3 and every two adjacent digits differ by 1? (repetition of digits is allowed).

- A) 14 B) 15 C) 16 D) 17 E) more than 17

22) A Kangaroo has 45 cubes of dimension $1 \times 1 \times 1$. With these it formed an rectangular parallelepiped. The total outer surface area of the parallelepiped cannot have the value of:

- A) 182 B) 126 C) 118 D) 78 E) 124

23) Calculate the value of the expression $\frac{12}{11} + \frac{13}{22} + \frac{14}{33} + \frac{15}{44} + \frac{16}{55} + \frac{17}{66} - \left(1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}\right)$.

- A) $\frac{6}{11}$ B) $\frac{7}{11}$ C) $\frac{8}{11}$ D) $\frac{9}{11}$ E) $\frac{10}{11}$

24) A fruit seller put in a row oranges, peaches, apples and bananas (not necessary in this sequence). Each fruit appeared in the row more than once. At some point the seller noticed that somewhere in the row there an orange whose next fruit a peach. Also, there was an orange (which could be the latter one or a different one) whose next fruit is an apple. Generally, the seller noticed that every two type of fruits, somewhere in the row, were next to each other. What is the least number of fruits in the row?

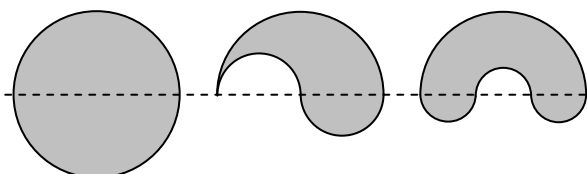
- A) 4 B) 5 C) 8 D) 11 E) it is not possible to place the fruits in this way

25) Zoe discover a nine-digit prime number, but the unit digit was cover accidentally by ink. Zoe's number had the form as shown. Can you help her find the last digit, without having to do her calculations again?

19700019

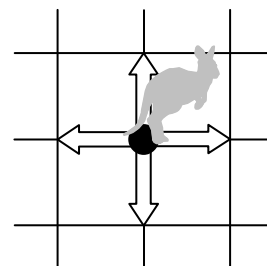
- A) 1 B) 3 C) 7 D) 9 E) none of the previous

26) In the figures the first one is a circle of radius R . The second is a semi-circle of radius R and two smaller and equal semi-circles. The third one consists of one semi-circle of radius R and of three smaller and equal semi-circles. Which of the three figures has the largest perimeter?



- A) A B) B C) C D) all three have the same perimeter
E) A and B have the same perimeter but C larger

27) A Kangaroo is located at the origin. It can make jams of length 1 unit either horizontally (right or left) or vertically (up or down). In how many points of the grid could the Kangaroo be located after a total of 4 jams?



- A) 25 B) 16 C) 40
D) 41 E) none of the previous

28) John multiplied the number 148530 2673 by it self. Unfortunately, some ink was dropped and covered a part of number. However, John remembered that the original number had 13 digits. How many digits does the product have?

- A) 23 B) 24 C) 25 D) 26 E) 27

29) Katy wrote on the board all the five digit numbers that contain the digits 1, 2, 3, 4, 5 using each digit once and which are all multiples of 15. How many numbers did Katy wrote?

- A) 12 B) 24 C) 30 D) 60 E) 120

30) A Kangaroo family was very strange. From its 13 members of the family, 7 kangaroo had green colour, 4 had yellow colour and 2 had black colour. One day, all the members of the family were placed in a row, each one behind another. In no place in the row there were two kangaroo of the same colour. Which one of the following statements is for sure correct?

- A) It is not possible to place the kangaroo in a row in this way
B) the two kangaroo at the ends of the row have green and yellow colour, respectively.
C) some yellow kangaroo is standing next (front or behind) of a black kangaroo
D) there is at least one green kangaroo whose two adjacent kangaroo have yellow colour
E) there are at least three green kangaroo whose two adjacent in the row have yellow colour