wizPROF 2010

W4 KANGOEROE WereldWijde WiskundeWedstrijd

Good luck and most of all have fun.

www.w4kangoeroe.nl

calculator not allowed

you may use 75 minutes

scrap paper is allowed

results and awards at school mid-May

23th March the answers will be on the website

20th April the explanations will be on the website

wizPROF
havo 4 & 5
vwo 3, 4, 5 & 6

wizPROF 2010

1. 20102010 : 2010 = ?

A. 11 **B.** 101 **C.** 1001 **D.** 10001 **E.** 10101

2. When playing a game, Tony scored 85% of the points. Lisa performed a little better and obtained 90%. She scored exactly one point more.
How many points can be scored in this game?

A. 5 **B.** 17 **C.** 18 **D.** 20 **E.** 25

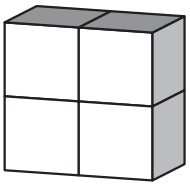
3. The top and the bottom row give the same number when added up.

1	2	3	4	5	6	7	8	9	10	2010
11	12	13	14	15	16	17	18	19	20	*

What is the number at the *?

A. 1010 **B.** 1020 **C.** 1910 **D.** 1990 **E.** 2020

4. This construction consists of four equal cubes. The area of one cube is 24 cm^2.
What is the area of the outside of this construction?



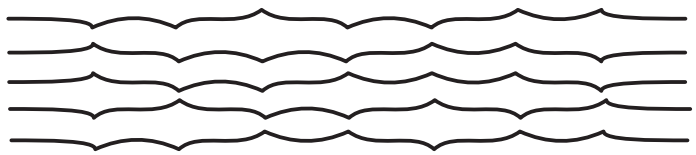
A. 24 cm² **B.** 32 cm² **C.** 40 cm² **D.** 64 cm² **E.** 80 cm²

5. When Lisa turned one year old, her birthday cake held one candle.
When she turned two, there were two candles on the cake, etcetera.
So, every year there are as many candles as her age.
She kept all of these candles, and now she has 120 of them.
How old is Lisa?

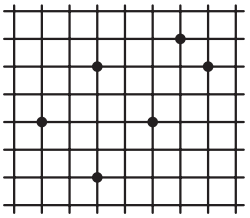
A. 11 years old **B.** 12 years old **C.** 13 years old **D.** 14 years old **E.** 15 years old

6. A paper strip is folded in two three times. Then it is unfolded again.
When holding the strip upright, you can see the folds from above.
Which of the following strips cannot be seen?

A.
B.
C.
D.
E.

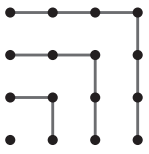


7. In the grid shown, Tony erases one or more points.
He draws a figure, using the remaining points for vertices.
Which figure is impossible for him to draw?



A. equilateral triangle **B.** rectangle
C. right-angled triangle **D.** rhombus **E.** pentagon

8. The picture shows that 1 + 3 + 5 + 7 = 4 x 4.
To what will 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 be equal?



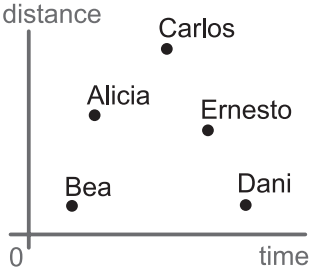
A. 10 x 10 **B.** 11 x 11 **C.** 12 x 12 **D.** 13 x 13 **E.** 14 x 14

9. During one month, there are three Tuesdays on an even date.
What day will be the 21st of that month?

A. Wednesday **B.** Thursday **C.** Friday **D.** Saturday **E.** Sunday

10. Five athletes have been running. On the set of axes shown alongside you can read off the time and distance for each athlete.
Who ran fastest?

A. Alicia
B. Bea
C. Carlos
D. Dani
E. Ernesto



11. Lisa is on holiday in Verona. Five famous bridges cross a river there.
Lisa takes a walking tour through town. She starts and finishes at her hotel on the north bank of the river. Lisa walks across each of the famous bridges, and so crosses the river several times.
How often at least?

A. 3 **B.** 4 **C.** 5 **D.** 6 **E.** 7

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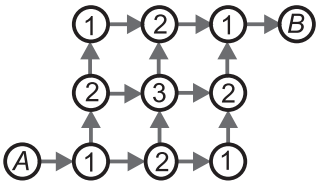
12. You take a route from *A* to *B* following the arrows.
You add up the numbers you come across.
How many different answers could you get?



A. 1 **B.** 2 **C.** 3 **D.** 4 **E.** 6

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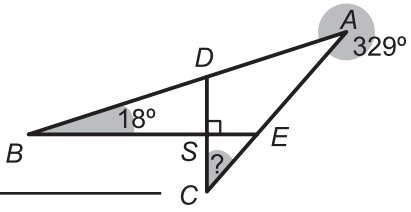
13. *DC* is perpendicular to *EB*, the exterior angle at *A* is 329°, $\angle B = 18°$.
How big is $\angle C$, the angle marked with a question mark?



A. 39° **B.** 40° **C.** 41° **D.** 42° **E.** 43°

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14. Today (March 18, 2010) is both Lisa's birthday and the birthday of her grandmother.
When multiplying the age of her mother and that of her grandmother, you get 2010.
In what year was Lisa's grandmother born?

A. 1933 **B.** 1934 **C.** 1943 **D.** 1944 **E.** 1953

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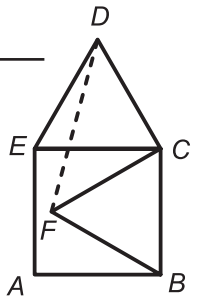
15. *ABCE* is a square with sides 1.
BCF and *CDE* are equilateral triangles.
What is the length of *FD*?



A. $\frac{\sqrt{3}}{2}$ **B.** $\sqrt{5}-1$ **C.** $\sqrt{2}$ **D.** $\sqrt{6}-1$ **E.** $\sqrt{3}$

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16. We look at whole numbers having the following two properties:
- adding up the digits of the number, you will get 2010;
- multiplying the digits of the number you will get 2.

How many of such numbers do exist?

A. 1004 **B.** 1005 **C.** 2008 **D.** 2009 **E.** 2010

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17. A circle of radius 4 is divided in four equal regions using pieces of circles of radius 2.
What is the perimeter of such a region?

A. 2π **B.** 4π **C.** 6π **D.** 8π **E.** 12π

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18. Two rows of shopping trolleys are parked at a supermarket.
The first row of 10 trolleys is 2.9 meters long.
The second row of 20 trolleys is 4.9 meters long.
How long is a shopping trolley?

A. 0,9 m **B.** 1 m **C.** 1,1 m **D.** 1,2 m **E.** 1,4 m

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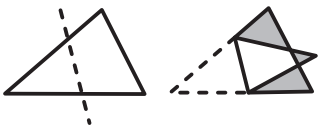
19. The left-hand triangle has been folded along the dotted line. This way you obtain the right-hand figure.
The area of the left-hand triangle is 1.5 times the area of the right-hand figure.
The grey regions have a total area of 1.
What is the area of the left-hand triangle?



A. 2 **B.** 3 **C.** 4 **D.** 5 **E.** impossible to know

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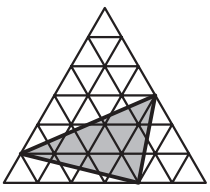
20. The large equilateral triangle consists of 36 small equilateral triangles of area 1 cm^2 each.
How many cm^2 is the area of the grey triangle?

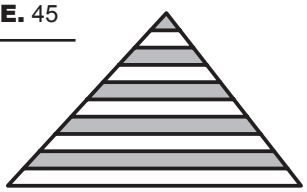


A. 9 **B.** 10 **C.** 11 **D.** 12 **E.** 15

21. In this exercise we look at positive three-digit whole numbers of which the middle digit is the average of the other two digits. One example of such number is 741.
How many of these numbers do exist?

A. 9 **B.** 12 **C.** 25 **D.** 37 **E.** 45

22. In the triangle shown alongside you see 9 parallel line segments within the triangle. These line segments divide two sides of the triangle in 10 equal parts.
Which percentage of the area of the triangle is grey?



A. 42,5% **B.** 45% **C.** 46% **D.** 47,5% **E.** 50%

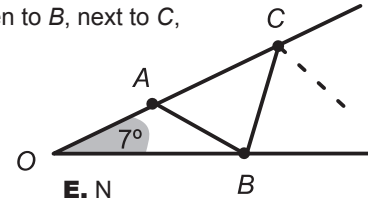
23. How many of the numbers 1^1, 2^2, 3^3, up to and including 100^{100} are squares?

A. 5 **B.** 15 **C.** 50 **D.** 54 **E.** 55

24. In some lake live 6-, 7-, and 8-armed octopuses. The 7-armed ones always lie, the 6- and 8-armed ones always speak the truth. Four octopuses are lying on the beach together: a blue one, a green one, a yellow one, and a red one. The blue octopus says: 'Together we have 28 arms', the green one says: "Together we have 27 arms", the yellow one says: "Together we have 26 arms", and the red one says: "Together we have 25 arms".
How many arms does the red octopus have?

A. 6 **B.** 6 of 8 **C.** 7 **D.** 8 **E.** impossible to know

25. A kangaroo jumps alternately on the two lines, starting from *O*. From *O* to *A*, then to *B*, next to *C*, etcetera. All jumps are equally long. The two lines form an angle of 7 degrees.
He attempts to get as far away from *O* as possible, and then stops jumping.
At which letter does the kangaroo stop?



A. J **B.** K **C.** L **D.** M **E.** N

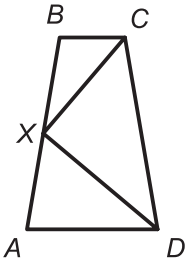
26. Tony produces a sequence of numbers. He starts with 1, 2 and 3.
After that he computes every number from the previous three. He subtracts the last number from the sum of the preceding two. This way he obtains the sequence 1, 2, 3, 0, 5, -2, 7, -4, etcetera.
What is the 2010th number in this sequence?

A. –2006 **B.** –2004 **C.** –2002 **D.** 2008 **E.** –2008

27. The hot water tap produces water of 64 °C, the cold water tap water of 20 °C.
Both taps produce the same amount of water when fully opened.
The hot water tap is opened $\frac{2}{3}$, the cold water tap is opened $\frac{4}{5}$.
What will the temperature be, in °C, of water that runs into the bath?

A. 35 **B.** 40 **C.** 45 **D.** 48 **E.** 58

28. In a trapezium with $AB = CD = 2$, X is the midpoint of side AB, and angle $CXD = 90°$.
What is the perimeter of the trapezium?

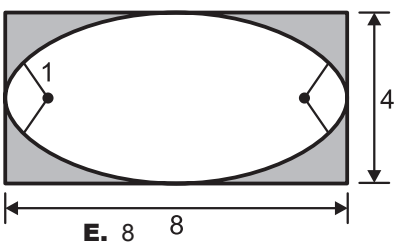


A. 5 **B.** 6 **C.** 7 **D.** 8 **E.** can not be determined

29. A bar code, as shown, consists of a number of bars, alternately white and black. The outer bars are always black. Every bar (white and black) is always 1 or 2 wide, the total width is 12.
How many different possibilities are there for these bar codes?

A. 12 **B.** 24 **C.** 66 **D.** 116 **E.** 132

30. An oval is made of four circle arcs. The arcs on the left and the right are equal, and so are the arcs on top and bottom. The oval has a horizontal and a vertical axis of symmetry, and is smooth everywhere. The oval fits exactly inside a 4 by 8 rectangle. The radius of the small circle arcs is 1.
What is the radius of the large circle arcs?



A. 6 **B.** 6,5 **C.** 7 **D.** 7,5 **E.** 8