

WereldWijde WiskundeWedstrijd
W4Kangoeroe

THURSDAY
MARCH 18TH 2021

WWW.W4KANGOEROE.NL

**Good luck and most of
all have fun.**

© Stichting Wiskunde Kangoeroe



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 March 29th



solutions will be posted on the website about April 20th

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

zwij^sen

Breng Leren tot Leven
www.zwijsen.nl



www.e-nemo.nl



www.education.ti.com



www.smart.be



www.schoolsupport.nl



www.idpremiums.nl



www.mathplay.eu



www.ru.nl



www.platformwiskunde.nl



www.museumboerhaave.nl

1. Which of the following numbers is biggest?
A. $20 \cdot 21$ **B.** $202 \cdot 1$ **C.** 202^1 **D.** $2^0 \cdot 2^1$ **E.** $(2^0)^{21}$

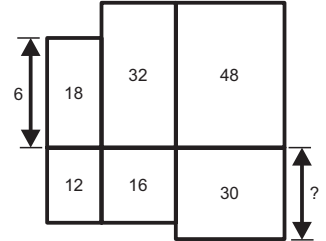
2. A park has the shape of an equilateral triangle. There are three hiking trails in the park. The lengths of the hiking trails are P , Q and R respectively, as shown in the diagram.



Which of the following statements is true?

- A.** $P < Q < R$ **B.** $P < R < Q$ **C.** $P < Q = R$ **D.** $P = R < Q$ **E.** $P = Q = R$

3. Six rectangles are positioned as shown. The numbers within the rectangles indicate their areas in cm^2 . The left rectangle at the top has height 6 cm.



What is the height in cm of the rectangle at the bottom right?

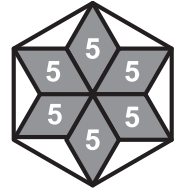
- A.** 4 **B.** 5 **C.** 6 **D.** 7.5 **E.** 10

4. At the halftime of a handball match, the visiting team was leading by 9–14. In the second half, the home team scored twice as many goals as the visitors, and won the match by one goal.

What was the final score of the match?

- A.** 20–19 **B.** 21–20 **C.** 22–21 **D.** 23–22 **E.** 24–23

5. Six congruent diamonds, each of area 5 cm^2 , form a star. The tips of the star are joined, creating a hexagon, as shown.



What is the area of the hexagon in cm^2 ?

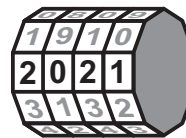
- A.** 36 **B.** 40 **C.** 45 **D.** 48 **E.** 60

6. The saxophonist, trumpet player and singer of a jazz band are the same age. There are three more members in the band. They are 19, 20 and 21 years old respectively. The average age of the jazz band's six members is 21 years old.

How old is the singer?

- A.** 20 **B.** 21 **C.** 22 **D.** 23 **E.** 24

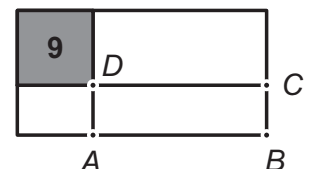
7. The bike lock of my bicycle is a combination lock. When I look at the front of the lock, I see:



What do I see on the back of the lock?

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

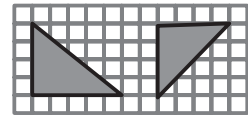
8. A rectangle with perimeter 30 cm is divided by two lines forming a square of area 9 cm^2 and a rectangle $ABCD$, as shown in the figure.



What is the perimeter of rectangle $ABCD$ in cm?

- A.** 14 **B.** 16 **C.** 18 **D.** 21 **E.** 24

9. Louise has drawn three triangles on a grid. Exactly two of them are isosceles, exactly two of them are rectangular and there are exactly two of them with the same area. On the right you see two of Louise's triangles.



Which of the following five triangles can be the third one?



10. Jos has a number in his mind. He gets the same result by subtracting $\frac{1}{10}$ from this number or by multiplying it by $\frac{1}{10}$.

What number does Jos have in mind?

- A. $\frac{1}{100}$ B. $\frac{1}{11}$ C. $\frac{1}{10}$ D. $\frac{11}{100}$ E. $\frac{1}{9}$

11. On New Year's Eve, Rob had ten sparklers of the same size. He lit one first. When only a tenth of the first one remained, he lit the second one. When only a tenth of the second one remained, he lit the third one, and so on. Each sparkler burned at the same speed and for exactly two minutes.

How long did it take for all ten sparklers to burn down?

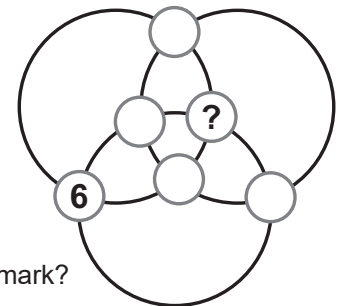
- A. 16 minutes en 40 seconds
 B. 17 minutes
 C. 18 minutes
 D. 18 minutes en 12 seconds
 E. 18 minutes en 20 seconds

12. Ahmed walks up 8 steps going up. He takes either 1 or 2 steps at a time. The sixth step is broken, he cannot use this step.

In how many different ways can Ahmed reach the 8th step?

- A. 6 B. 7 C. 8 D. 9 E. 10

13. The numbers from 1 to 6 are placed in the six small circles. The number 6 is already placed. The sum of the numbers on each large circle is the same.



Which number must be placed in the small circle with the question mark?

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

14. In a small school there are only five classes. Each class consists of either only girls or only boys. The classes have 9, 15, 17, 19 and 21 students respectively. One of the classes is on an excursion today. That is why the number of girls is now three times the number of boys in school.

How many students does the class on an excursion consist of?

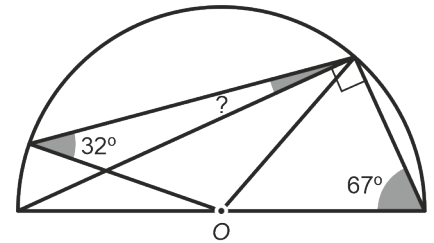
- A. 9 B. 15 C. 17 D. 19 E. 21

15. The number 2021 has the property that when divided by one of the numbers 6, 7, 8 and 9, the remainder is always 5.

How many numbers smaller than 2021 have this same property?

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

16. Three angles are given in the semicircle with center O , one of 32° , one of 67° and a right angle.



What is the size of the grey angle with the question mark?

- A. 9 B. 11 C. 16 D. 17,5 E. 18

17. Five cars are at the start for a race:



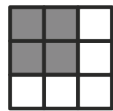
Whenever a car overtakes another car, a point is awarded.
The cars finished in the following order:



What is the least number of points in total that could be awarded?

- A. 6 B. 7 C. 8 D. 9 E. 10

18. A 3×3 square is covered several times by a 2×2 square, as shown in the first diagram on the right. Afterwards, in each square will be written how many times the square has been covered, as shown in the second diagram. Unfortunately some numbers are hidden.

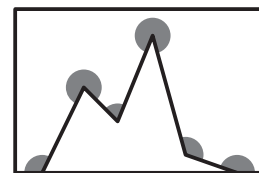


■	18	■
■	47	■
13	■	?

What number is in the square with the question mark?

- A. 14 B. 15 C. 16 D. 17 E. 19

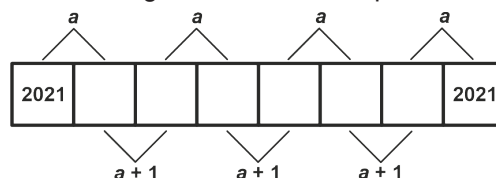
19. Six angles are indicated in the picture.



What is the sum, in degrees, of these six angles?

- A. 360 B. 900 C. 1080 D. 1120 E. 1440

20. A number is written in each of the eight boxes in the strip below.

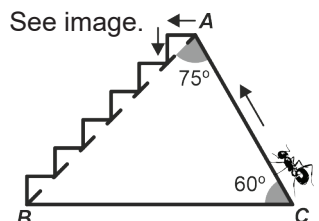


Numbers in two boxes next to each other have sum either a or $a + 1$ as shown in the picture. The numbers in the first box and in the last box are both 2021.

What is the value of a ?

- A. 4041 B. 4042 C. 4043 D. 4044 E. 4045

21. Miss Ant climbs a hill on the road CA and then descends on the stairs AB . See image. We divide the length of the road CA by the length of the stairs AB .



What is the ratio $CA : AB$?

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

22. From the three numbers a , b and c we know that $a + b + c = 0$ and $abc = 78$.

What is the value of $(a + b)(b + c)(c + a)$?

- A. -156 B. -78 C. -39 D. 78 E. 156

- 23.** We take the smallest positive integer whose sum of its digits is 2021. By adding 2021 to this integer we get a new number.

What is the sum of the digits of this new number?

- A.** 10 **B.** 12 **C.** 19 **D.** 28 **E.** 2021

- 24.** Three boys played a word game. They all wrote down ten words. No points were rewarded for words all three of them wrote down. If exactly two boys wrote down the same word, both boys scored one point for that word. For a word written down by exactly one boy, that boy scored three points. Afterwards, when they added up their scores they found that each of the three boys had different scores. *Sam* got 19 points, the smallest score. And *Colin* scored the most.

How many points did *Colin* score?

- A.** 21 **B.** 22 **C.** 23 **D.** 24 **E.** 25

- 25.** There are 2021 balls in a row, numbered from 1 to 2021. There are red, green, yellow and blue balls. Among any five consecutive balls there is exactly one red, one yellow and one blue ball. After any red ball, the next ball is yellow. The balls with the numbers 2, 20 and 202 are all green.

What is the colour of the ball with number 2021?

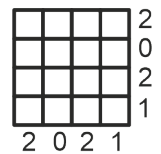
- A.** blue **B.** yellow **C.** green **D.** red **E.** you cannot know

- 26.** a and b both are the square of an integer. The difference $a - b$ is a prime number.

Which of the following numbers could be b ?

- A.** 100 **B.** 144 **C.** 256 **D.** 900 **E.** 10000

- 27.** In the 4×4 table the cells must be painted either white or black. The numbers next to and below the table show how many cells in that row or column must be painted black.



In how many ways can this table be painted?

- A.** 1 **B.** 2 **C.** 3 **D.** 5 **E.** more than 5

- 28.** How many positive five-digit numbers have the product of their digits equal to 1000?

- A.** 10 **B.** 20 **C.** 30 **D.** 40 **E.** 60

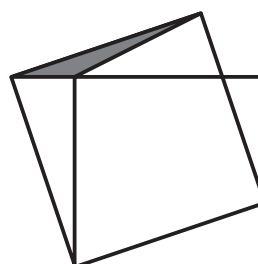
- 29.** *Sila* has eight coins, whose weights in grams are different integers. Each time she will weigh four coins with a balance, two on the left scale and two on the right scale. Each time, the scale with the heaviest of the four coins on it, is the heavier one.



What is the smallest possible weight of the heaviest coin *Sila* has?

- A.** 8 **B.** 12 **C.** 21 **D.** 34 **E.** 128

- 30.** The smallest square in the figure has area 16. The grey triangle has area 1.



What is the area of the largest square?

- A.** 17 **B.** $17\frac{1}{2}$ **C.** 18 **D.** $18\frac{1}{2}$ **E.** 19