2005

wizBRAIN

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 ¾ 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 1¼ 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 22nd,
  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!!

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the Netherlands: 1 & 2 havo/vwo and 3 & 4 vmbo
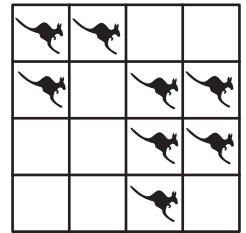Flanders: bso 2nd & 3rd degree and aso/tso 1st degree

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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. In a magic square the sum of the numbers in any row, in any column, or along any diagonal is the same. Which number should replace the question mark to create a magic square?
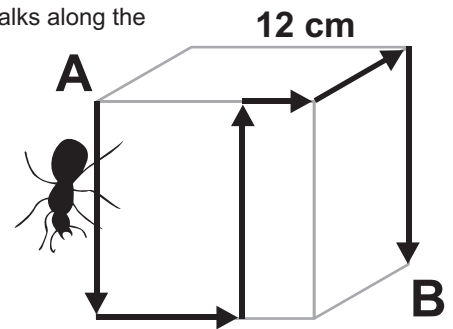
15	1	11
5	?	13
7	17	3

A. 6   **B.** 8   **C.** 9   **D.** 10   **E.** 15

03. How many hours does one half of a third of a fourth of a day have?

A. 1/3   **B.** 1/2   **C.** 1   **D.** 2   **E.** 3

04. The cube shown measures 12 cm by 12 cm by 12 cm. An ant walks along the marked route, from A to B. How many cm does the ant walk?

12 cm

A

B

A. 36   **B.** 40   **C.** 48   **D.** 50   **E.** 60

05. In the sequence **AGKNORE** letters stand for digits in such a way that every digit is greater than the previous one. What is the largest number that the word **KANGOEROE** can represent?

A. 436479879   **B.** 536479879   **C.** 597354354   **D.** 987654321
E. 987654354

06. Of all children at Meryl's school 50% have got a bicycle. 30% of the children with a bicycle have also got skates. What percentage of children at this school own both bicycle and skates?

**A.** 15 %   **B.** 20 %   **C.** 25 %   **D.** 40 %   **E.** 80 %

07. Three angles in a triangle add up to 180 degrees. In triangle *ABC* angle *A* is three times angle *B*, and half of angle *C*. What is the size of angle *A*?

A. 30°   **B.** 36°   **C.** 54°   **D.** 60°   **E.** 72°

08. Tim has cut a piece of paper in ten pieces. After this he has cut one of the pieces in ten again. He repeated this three more times. How many pieces of paper does he end up with?

A. 36   **B.** 40   **C.** 46   **D.** 50   **E.** 56

09. A plan of a room is shown. All angles are right angles. Some of the measurements of the room are given. What is the area of the room?
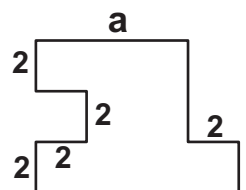
A. 4a + 2(a-2)   **B.** 6(2+a) - 4   **C.** 12a   **D.** 6(a-2) + 4   **E.** 6a

10. In the back of the garden there are some poles. Crows are sitting on them, one crow on each pole, but unfortunately for one crow there is no pole left. Some time later the same crows sit on the poles in pairs. Now there is one pole left. How many poles are there in the back of the garden?

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

3 points

11. A group of children is having icecream cones. Each boy eats twice as many cones as each girl eats. Two girls and three boys ate 16 cones.
How many cones are eaten by three girls and two boys?

A. 12   **B.** 13   **C.** 14   **D.** 16   **E.** 17

12. Five equally big circles are touching as you can see in the diagram.
The centres of the outer circles are vertices of a square.
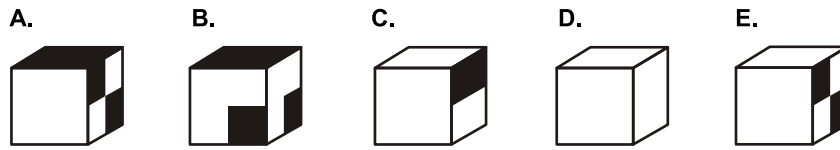What part of the grey region is inside the square?
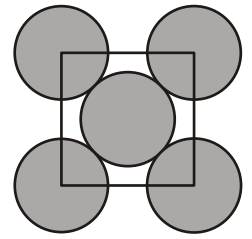
A. 1/4   **B.** 2/5   **C.** 5/9   **D.** 3/5   **E.** 2/3

13. Tim's father always works four days in a row, and then has one day off.
How many days are there between two sundays off from work?

A. 7   **B.** 12   **C.** 30   **D.** 34   **E.** 36

14. A cube is folded from the net.
Which cube could you get?

A.   **B.**   **C.**   **D.**   **E.**

15. Meryl sleeps under an oak tree every day from noon until midnight. She is awake for story-telling for the rest of the time. A sign is put up on the oak saying: "Two hours ago Meyl did the same as she will be doing in an hour from now."
How many hours per day is the text on the sign true?

A. 3   **B.** 6   **C.** 12   **D.** 18   **E.** 21

16. You can find squares in the picture. You can find more triangles.
How many more?
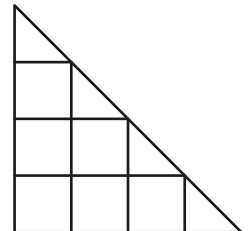
**A.** 0   **B.** 1   **C.** 2   **D.** 3   **E.** 4

17. Meryl writes down a three-digit number. She also writes down a two-digit number. Subtracting the numbers she gets 989.
What will she get when she adds up the numbers?

A. 1000   **B.** 1001   **C.** 1009   **D.** 1010   **E.** 2005

18. A prime number is a whole number greater than 1 that can not be written as a product of two smaller positive whole numbers. For example 2, 3, 5, 7, 11.
90 is the product of 4 prime numbers: 90 = 2 x 3 x 3 x 5. We say that 90 has prime length 4.
How many odd numbers smaller than 100 have prime length 3?

A. 2   **B.** 3   **C.** 4   **D.** 5   **E.** 7

19. The square dartboard shown here is divided into four areas A, B, C and D. All squares in area A have the same value. All squares in area B have the same value. And all squares in area C have the same value. The squares in areas A, B, C and D each have the same total value. The two darts in the square of A and in the square of B score 5 points.
How much will the score be for the dart in the square of C?
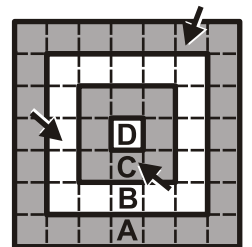
A. 6   **B.** 8   **C.** 12   **D.** 24   **E.** 30

20. Tim's schoolclass is going on a school trip. If every pupil pays 24 euro, they will be 18 euro short. If every pupil pays 26 euro, there will be 12 euro left.
How many euro should every pupil pay to have exactly 0 euro left?

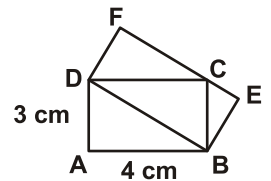**A.** 24,80   **B.** 25,00   **C.** 25,20   **D.** 25,40   **E.** 25,60

21. The picture shows two rectangles, ABCD and DBEF.
What is the area in cm² of rectangle DBEF?

A. 10   **B.** 12   **C.** 13   **D.** 14   **E.** 16

22. A two-digit number will become more than three times as large when its digits are interchanged. How many such numbers are there?

A. 6   **B.** 10   **C.** 15   **D.** 22   **E.** 33

23. A barrel contains 64 litres of wine. We replace 16 litres of wine by 16 liters of water and mix thoroughly. Next we replace 16 litres of the mixture by 16 litres of water, and mix thoroughly. We do this one more time.
How many litres wine contains the mixture at the end?

A. 16   **B.** 24   **C.** 27   **D.** 30   **E.** 48

24. The mean of 10 different positive whole numbers is 10.
What is the maximal possible value for the largest of the ten numbers?

**A.** 10   **B.** 45   **C.** 50   **D.** 55   **E.** 91

25. Kangarooland has strange mountains. In the picture you see them on the left. Next to them you see the contour maps for these mountains; they are out of order, however.

What is the right order?

A. 13254   **B.** 31452   **C.** 32415   **D.** 32451   **E.** 35214

26. A rectangular strip of 24 cm by 1 cm is cut into seven 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.
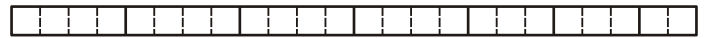
What is the smallest possible perimeter of such a new rectangle?

A. 14 cm   **B.** 20 cm   **C.** 22 cm   **D.** 24 cm   **E.** 28 cm

27. A dice is rolled as indicated. At the start S the dice shows a 3. The 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

28. A kangaroo makes 1 meter jumps in the first quadrant. He starts in the origin (0,0) and jumps to point (1,0), then to (1,1), (0,1), (0,2), (1,2), etc.
To which point does the kangaroo jump on his 120th jump?
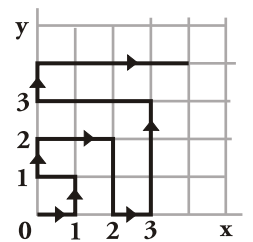
A. (1,11)   **B.** (2,10)   **C.** (10,0)   **D.** (10,11)   **E.** (11,11)

29. Meryl always 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?
a) The number of my classmates is odd.
b) There are as many boys as girls among my classmates.
c) It is 2005 now.
d) I always speak the truth.
e) Three of my classmates are older than I am.

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

30. Tim is looking for sequences of consecutive positive whole numbers. Such a sequence must consist of at least two numbers and the numbers should add up To 100. How many of these sequences do exist?

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