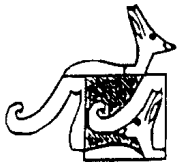


If you are interested in logical puzzles: de first round of the Dutch Championship Puzzlesports starts soon. See: www.puzzelsport.nl

EUROPEAN KANGAROO MATHEMATICS CONTEST

Friday March 22th 2002

HAVO, VWO 3rd, 4th & 5th YEAR

Welcome to the Kangaroo Contest !

- You have 75 minutes to do the test. Don't be disappointed if you cannot answer all the questions; just do what you can and have fun!
- The use of a pocket calculator is not allowed.
- Fill in the answer sheet very carefully, *using a pencil.*
- About scoring points:
  - * You get 30 points to start with.
  - * For each correct answer 3, 4 or 5 points are added to your total.
  - * For each incorrect answer ¾, 1 or 1¼ points are deducted from your total.
  - * If you don't answer a question, you neither gain nor lose points.
- De correct answers are shown from Wednesday March 27th on the website: www.sci.kun.nl/math/kangoeroe

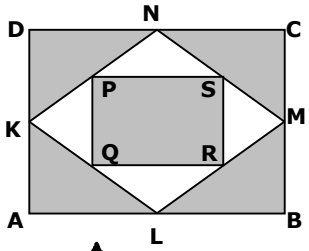
We wish you lots of success and fun!

Questions 1 to 10: *for every* ***correct*** *answer* ***+3*** *points, for every* ***incorrect*** *answer* ***- ¾*** *point.*

1. Andrew, Bianca en Claire are eating 17 toffees together. Andrew eats more toffees than each of the other two kids. What is the smallest number of toffees that Andrew could have eaten?

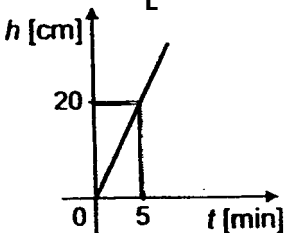
A. 5 B. 6 C. 7 D. 8 E. 9

2. K, L, M and N are the midpoints of the sides of a rectangle ABCD. In the same way P, Q, R and S are the midpoints of the sides of quadrilateral KLMN. What part of rectangle ABCD is coloured gray?



A. $\frac{3}{5}$ B. $\frac{2}{3}$ C. $\frac{5}{7}$ D. $\frac{3}{4}$ E. $\frac{5}{6}$

3. An empty swimming pool is being filled with water. The water flows at a constant rate. In the graph you can see the waterheight plotted against the time. How many minutes does it take the water to reach a height af 120 cm?



A. 15 B. 20 C. 25 D. 28 E. 30

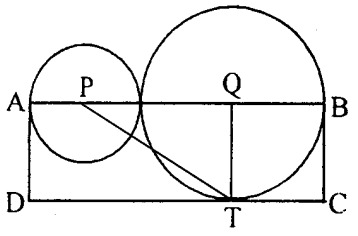
4. Sean reads exactly 23 pages every day. Today he started a book having 2002 pages. How many days does he need to read the whole book? And how many pages will he read on the final day in a new book?

A. 87 days en 0 pages of the new book.
B. 87 days en 1 page of the new book.
C. 88 days en 20 pages of the new book.
D. 88 days en 21 pages of the new book.
E. 88 days en 22 pages of the new book.

5. In a certain month three Sundays are on even days in that month. (the 2nd, or the 4th, or the 6th, etc.). On what day is the 20th of that month?

A. Monday B. Tuesday C. Wednesday D. Thursday E. Saterday

6. P and Q are the centres of the circles and ABCD is a rectangle having area 15. What is the area of triangle PTQ?

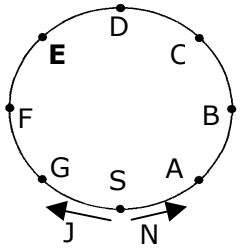


A. $3\frac{1}{2}$ B. $3\frac{3}{4}$ C. 4 D. $4\frac{1}{4}$ E. $4\frac{1}{2}$

7. Chris has drawn two circles and three straight lines and he coloured all points of intersection. What is the biggest number of points of intersection he could have coloured?

A. 14 B. 15 C. 16 D.17 E. 18

8. John runs three times as fast as his little sister Nicole. The track is divided into 8 equal parts. They start at the same moment at S. John starts running to the left and Nicole to the right. At what point do they meet for the first time?

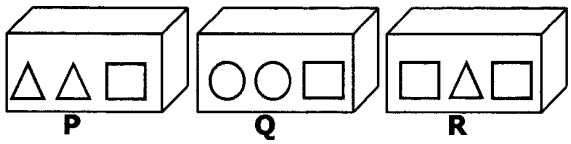


A. A B. B C. C D. D E. E

9. A solid is bounded by planes. One of its faces is a pentagon. What is the smallest number of faces that the solid can have?

A. 5 B. 6 C. 7 D. 8 E. 10

10. Three boxes P, Q and R containing weights are arranged in ascending order of weight with the lightest one first. So P is the lightest box and R is the heaviest one. There is a fourth box standing aside that has to fit in the row without disturbing the ascending order of weight. Which of the following statements, with respect to this fourth box, is true?



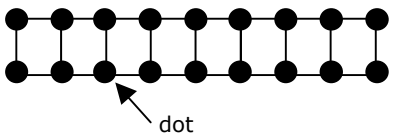
A. The box should be the first one in the row.
B. The box should be in between P and Q.
C. The box should be in between Q and R.
D. The box should be the last one in the row.
E. The box has the same weight as R.

Questions 11 to 20: *for every* ***correct*** *answer* ***+4*** *points, for every* ***incorrect*** *answer* ***-1*** *point.*

11. If Mr. Bean stands still on an escalator he is up in 60 seconds. If the escalator stands still and Mr. Bean walks it, he is up in 90 seconds. How many seconds does it take Mr. Bean to be up if he walks the moving escalator?

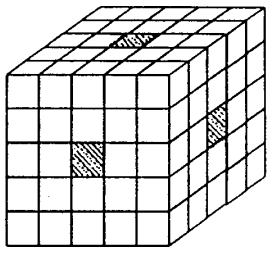
A. 30 B. 36 C. 45 D. 50 E. 75

12. You have to put some coins on the black dots in the shape shown. If you don't put a coin on a certain dot, you'll have to put a coin on at least one of its adjacent dots. What is the smallest number of coins you need?



A. 5 B. 6 C. 7 D. 8 E. 9

13. A cube of side 5 consists of little cubes of side 1. Three rows are removed from the cube. So now you are able to look through the cube into three directions. Then you dip the object in a tin of paint. How many of the little cubes have exactly one painted face?



A. 24 B. 26 C. 30 D. 40 E. 48

14. Ernst makes three-different-digit numbers. What is the difference between the biggest and the smallest number Ernst can make?

A. 800 B. 864 C. 885 D. 899 E. 975

15. A virus is 'eating' a computer disk. On the first day half of the disk is eaten. On the second day 1/3 of the remaining part is eaten, the day after it eats 1/4 of the remainder of the second day, finally it eats 1/5 of the remainder of the third day. Which part of the disk is still not eaten?

A. $\frac{1}{24}$ B. $\frac{1}{12}$ C. $\frac{1}{10}$ D. $\frac{1}{6}$ E. $\frac{1}{5}$

16. What is the maximal number of intersection points that six circles can have?

A. 15 B. 24 C. 28 D. 30 E. 36

17. When an amount of water gets frozen its volume increases with 1/11 of the original volume. By what part does the volume of an amount of ice decrease when it melts?

A. $\frac{1}{14}$ B. $\frac{1}{13}$ C. $\frac{1}{12}$ D. $\frac{1}{11}$ E. $\frac{1}{10}$

18. Six waterpolo teams play a tournament. Each team plays every other team exactly once. The winner of a game gets 3 points, the loser gets 0 points. If a game ends in a draw each team gets 1 point. Altogether the teams got 40 points. How many games did end in a draw?

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

19. The lengths of the sides of a reactangle are integers. The permeter of the rectangle is 32. Which of the following numbers could be the area of the rectangle?

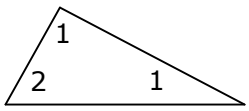
A. 24 B. 48 C. 76 D. 192 E. 384

20. Achilles and the tortoise are competing in a walking contest. That might not seem fair, because Achilles walks at a speed of 10 metres per second and the tortoise only walks at a speed of 1 metre per 10 seconds. That is why the tortoise is given a headstart of 990 metres. How many seconds does Achilles need to pass the tortoise?

A. 99 B. 100 C. 110 D. 990 E. meer dan 1000

Questions 21 to 30: *for every* ***correct*** *answer* ***+5*** *points, for every* ***incorrect*** *answer* ***-1¼*** *point.*

21. Mary-Ann writes a 1, 2, 3, 4 or 5 in every angle of the triangle shown. None of the numbers written in the bottom angles is smaller than the number written in the top angle. How many different possibilities are there?



A. 10 B. 20 C. 30 D. 55 E. 125

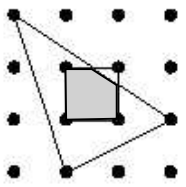
22. On Wendy's birthday party there are six glasses of soft drinks for every child. Unexpectedly three cousins of Wendy's arrive. Because of that there are five glasses of soft drinks for every child now. How many children were at the party before the three cousins arrived?

A. 4 B. 11 C. 14 D. 15 E. 18

23. In some reservation live a lot of female kangaroos. 25% of these female kangaroos are light brown and 75% are dark brown. 50% of the light brown (female) kangaroos have a baby and 20% of the dark brown ones have a baby. Alle female kangaroos together have 99 babies. How many female kangaroos live in that reservation?

A. 99 B. 240 C. 300 D. 340 E. 360

24. The distance between two adjacent points in the grid is 1. What is the area of the part the triangle and the square have in common?

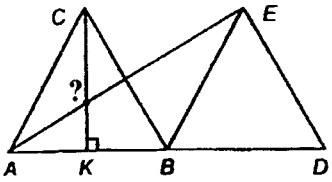


A. $\frac{8}{9}$ B. $\frac{9}{10}$ C. $\frac{11}{12}$ D. $\frac{14}{15}$ E. $\frac{15}{16}$

25. During the three summer months 88% of the accomodation of a hotel is taken. In the rest of the year only 40% is taken. What is the average percentage during the whole year?

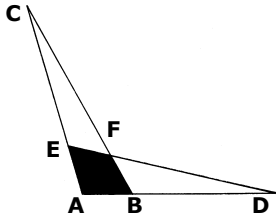
A. 48% B. 52% C. 64% D. 80% E. 128%

26. ABC and BDE are equilateral. B is the midpoint of AD and CK is perpendicular to AB. What is the size of the angle marked with a questionmark?



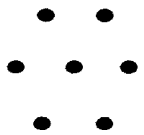
A. 60° B. 90° C. 120° D. 135° E. 150°

27. Triangle ABC and triangle ADE are identical. AB and AE are each 1, AC and AD are each 4. The area of quadrileteral ABFE is … times as big as the area of triangle ABC.



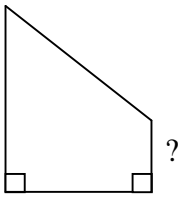
A. $\frac{1}{5}$ B. $\frac{1}{4}$ C. $\frac{2}{5}$ D. $\frac{1}{2}$ E. $\frac{2}{3}$

28. In the figure you can draw a letter V using three dots. These three dots are not on a straight line and two of those three dots have the same distance to the third dot. How many letters V can be drawn in this figure?



A. 6 B. 18 C. 20 D. 30 E. 36

29. The shape drawn is called a right-angled trapezium. The lengths of its sides are integers and its perimeter is 16. What is the length of the shorter of the two parallel sides?



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

30. Leon writes down a four-digit number. If you sum the last two digits and add this to the number formed by the first two digits of the original number the answer will be the number formed by the last two digits of the original number. For example 6370: 7+0+63=70.
How many of these numbers can Leon write down?

A. 10 B. 45 C. 50 D. 80 E. 90

Pupils from 26 countries participate in the European Kangaroo 2002. In The Netherlands, the Kangaroo-contest is organised by the "Stichting Wiskunde Kangoeroe", under the auspices of the "Nederlandse Onderwijs Commissie voor Wiskunde" of the Wiskundig Genootschap.

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