

2 2004



19 March

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 23rd, www.math.kun.nl/kangoeroe
- * The scores and the prizes will arrive at schools in week 17.

Good luck and most of all: have fun!!

version 2
the Netherlands: 1 & 2 havo/vwo and 3 & 4 vmbo
Flanders: bso 2nd & 3rd degree and a-stream 1st degree

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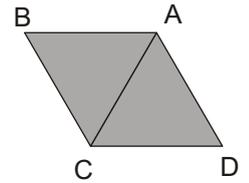
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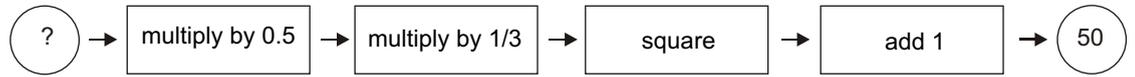
01. $2004 - 200 \times 4 = ?$
 A. 1200 B. 1204 C. 2804 D. 7216 E. 400000

02. The equilateral triangle ACD is turned anti-clockwise about point A until it is on triangle ABC. What angle has it been turned through?



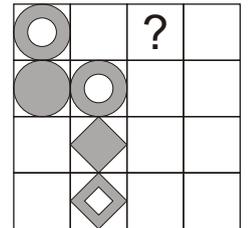
A. 60° B. 120° C. 180° D. 240° E. 300°

03. What is the positive start number in the place of the question mark?



A. 18 B. 24 C. 30 D. 40 E. 42

04. Esther has 16 cards: 4 with a \blacklozenge , 4 with a \odot , 4 with a \bullet , and 4 with a \blacklozenge . She places these cards in a square. In every row from left to right and in every column from top to bottom every symbol has to be present. On the right you can see how Esther started. How many possibilities are there for the symbol on the card which is in the square marked with a question mark?

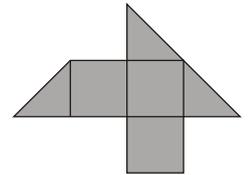


A. 0 B. 1 C. 2 D. 3 E. 4

05. $(1 - 2) - (3 - 4) - (5 - 6) - \dots - (99 - 100) = ?$

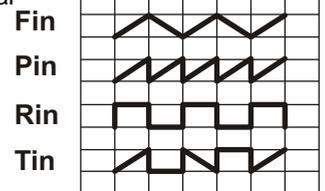
A. -48 B. 0 C. 48 D. 49 E. 50

06. A part of a hollow cube is sawn off; because of that, there is a hole in the cube. Alongside you see a net of what remained of the cube. What is the shape of the hole?



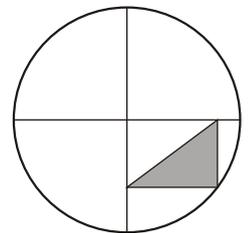
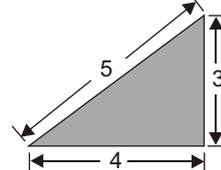
A. an equilateral triangle B. a right-angled triangle C. a hexagon
 D. a square E. a rectangle, but not a square

07. Four kangaroos Fin, Pin, Rin and Tin are jumping across a square of identical rectangular tiles. You can see their routes on the right.
 Fin jumped 25 m.
 Pin jumped 37 m.
 Rin jumped 38 m.
 How many meters did Tin jump?



A. 27 B. 30 C. 35 D. 36 E. 40

08. A circle is divided into four quarters by two axes. A right-angled triangle with sides of 3 cm and 4 cm parallel to the axes fits exactly in one of these quarters. How many cm is the diameter of the circle?



A. 10 B. 12 C. 12,5 D. 14 E. 18

09. An ice-cream bar sells 9 different flavours of ice. You can also buy all sorts of duo flavours: two different flavours in one cup. How many duo flavours can be bought?

A. 9 B. 36 C. 72 D. 81 E. 90

10. Hielke wants to build a cube using some bricks. The bricks are 1 dm by 2 dm by 3 dm. What is the least number of bricks which he will need?

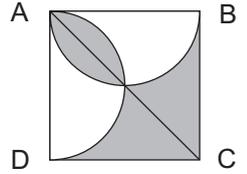
A. 12 B. 18 C. 24 D. 36 E. 60



11. Hielke has a rectangular terrace in his garden. He has this terrace enlarged by increasing both length and breadth by 10 %. By what percentage is the area of the terrace enlarged?

- A. 10% B. 20% C. 21% D. 40% E. 121%

12. In square ABCD with sides 2 cm two semi-circles are drawn with diameters AB and AD. How many cm^2 is the area of the grey region?



- A. $3/4$ B. 1 C. $\pi/2$ D. 2 E. 2π

13. In the first box there is a 7 and in the ninth box there is a 6. You have to write a number in every box. But not just any number. You have to make sure that the numbers in any three consecutive boxes add up to 21. What number do you have to write in the second box?



- A. 6 B. 7 C. 8 D. 10 E. 21

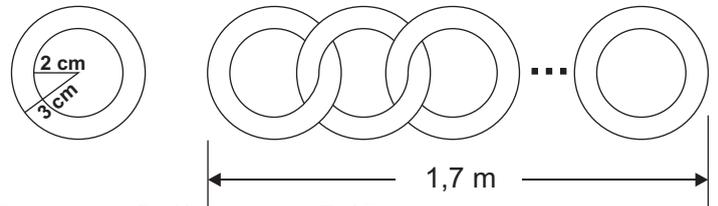
14. In a certain year there were more Thursdays than Tuesdays. Which day appeared most in the next year? Neither of the years was a leap year.

- A. Tuesday B. Wednesday C. Friday D. Saturday E. Sunday

15. Harry the Ostrich is training for the animals Olympics. He takes part in "Putting one's head in the sand". When he removed his head from the sand last Monday at 08.15 he saw to his delight that he had just set a new personal record of 98 hours and 56 minutes. When did Harry put his head in the sand?

- A. Thursday at 05.19 B. Thursday at 05.41 C. Thursday 11.11
D. Friday at 05.19 E. Friday at 11.1

16. A number of rings are linked into a chain as in the figure. The total length of the chain is 1.7 meter. How many rings does the chain consist of?



- A. 17 B. 21 C. 30 D. 42 E. 85

17. Five children have each chosen a number. They each had a choice from 1, 2 or 4. When the chosen numbers are multiplied together the outcome is one of the following numbers. Which number is it?

- A. 100 B. 120 C. 256 D. 768 E. 2048

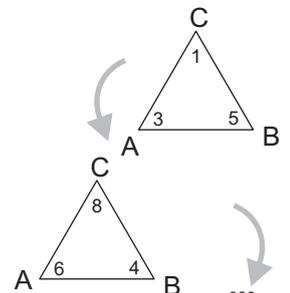
18. The average age of grandfather, grandmother and their seven grandchildren is 28. The average age of the grandchildren is 15. Grandfather is three years older than grandmother. How old is grandfather?

- A. 71 B. 72 C. 73 D. 74 E. 75

19. Esther is drawing isosceles triangles ABC with $AB = BC = 5$ cm. The top angle is larger than 60° and the base is a whole number in centimetres. How many different triangles can she draw?

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

20. In the angles of triangle ABC the numbers 1, 3 and 5 are written. We make a new triangle and in every angle of the new triangle we write the sum of the numbers that were written in the other two angles. That way a triangle with the numbers 8, 4 and 6 in its angles arises. We do this 1001 more times. Then we subtract the number that is in angle B from the number that is in angle A. Which number do we find?



- A. -2004 B. -2 C. 2 D. 1002 E. 2004

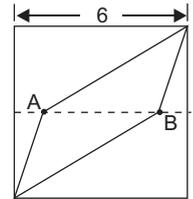


21. Sietse lays a number of his computer magazines on a bookshelf. Each magazine has either 48 or 52 pages. How many pages are definitely not lying on the bookshelf?

- A. 196 B. 200 C. 204 D. 208 E. 212

22. A square sheet of paper measuring 6 by 6 cm is folded in two. Point A and point B are on the fold; they are connected with two of the angles of the sheet of paper. This way three regions appear with an equal area. How many cm apart are A and B?

- A. 3,6 B. 3,8 C. 4,0 D. 4,2 E. 4,4

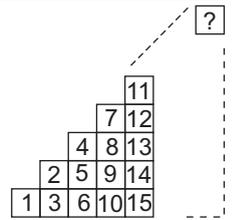


23. Esther rides her bike from town to the beach. On the way to the beach she rides with an average speed of 30 km/h, on the way back she rides at 10 km/h. What is her average speed in km/h during the whole trip?

- A. 12 B. 15 C. 20 D. 22 E. 25

24. In every box of the staircase a number is written according to the regularity shown in the figure. You don't know the height of the staircase. What number cannot be in the top box?

- A. 79 B. 121 C. 171 D. 211 E. 277

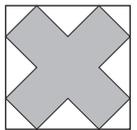


25. Sietse has two positive integers in mind. Neither of the two is divisible by 10, but their product 10.000 is. What is their sum?

- A. 641 B. 1000 C. 1024 D. 1258 E. 2401

26. An equilateral cross-shaped rectangular dodecagon fits exactly in a square. The perimeter of the dodecagon is 36 cm. How many cm² is the area of the square?

- A. 48 B. 72 C. 108 D. 115,2 E. 144



27. The houses in a street are numbered from 1 until and including 200. Two hundred kangaroos send cards to houses in this street. Kangaroo 1 sends a card to the houses numbered 1, 2, 3, 4 etc. Kangaroo 2 sends a card to the houses numbered 2, 4, 6, 8, etc. Kangaroo 3 sends a card to the houses numbered 3, 6, 9, etc., kangaroo 4 to 4, 8, 12 etc. How many cards will house number 120 receive?

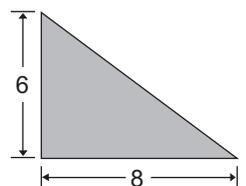
- A. 12 B. 16 C. 20 D. 24 E. 32

28. Hielke cuts a triangle out of a sheet of paper. Two sides of the triangle are 6 cm and 8 cm; the angle in between is a right angle. He folds the triangle once. He can get lots of different figures, for instance

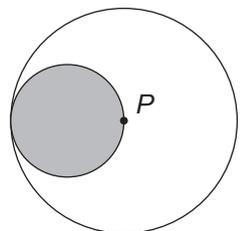
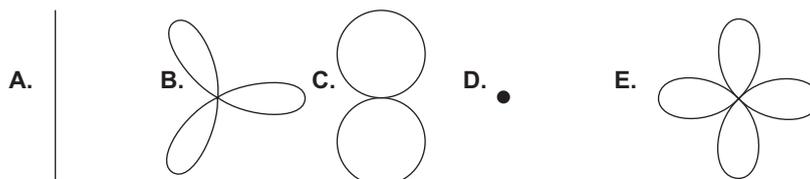


Which of the following numbers can be the area of the figure?

- A. 9 cm² B. 12 cm² C. 18 cm² D. 24 cm² E. 30 cm²



29. The small circle rolls along the inside of the big circle. The radius of the big circle is twice the radius of the small circle. P is a point on the small circle. What does the trajectory of P look like?



30. ABCD is a rectangle and k is a line, as in the picture. A is 4 cm from line k, B is 5 cm from line k and C is 7 cm from line k. How many cm is D from k?

- A. 12 B. 13 C. 15 D. 16 E. 18

