

2005



WIZPROF

# EUROPEAN KANGAROO ARITHMETIC AND MATHEMATICS CONTEST

**Welcome to the Kangaroo, great that you join in!**

- \* You have 75 minutes. There are 30 questions. With every question one of the five options is the correct one.
- \* Do what you can, don't be disappointed if you cannot answer everything.
- \* You are not allowed to use a calculator; of course you may use scribbling paper.
- \* Use a pencil to fill in the answer sheet carefully.
- \* About scoring points:
  - \* You start with 30 free points.
  - \* Question 1 - 10: you will get 3 points for a correct answer; you will lose  $\frac{3}{4}$  points for an incorrect one.
  - \* Question 11 - 20: you will get 4 points for a correct answer; you will lose 1 point for an incorrect one.
  - \* Question 21 - 30: you will get 5 points for a correct answer; you will lose  $1\frac{1}{4}$  points for an incorrect one.
  - \* If you don't answer a question, you neither gain nor lose points.
- \* The answers will be on the website from March 22<sup>nd</sup>, [www.math.ru.nl/kangoeroe](http://www.math.ru.nl/kangoeroe)
- \* The scores and the prizes will arrive at schools in week 17.

**Good luck and most of all: have fun!!**

wizPROF  
the Netherlands: 3, 4 & 5 havo/vwo  
Flanders: 2nd & 3rd degree tso/aso



[www.museumboerhaave.nl](http://www.museumboerhaave.nl)



[www.technopolis.be](http://www.technopolis.be)

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[www.tue.nl](http://www.tue.nl)



[www.education.ti.com](http://www.education.ti.com)



[www.smart.be](http://www.smart.be)



[www.knaw.nl](http://www.knaw.nl)



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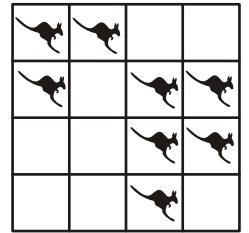
[www.kijk.nl](http://www.kijk.nl)

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01. We want two kangaroos in each row (from left to right and from top to bottom). We want to move the least number of kangaroos possible. How many kangaroos will be moved.



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

02. Tim lives with his father, mother and sister. They also have a dog, two cats, two canaries and 4 goldfish. How many legs do they have altogether?

- A. 13                      B. 22                      C. 24                      D. 28                      E. 32

03. At last year's Kangaroo contest Meryl finished 50<sup>th</sup> from the top and 50<sup>th</sup> from the bottom. How many pupils participated at her school?

- A. 50                      B. 75                      C. 99                      D. 100                      E. 101

04. 18 schoolkids are crossing the street in pairs. The pairs are numbered 1 up to 9 inclusive. Each even numbered pair consists of a boy and a girl, every other pair consists of two boys. How many boys are crossing the street?

- A. 10                      B. 11                      C. 12                      D. 14                      E. 18

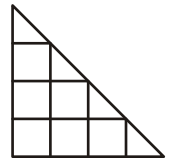
05. Tim inflates 8 balloons every three minutes. Every tenth inflated balloon deflates immediately. How many balloons are still inflated when Tim has been inflating balloons for two hours?

- A. 160                      B. 216                      C. 240                      D. 288                      E. 320

06. A company got an order for bricks of 10 by 12 by 14 cm. Accidentally they produced bricks of 12 by 14 by 16 cm. How many percent was the excess in volume of these bricks?

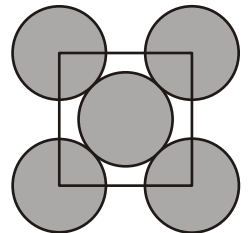
- A. 20                      B. 30                      C. 40                      D. 50                      E. 60

07. In the picture you can discover seven squares. You could discover more triangles in it. How many more?



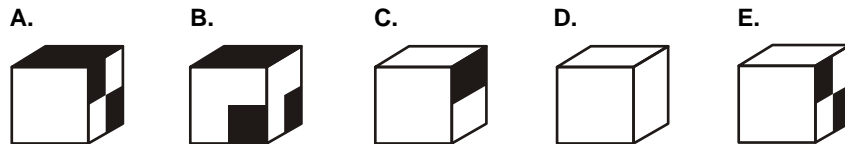
- A. 0                      B. 1                      C. 2                      D. 3                      E. 4

08. Five equally big circles are touching as you can see in the diagram alongside. The centres of the outer circles are vertices of a square. What part of the grey region is inside the square?

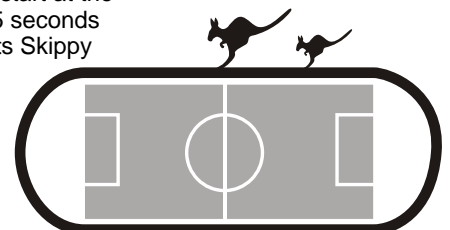


- A. 1/4                      B. 2/5                      C. 5/9                      D. 3/5                      E. 2/3

09. The net is folded into a cube. Which cube could you get?

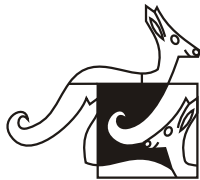


10. Mother Kangaroo and her son Skippy are jumping on the track around a football field. The track has a length of 330 m. They both make one jump per second; mother makes jumps of 5 m, Skippy makes jumps of 2 m. They start at the same time, on the same spot and in the same direction. After 25 seconds Skippy gets tired and stops. Mother keeps on jumping and meets Skippy again after a while. How many seconds does Skippy have to wait for his mother?



- A. 24                      B. 41                      C. 51                      D. 66                      E. 76

3 points



11. Two equally big bottles are totally filled with a mixture of water and wine. The ratio of water and wine in the first bottle is 2:1 and in the second bottle it is 4:1. Both bottles are emptied into the same decanter. What will be the ratio of water and wine in the decanter?

- A. 11:4      B. 3:1      C. 5:1      D. 6:1      E. 8:1

12. Tim has been sitting in a street café for 19 minutes. Every 3 minutes a bus of line A passes by, every 5 minutes a bus of line B passes by. Tim subtracts the number of B busses from the number of A busses. How many different outcomes are possible?

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

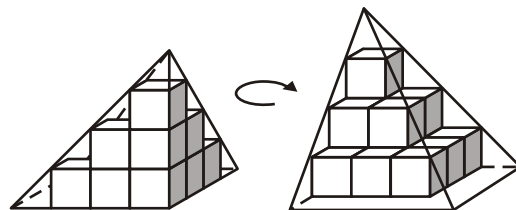
13. The upper half circle connects the top points of the two lower half circles. Each half circle has a radius of 2 cm. How many  $\text{cm}^2$  is the area of the grey region?

- A.  $2\pi$       B. 7      C.  $2\pi+1$       D. 8      E.  $2\pi+2$



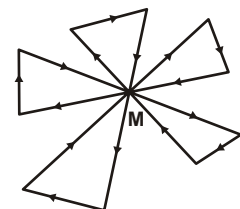
14. Fourteen little cubes of volume 1 are piled up, in such a way that they fit exactly into one pyramid. See figure. What is the volume of this pyramid?

- A.  $10\frac{2}{3}$       B.  $13\frac{1}{3}$       C. 16      D.  $18\frac{2}{3}$       E.  $21\frac{1}{3}$



15. A car drives a route through town as indicated alongside, crossing square M five times while doing so. How large is the total angle his car turned through when it has completed the route?

- A.  $1080^\circ$       B.  $1200^\circ$       C.  $1350^\circ$       D.  $1440^\circ$       E.  $1500^\circ$



16. The average of sixteen different positive integers is 16. How large can the largest of those sixteen numbers be at most?

- A. 16      B. 24      C. 32      D. 136      E. 256

17. A dice is rolled as indicated below. At the start S the dice shows a 3. The number of dots on opposite faces of the dice always add up to 7. What face does the dice show at the finish F?

- A. 2      B. 3      C. 4      D. 5      E. 6



18. A car drove at a constant speed of 90 km/h. When the car clock displayed 21:00, the odometer displayed 116.0, so the car had done 116.0 km. Later that evening the car clock and the odometer displayed exactly the same sequence of four digits. At what time was that?

- A. 21:30      B. 21:50      C. 22:00      D. 22:10      E. 22:30

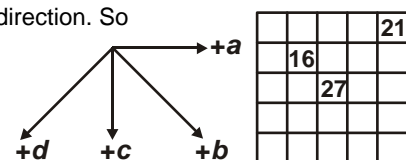
19. A rectangular strip of 24 by 1 cm is cut into 7 rectangles of width 1 cm each. Four of the rectangles have length 4 cm, two of them have length 3 cm, and one has length 2 cm. Various new rectangles can be assembled from these seven rectangles. What is the smallest possible perimeter of such a new rectangle?

- A. 14 cm      B. 20 cm      C. 22 cm      D. 25 cm      E. 28 cm



20. The square on the right is filled with numbers. The diagram alongside indicates what happens to a number when you do one step in the indicated direction. So a number is increased by  $a$  with every step to the right. You can read in the square that  $b = 11$ . Which number is  $c$ ?

- A. 5,6      B. 6      C. 7      D. 11      E. 28



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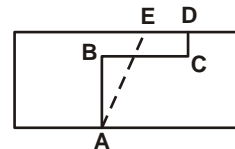
21. A vase contains seventeen marbles, numbered from 1 to 17 inclusive. How many marbles do you have to pick from the vase to be sure that you have got at least one pair that adds up to 18?

- A. 7                      B. 8                      C. 10                      D. 11                      E. 17

22. You add a positive integer and its square. Then you take the square root. How many outcomes are in between 2000 and 2005?

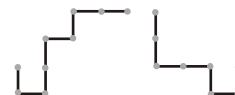
- A. 1                      B. 2                      C. 3                      D. 4                      E. 5

23. Two farmers share a rectangular meadow. The ditch ABCD is the border. AB, BC and CD run parallel to the sides of the meadow and AB = 30 m, BC = 24 m and CD = 10 m. The ditch is filled up and a new ditch is digged in a straight line from A to E to serve as a new border, in such a way that each farmer gets back as much land as he gives up. How many metres will E be from D?



- A. 8                      B. 10                      C. 12                      D. 14                      E. 16

24. One pipe is put on top of the other in such a way that as many pieces as possible cover each other perfectly. How many pieces do cover each other then?



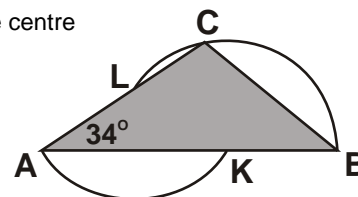
- A. 2                      B. 3                      C. 4                      D. 5                      E. 6

25. Meryl speaks the truth every other day, she always lies on the remaining days. Today she uttered four of the following five sentences. What can't she have said today?

- The number of my classmates is odd.
- There are as many boys as girls among my classmates.
- It is 2005 now.
- I always speak the truth.
- Three of my classmates are older than I am.

- A. a                      B. b                      C. c                      D. d                      E. e

26. Point L is the centre of a circle that runs through A and K. Point K is the centre of a circle that runs through B, C and L. In triangle ABC  $\angle A = 34^\circ$ . What does  $\angle B$  measure?

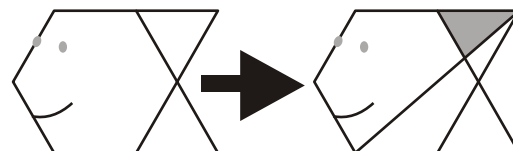


- A.  $34^\circ$                       B.  $35^\circ$                       C.  $39^\circ$                       D.  $42^\circ$                       E.  $68^\circ$

27. By how many four-digit numbers can you divide  $102^{2^2}$ ?

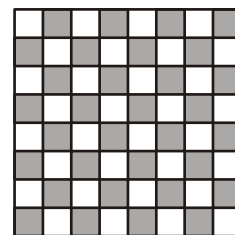
- A. 2                      B. 3                      C. 4                      D. 5                      E. 6

28. A fish is made from 10 matches. A line has been drawn, creating the grey triangle. The fish has area 24. What is the area of the grey triangle?



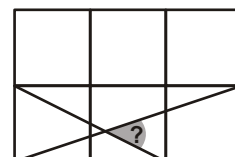
- A.  $\sqrt{2}$                       B.  $\sqrt{3}$                       C. 2                      D.  $\sqrt{5}$                       E.  $\sqrt{6}$

29. Two castles are placed on a chessboard, one on a white square, the other on a black square. Moreover they are not in the same row or the same column. In how many ways can this happen?



- A. 56                      B. 672                      C. 720                      D. 768                      E. 5040

30. Two lines are drawn on a square grid. What is the angle between the two crossing lines?



- A.  $45^\circ$                       B.  $45,5^\circ$                       C.  $46^\circ$                       D.  $46,5^\circ$                       E.  $47^\circ$

5 points