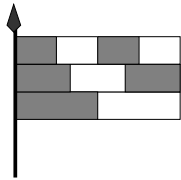
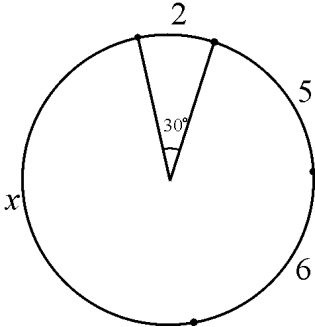
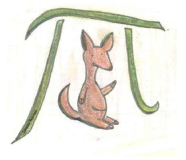


## Cathégorie: Juniors

### 3 Points

1. What is halfway between 2006 and 6002?  
A) 3998      B) 4000      C) 4002      D) 4004      E) 4006
  2. How many four-digit numbers (whose four digits are distinct) are divisible by 2006?  
A) 1      B) 2      C) 3      D) 4      E) 5
  3. What is the least 10-digit number that can be obtained by putting together the following six numbers one after another: 309, 41, 5, 7, 68, and 2?  
A) 1 234 567 890      B) 1 023 456 789      C) 3 097 568 241  
D) 2 309 415 687      E) 2 309 415 678
  4. How many times between 00:00 and 23:59 does an electronic watch show all the four digits 2, 0, 0 and 6 in any order?  
A) 1      B) 2      C) 3      D) 4      E) 5
  5. A flag consists of three stripes of equal width, which are divided into two, three and four equal parts, respectively. What fraction of the area of the flag is coloured grey?  
A)  $\frac{1}{2}$       B)  $\frac{2}{3}$       C)  $\frac{3}{5}$       D)  $\frac{4}{7}$       E)  $\frac{5}{9}$
- 
6. My Grandma's watch gains one minute every hour. My Grandpa's watch loses half a minute every hour. When I left their house I synchronised their watches and told them I would return when the difference between the times on their watches is exactly one hour. How long will it be before I return?  
A) 12 hours      B) 14 hours and a half      C) 40 hours      D) 60 hours      E) 90 hours
  7. Peter says that 25% of his books are novels, and  $\frac{1}{9}$  of them are poetry. Given that he has between 50 and 100 books, how many books does he have?  
A) 50      B) 56      C) 64      D) 72      E) 93
  8. A circle is divided into four arcs of length 2, 5, 6,  $x$ . Find the value of  $x$ , if the arc of length 2 subtends an angle of  $30^\circ$  at the centre.
- 
9. One packet of Chocofruit candies costs 10 crowns. There is a coupon inside every packet. For three coupons you get another packet of Chocofruit candies. How many packets of Chocofruit candies can you get for 150 crowns?  
A) 15      B) 17      C) 20      D) 21      E) 22

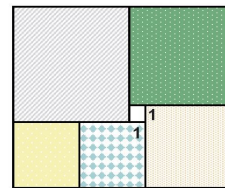


10. The numbers  $a, b, c, d$  and  $e$  are positive, such that  $ab = 2, bc = 3, cd = 4, de = 5$ . What is the value of  $e/a$ ?
- A)  $15/8$       B)  $5/6$       C)  $3/2$       D)  $4/5$       E) impossible to determine

**4 Points**

11. A tactless person asked Lady Ágnes how old she is. Lady Ágnes replied: “If I live to be one hundred, then my age is four thirds of half of my remaining time.” How old is Lady Ágnes?
- A) 20      B) 40      C) 50      D) 60      E) 80

12. The rectangle in the picture is divided into six squares. The length of the sides of the smallest square is 1 cm. What is the length of the sides of the largest square?
- A) 4 cm      B) 5 cm      C) 6 cm      D) 7 cm      E) 8 cm



13. Each letter represents a different digit, and each digit a different letter. What digit does G represent?

$$\begin{array}{r} \text{K A N} \\ + \text{K A G} \\ + \text{K N G} \\ \hline \text{2 0 0 6} \end{array}$$

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

14. While Nick is solving one of the “Kangaroo” problems he makes the following correct conclusions:

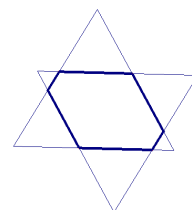
- 1) If answer A is true, then answer B is also true.
- 2) If answer C is not true, then answer B is also not true.
- 3) If answer B is not true, then neither D nor E is true.

Which of the answers to the problem is true? (Recall that for any Kangaroo problem exactly one answer is true.)

- A) answer A      B) answer B      C) answer C      D) answer D      E) answer E

15. Two identical equilateral triangles with perimeters 18 cm are overlapped with their respective sides parallel. What is the perimeter of the resulting hexagon?

- A) 11 cm      B) 12 cm      C) 13 cm  
D) 14 cm      E) 15 cm

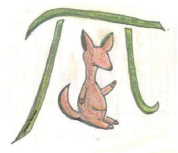


16. What is the maximum number of digits that a number could have if every pair of consecutive digits is a perfect square?

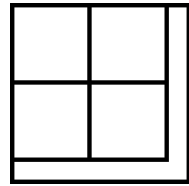
- A) 5      B) 4      C) 3      D) 6      E) 10

17. A box contains 15 balls that are coloured red-blue (half red, half blue), 12 balls that are coloured blue-green and 9 balls that are coloured green-red. What is the smallest number of balls that must be selected to guarantee that you have at least seven balls that share a colour?

- A) 7      B) 8      C) 9      D) 10      E) 11



18. A square of area  $125 \text{ cm}^2$  was divided into five parts of equal area – four squares and one L-shaped figure as shown in the picture. Find the length of the shortest side of the L-shaped figure.
- A) 1 cm   B) 1,2 cm   C)  $2(\sqrt{5} - 2)$  cm  
D)  $3(\sqrt{5} - 1)$  cm   E)  $5(\sqrt{5} - 2)$  cm



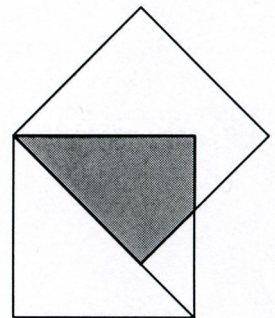
19. If the sum of three positive numbers is equal to 20, then the product of the two largest numbers among them is
- A) always less than 99                      B) always greater than 0,001  
C) always different from 25   D) always different from 75  
E) none of the above
20. A magic island is inhabited by knights (who always tell the truth) and liars (who always lie). A wise man met two people A and B from the island and decided to determine if they were knights or liars. When he asked A, "Are you both knights?" he could not be sure of their identities. When he asked A, "Are you of the same type?" he could then identify them. What were they?
- A) both liars              B) both knights              C) A – knight, B – liar  
D) B – knight, A – liar              E) impossible to specify

**5 Points** (tehtävässä 21 tarvitaan kombinatoriikan tietoja)

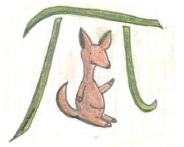
21. A train consists of five wagons: I, II, III, IV and V. How many ways can the wagons be arranged so that wagon I is nearer to the locomotive than wagon II is?
- A) 120              B) 60              C) 48              D) 30              E) 10

22. Two squares with side 1 have a common vertex, and the edge of one of them lies along the diagonal of the other. What is the area of the overlap between the squares?

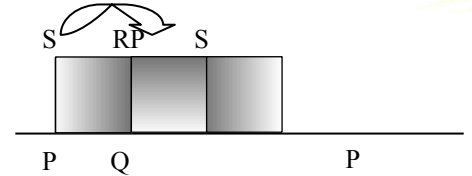
A)  $\sqrt{2} - 1$    B)  $\frac{\sqrt{2}}{2}$    C)  $\frac{\sqrt{2} + 1}{2}$    D)  $\sqrt{2} + 1$    E)  $\sqrt{3} - \sqrt{2}$



23. The Dobson family consists of the father, the mother, and some children. The mean age of the Dobson family is 18 years. Without the 38-year-old father the mean age of the family decreases to only 14 years. How many children are there in the Dobson family?
- A) 2              B) 3              C) 4              D) 5              E) 6
24. The numbers 1, 2, 3 are written on the circumference of a circle. Then the sum of each pair of neighbouring numbers is written between them, so 6 numbers are obtained (1, 3, 2, 5, 3 and 4). This operation is repeated 4 more times, resulting in 96 numbers on the circle. What is the sum of these numbers?
- A) 486              B) 2187              C) 1458              D) 4374              E) 998.



25. A square PQRS with sides of length 10 cm is rolled without slipping along a line. Initially  $P$  and  $Q$  are on the line and the first roll is around point  $Q$  as shown in the diagram. The rolling stops when  $P$  first returns to the line. What is the length of the curve that  $P$  has travelled?



- A)  $10\pi$       B)  $5\pi + 5\pi\sqrt{2}$       C)  $10\pi + 5\pi\sqrt{2}$       D)  $5\pi + 10\pi\sqrt{2}$   
E)  $10\pi + 10\pi\sqrt{2}$

26. Each face of a cube is coloured with a different colour from a selection of six colours. How many different cubes can be made in this way?

- A) 24      B) 30      C) 36      D) 42      E) 48

27. The number 287 has 3 distinct digits, which create a bigger number 782 when put in reverse order. How many 3-digit numbers have these properties?

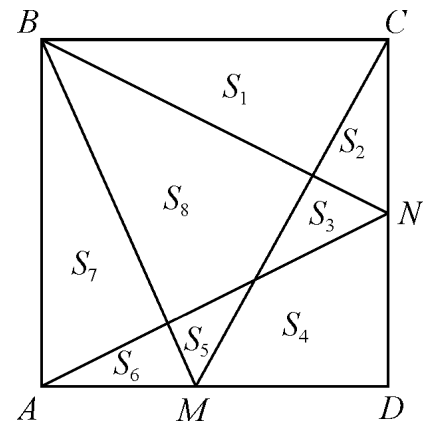
- A) 124      B) 252      C) 280      D) 288      E) 360

28.  $Y$  is defined to be the sum of the digits of  $X$ , and  $Z$  is the sum of the digits of  $Y$ . How many natural numbers  $X$  satisfy  $Z = X$ ?

- A) 0      B) 1      C) 2      D) 3      E) more than 3

29. Points  $M$  and  $N$  are arbitrarily chosen on the sides  $AD$  and  $DC$ , respectively, of a square  $ABCD$ . Then the square is divided into eight parts of areas  $S_1, S_2, \dots, S_8$  as shown in the diagram. Which of the following expressions is always equal to  $S_8$ ?

- A)  $S_2 + S_4 + S_6$       B)  $S_1 + S_3 + S_5 + S_7$   
C)  $S_1 + S_4 + S_7$       D)  $S_2 + S_5 + S_7$   
E)  $S_3 + S_4 + S_5$ .



30. Suppose the final result of a football match is 5 – 4 to the home team. If the home team scored first and kept the lead until the end, in how many different orders could the goals have been scored?

- A) 17      B) 13      C) 20      D) 14      E) 9