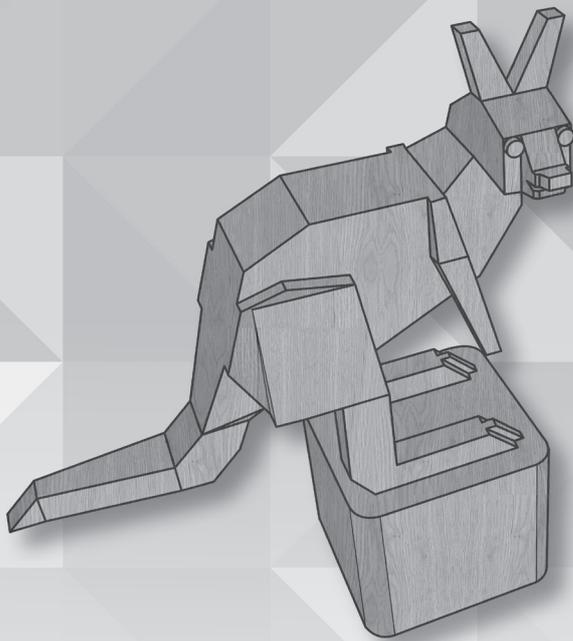


WereldWijde WiskundeWedstrijd W4Kangoeroe

COMPETITION PERIOD
MARCH 19 TO 27

WWW.W4KANGOEROE.NL



GOOD LUCK AND MOST OF ALL HAVE FUN!

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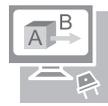
calculators are not allowed



you may use 75 minutes



only a pencil, an eraser and scribbling paper are allowed



results and prizes will arrive at school at the end of May



answers will be posted on the website about April 4th

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1. A triangle has one side of length 9 and one side of length 1.

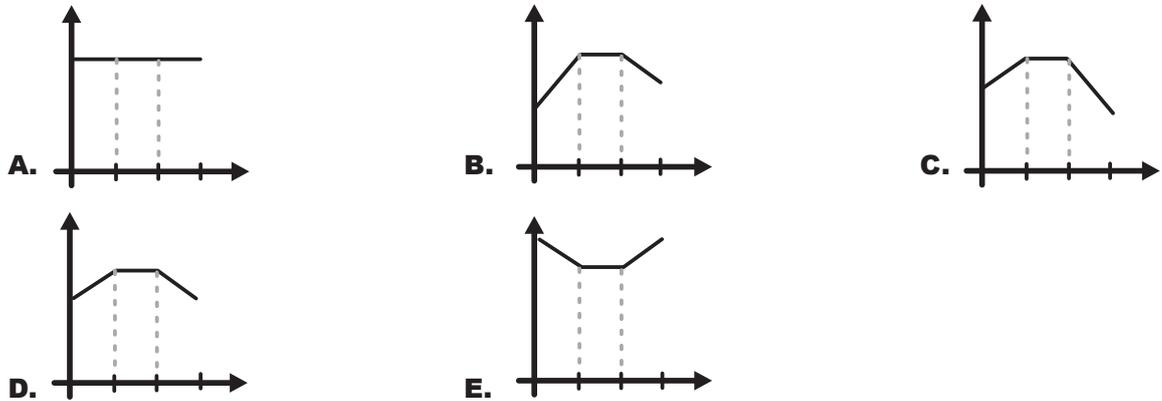
What is the length of the third side?

- A. 5 B. 7 C. 9 D. 11 E. 13

2. Mia jogged for 30 minutes. Afterward, she gets the following report on her smartwatch:

- during the first 10 minutes, her heart rate increased by 4 beats per minute,
- during the next 10 minutes, her heart rate stayed the same,
- during the last 10 minutes, her heart rate decreased by 2 beats per minute.

Which of the following graphs shows her heart rate?



3. A store has the following special offer: if you buy three items, you get the cheapest item for free.

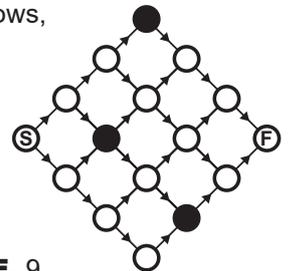
Julia chooses six pairs of socks, each at a different price.

Bought separately, they are priced at € 2.90, € 3.10, € 3.50, € 4.30, € 4.60 and € 4.90.

What is the maximum total price of the two pairs of socks that she can get for free?

- A. € 6.60 B. € 7.20 C. € 7.40 D. € 7.70 E. € 8.10

4. How many paths are there from S to F shown in the image, that follow the arrows, but avoid the black dots?



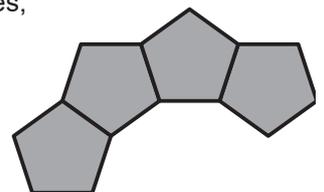
- A. 5 B. 6 C. 7 D. 8 E. 9

5. In the expression $(\square + \square)^{\square - \square}$ the numbers 2, 0, 2 and 6 must be filled into the boxes.

What is the largest number you can get?

- A. 2^4 B. 2^6 C. 2^8 D. 2^{10} E. 2^{12}

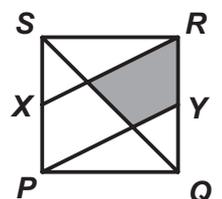
6. Tiles in the shape of a regular pentagon are placed side by side, sharing edges, as shown in the figure.



How many tiles are needed to make a complete ring?

- A. 10 B. 11 C. 12 D. 14 E. 15

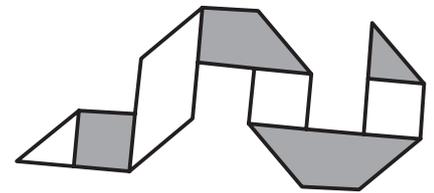
7. In the square PQRS, X and Y are the midpoints of sides PS and QR.



Which fraction of the square is colored grey?

- A. $\frac{1}{8}$ B. $\frac{1}{6}$ C. $\frac{1}{5}$ D. $\frac{1}{4}$ E. $\frac{1}{3}$

8. Ali folded a strip of paper with a white side and a dark side 7 times, as shown in the picture. Then he unfolded the paper.



What does the white side of the paper look like after unfolding?

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

9. A hotel has 9 rooms. In some rooms, 3 people can sleep, and in the other rooms, 4 people can sleep. When a group of 30 people stays in the hotel, all rooms are completely full.

How many rooms for 4 people does the hotel have?

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

10. How many three-digit numbers abc are there such that $a = (\frac{b}{c})^2$?

- A. 4 B. 8 C. 9 D. 10 E. 16

11. The number $\overline{333\dots3}^{2026}$ is divided by 33.

What is the sum of the digits of the result?

- A. 1111 B. 2025 C. 2026 D. 3039 E. another answer

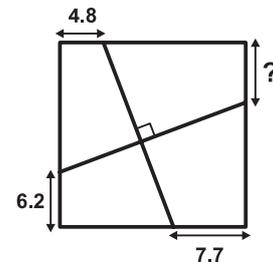
12. On a line segment AB , two points P and Q are randomly placed, neither of them at the midpoint of AB .



What is the probability that the segment PQ contains the midpoint of AB ?

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

13. In a square, two perpendicular line segments are drawn between opposite sides. The lengths of three line segments are given.



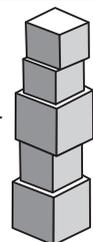
What is the length of the line segment with the question mark?

- A. 5,6 B. 5,9 C. 6,1 D. 6,3 E. 6,6

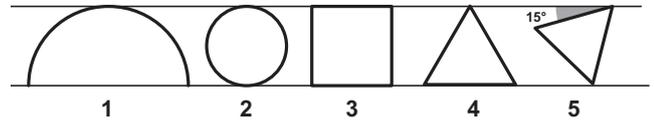
14. Little *Kangaroo* has lots of cubes that are 4 cm high and cubes that are 5 cm high. He uses them to build a tower.

What is the largest integer number of centimetres that **cannot** be the height of a tower the kangaroo can build?

- A. 6 B. 7 C. 11 D. 17 E. 37



15. Between two parallel lines, five shapes are drawn: in order, a semicircle, a circle, a square and two equilateral triangles. Their areas are S_1, S_2, S_3, S_4 and S_5 .



Which of the following is true?

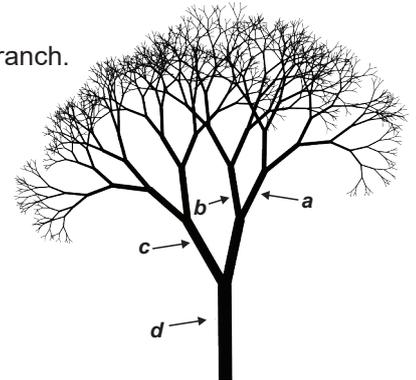
- A. $S_1 > S_2 > S_3 > S_4 > S_5$ B. $S_1 > S_4 > S_3 > S_2 > S_5$ C. $S_1 > S_3 > S_2 > S_4 > S_5$
 D. $S_1 > S_3 > S_4 > S_2 > S_5$ E. $S_1 > S_3 > S_2 > S_5 > S_4$

16. Two dice are rolled and we look at the product of the numbers shown. Anne gets a point if the product is divisible by 4. Drew gets a point if the product is divisible by 6.

What is the probability that they both get a point?

- A. $\frac{1}{18}$ B. $\frac{1}{9}$ C. $\frac{5}{36}$ D. $\frac{7}{36}$ E. $\frac{2}{9}$

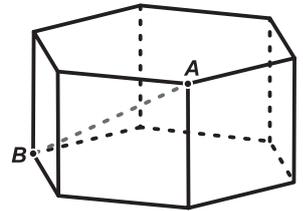
17. Every time this tree branches into two, the total cross-sectional area of the new branches is equal to the cross-sectional area of the old branch. The cross-sections of the branches at points a, b, c and d are circles with diameters 1, 4, 8 and x cm.



What is x ?

- A. 9 B. 10 C. 11 D. 12 E. 13

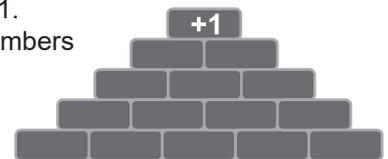
18. This hexagonal prism has 2 regular hexagons and 6 squares as faces. All edges have length 1.



What is the length of line segment AB ?

- A. $\sqrt{2}$ B. $\sqrt{3}$ C. $\sqrt{4}$ D. $\sqrt{5}$ E. $\sqrt{6}$

19. Amine wants to fill this wall from bottom to top with the numbers -1 and $+1$. Each number in the top 4 rows must be equal to the product of the two numbers directly below it. At the very top, the number must be $+1$.



In how many ways can Amine do this?

- A. 8 B. 16 C. 18 D. 20 E. 32

20. Oleg threw 100 dice and multiplies the numbers on the top faces. The result is 6^{70} .

At least how many times did a 6 appear on top?

- A. 10 B. 12 C. 24 D. 30 E. 35

21. On a blackboard the whole numbers $1, 2, \dots, 40$ are written. You perform 39 operations. The k -th operation works like this:

- If k is not a multiple of 7, choose any two numbers a and b , erase them and write $a + b - 1$.
- If k is a multiple of 7, choose any two numbers a and b , erase them and write $a + b + 5$.

No matter which choices you make, you always end with the same number.

What number is it?

- A. 781 B. 801 C. 811 D. 819 E. 821

22. For two real numbers a and b , we have $9^a = 11^b = 9801$.

What is $\frac{1}{a} + \frac{1}{b}$?

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

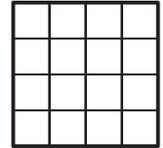
23. The sum of 15 consecutive natural numbers is equal to the sum of the next 9 natural numbers.

What is the smallest of these 24 numbers?

- A. 10 B. 11 C. 12 D. 13 E. 14

24. Arla wants to make straight cuts with a knife in this 4×4 grid. She wants none of the 16 small squares to stay completely uncut.

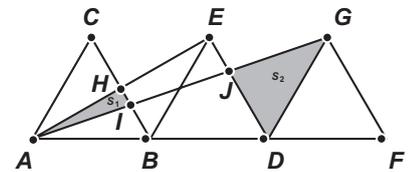
What is the minimum number of cuts Arla needs to make?



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

25. Three congruent equilateral triangles are drawn on a line segment AF . The area of triangle AHI is S_1 , and the area of triangle DGJ is S_2 .

What is the ratio $S_1:S_2$?



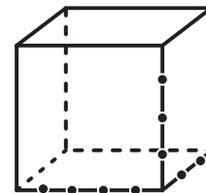
- A. 1:5 B. 1:4 C. 1:3 D. 3:5 E. 2:3

26. A function f has the property, that for every real number x , $f(x+10) = f(x)$ èn $f(6-x) = -f(x)$. It is also given that $f(27) = 9$.

What is $f(9) + f(13)$?

- A. -27 B. -9 C. -3 D. 3 E. 9

27. On three faces of this cube, nine points are marked.



In how many ways can you choose four of these points so that they are the vertices of a pyramid?

- A. 24 B. 36 C. 48 D. 60 E. 72

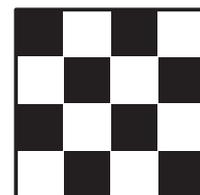
28. For each natural number n , we define a_n as the greatest integer less than or equal to \sqrt{n} .

What is the value of $a_1 - a_2 + a_3 - a_4 + a_5 - a_6 + \dots + a_{2025} - a_{2026}$?

- A. -2026 B. -22 C. 0 D. 22 E. 2026

29. In the diagram we see a 4×4 board with black and white squares. We want to make all the squares white. The only move we are allowed to do is to choose a 2×2 square and switch the color of all its squares.

What is the minimum number of moves needed?



- A. 4 B. 6 C. 8 D. 16 E. this is impossible

30. For a number $x > 0$ we define $\sqrt[3]{x}$, the *triangular root* of x to be the value $s > 0$ such that $\frac{s(s+1)}{2} = x$.

Which of the following is always equal to $\sqrt[3]{4x - \sqrt[3]{x}}$?

- A. $2\sqrt[3]{x}$ B. $4\sqrt[3]{x} - 1$ C. $3\sqrt[3]{x}$ D. $\sqrt[3]{x^2+x}$ E. $\sqrt[3]{x^2}$