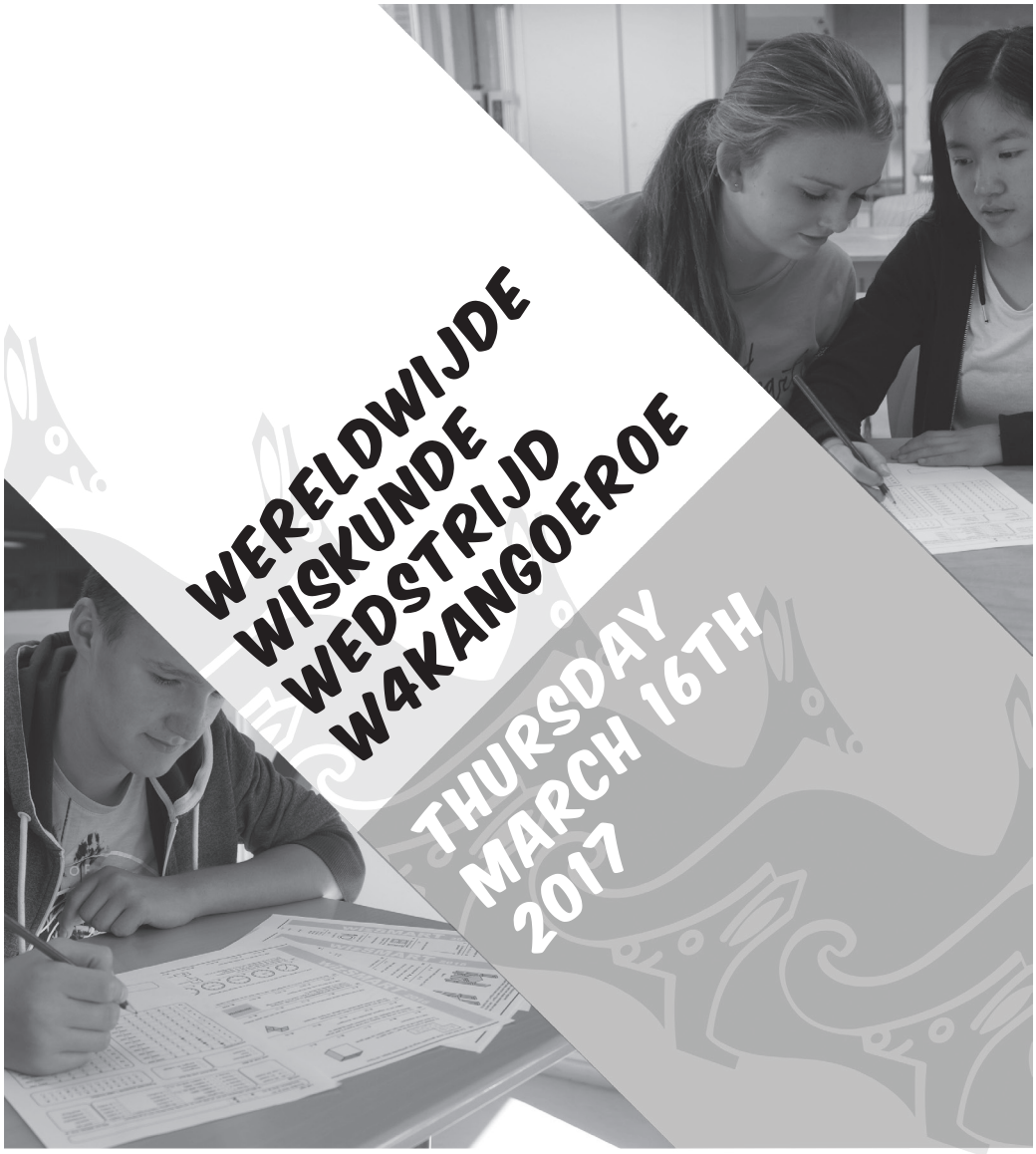
wizPROF 2017




WWW.W4KANGOEROE.NL

Good luck and most of all have fun.



calculators are not allowed

you may use 75 minutes

Only a pencil, an eraser and scribbling paper are allowed

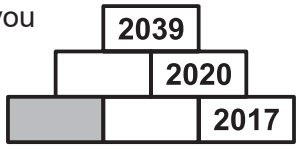
results and prizes will arrive at school in May

answers will be posted on the website March 26th

solutions will be posted on the website April 22th

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

**1.** If you add the numbers in two boxes next to each other, you obtain the number in the box directly above.




Which number will be in the grey box?

**A.** 15 **B.** 16 **C.** 17 **D.** 18 **E.** 19

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**2.** A group of girls forms a circle.
*Eva* is the fifth girl to the left from *Laura* and the eighth to the right from *Laura*.

How many girls form a circle?

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

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**3.** *Martin* plays in the chess competition.
Out of the fifteen games he played this season, he won nine.
*Martin* has five more games to play. Suppose he wins all five of these.

What percentage of games will *Martin* have won then, this season?

**A.** 60 **B.** 65 **C.** 70 **D.** 75 **E.** 80

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**4.** The shape alongside has been made by placing two white stars and two grey stars on top of each other.
The areas of the stars are 1 cm², 4 cm², 9 cm² and 16 cm².

How many cm² of the grey stars is still visible?

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

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**5.** *Eveline* has 24 euros. Each of her three sisters has 12 euros.
She gives each of her sisters a number of euros. Now the four girls have the same amount.

How many euros did *Eveline* give to each of her sisters?

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

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**6.** A wheel rolls along the hill-tops as shown.

Which picture shows the movement of the midpoint of the wheel?

**A.**


**B.**


**C.**


**D.**


**E.**


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**7.** *Peter* wrote the word KANGAROO on a piece of transparent glass.
He turns over this piece around its right side.
Then he rotates it 180°.


What will he see?

**A.**


**B.**


**C.**


**D.**


**E.**


**8.** A circle of radius 1 rolls over a length of $11\pi$ from START to FINISH.


What does the circle look like when it arrives at FINISH?

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

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**9.** Of the guests (men, women and children) at a wedding, $\frac{1}{8}$th were children.
Of the adult guests, $\frac{3}{7}$ths were men.

What fraction of the wedding guests were women?

**A.** $\frac{3}{7}$ **B.** $\frac{25}{56}$ **C.** $\frac{1}{2}$ **D.** $\frac{4}{7}$ **E.** $\frac{5}{8}$

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**10.** My teacher has a box of coloured stickers: 203 red ones, 117 white ones and 28 blue ones.
I take a number of stickers, without looking. I would like to get at least three of the same colour.

At least how many stickers should I take?

**A.** 3 **B.** 6 **C.** 7 **D.** 28 **E.** 203

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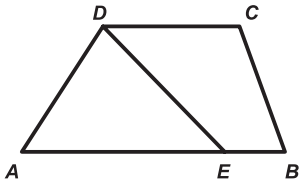
**11.** *DE* divides trapezoid *ABCD* into two parts of equal area.
*AB* is parallel to *CD*, the length of *AB* is 50, the length of *CD* is 20.
*E* is a point on side *AB*.




What is the length of *AE*?

**A.** 25 **B.** 30 **C.** 35 **D.** 40 **E.** 45

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**12.** How many natural numbers N have the property that N or N+20 is a 4-digit number, but not both?

**A.** 19 **B.** 20 **C.** 38 **D.** 39 **E.** 40

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**13.** *Tycho* prepares a running schedule. He wants to run three days of the week, each week on the same days. He never wants to run on consecutive days.

How many different schedules can *Tycho* make?

**A.** 6 **B.** 7 **C.** 9 **D.** 10 **E.** 35

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**14.** Three consecutive positive integers are squared. Then these squares are added.
The result is 770.

What was the largest of the three integers?

**A.** 13 **B.** 15 **C.** 17 **D.** 19 **E.** 21

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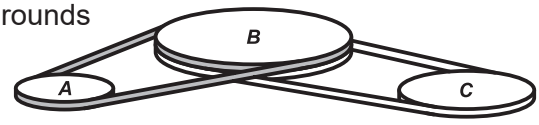
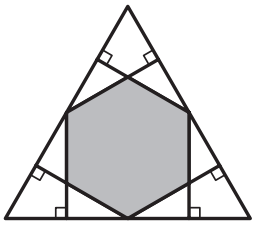
**15.** A belt drive system consists of two belts and three wheels *A*, *B* and *C*.
The wheels rotate without slippage.
Wheel *B* turns 4 full rounds when wheel *A* turns 5 full rounds.
Wheel *B* turns 6 full rounds when wheel *C* turns 7 full rounds
The perimeter of wheel *C* is 30 cm.




How many cm is the perimeter of wheel *A*?

**A.** 27 **B.** 28 **C.** 29 **D.** 30 **E.** 31

**16.** From the midpoints of the sides of an equilateral triangle, perpendiculars are drawn to the other sides.
This results in the regular grey hexagon (see figure).



What fraction of the area of the equilateral triangle is grey?

**A.** $\frac{1}{3}$ **B.** $\frac{2}{5}$ **C.** $\frac{4}{9}$ **D.** $\frac{1}{2}$ **E.** $\frac{2}{3}$

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**17.** The different heights of four brothers, when ordered from shortest to tallest, differ by the same amount in each step. *Sietse* is shorter than *Adam*, but taller than *Hielke*. *Benjamin* is shorter than *Hielke*. *Sietse* is 184 cm tall. The average height is 178 cm.

How tall is *Benjamin*, in cm?

**A.** 160 **B.** 166 **C.** 172 **D.** 184 **E.** 190

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**18.** It rained seven times during our holidays. If it rained in the morning, it was sunny in the afternoon. If it rained in the afternoon, it was sunny in the morning.
There were five sunny mornings and six sunny afternoons.

How many days did our holidays last at least?

**A.** 7 **B.** 8 **C.** 9 **D.** 10 **E.** 11

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**19.** *Samir* wants to write numbers in the table.
He would like the sums of the numbers in all 2x2 squares to be the same.
He filled in three numbers already, as shown.

| | | |
|---|---|---|
| 3 | | 1 |
| | | |
| 2 | | |

Which number should he enter in the grey cell?

**A.** 0 **B.** 1 **C.** 4 **D.** 5 **E.** impossible to tell

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**20.** The numbers -3, -2, -1, 0, 1 and 2 appear on the faces of a dice.
You throw twice and multiply the results.

What is the probability that the product is negative?

**A.** $\frac{1}{4}$ **B.** $\frac{11}{36}$ **C.** $\frac{1}{3}$ **D.** $\frac{13}{36}$ **E.** $\frac{1}{2}$

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**21.** Four children have different ages. They are all under 18.
The product of their ages is 882.

What is the sum of their ages?

**A.** 23 **B.** 25 **C.** 27 **D.** 31 **E.** 33

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**22.** Seven positive integers $a$, $b$, $c$, $d$, $e$, $f$ and $g$ are written in a row.
Any two neighbouring numbers differ by 1 or -1. The sum of the seven numbers equals 2017.

Which of the numbers can be equal to 286?

**A.** only $a$ or $g$ **B.** only $b$ or $f$ **C.** only $c$ or $e$ **D.** only $d$ **E.** any of them

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**23.** Some two-digit number is repeated three times.
We obtain a six-digit number this way.

By what number will this six-digit number certainly be divisible?

**A.** 2 **B.** 5 **C.** 7 **D.** 9 **E.** 11

**24.** *Fiona* wants to make special passwords. They should consist of seven digits. Each digit should occur exactly as often as its value indicates. Equal digits are always consecutive. Good passwords are, for example, 4444333 and 1666666.

How many different passwords can *Fiona* produce?

**A.** 5 **B.** 7 **C.** 10 **D.** 12 **E.** 13

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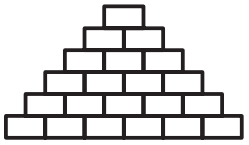
**25.** *Gregor* wants to write a natural number in each box of this diagram. The number in any box should be the sum of the two numbers in the boxes directly below it.
*Gregor* wants to write as many odd numbers as possible in the diagram.



How many odd numbers can *Gregor* write in the diagram then?

**A.** 13 **B.** 14 **C.** 15 **D.** 16 **E.** 17

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**26.** *Lisa* has a polygon of which all angles are smaller than 180°.
She adds up all angles except one, and obtains 2017° as sum.

How many degrees is the angle *Lisa* missed?

**A.** 37° **B.** 53° **C.** 97° **D.** 127° **E.** 143°

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**27.** Thirty dancers are standing in a circle, each looking at one of their neighbours. The dancers facing each other say “Hello” to each other. It turns out there are ten such dancers. The dance instructor gives the “Around” command. All dancers turn around. The dancers now facing each other also say “Hello” to each other.

How many dancers say “Hello” the second time?

**A.** 8 **B.** 10 **C.** 15 **D.** 20 **E.** impossible to tell

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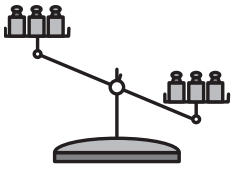
**28.** On both scales of a balance 3 different weights are put at random.
The weights are of 101, 102, 103, 104, 105 and 106 grams.



What is the probability that the 106 gram weight has been put on the heavier (right) scale?

**A.** 75 % **B.** 80 % **C.** 90 % **D.** 95 % **E.** 100 %

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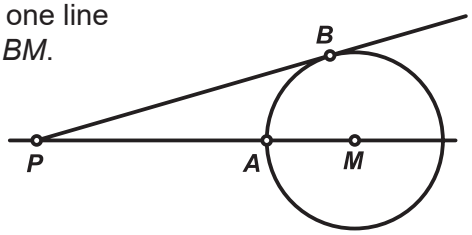
**29.** *A* and *B* are on a circle with centre *M*.
*P* is a point outside the circle such that *P*, *A* and *M* are on one line and the length of *PA* is a natural number. So is the radius *BM*.
Line *PB* is tangent to the circle
(so *BM* is perpendicular to *PB*) and *PB* = *PA* + 8.




How many possible values are there for radius *BM*?

**A.** 0 **B.** 2 **C.** 4 **D.** 6 **E.** 8

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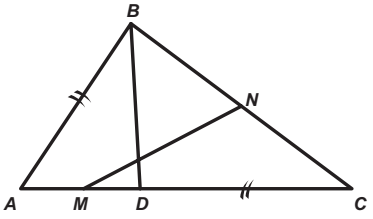
**30.** Point *D* is on side *AC* of triangle *ABC*, such that *CD* and *AB* are of equal length.
*M* and *N* are midpoints of segments *AD* and *BC*, respectively.




If angle *NMC* = $\alpha$ then what is the size of angle *BAC*?

**A.** $2\alpha$ **B.** $90° - \alpha$ **C.** $45° + \alpha$ **D.** $90° - \frac{1}{2}\alpha$ **E.** $60°$