wizBRAIN 2014

wereldwijde wiskunde wedstrijd

# W4Kangoeroe

## www.w4kangoeroe.nl

**March 20th 2014**

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



calculators are not allowed

you may use 75 minutes

Only a pencel, an eraser and scribbling paper are allowed

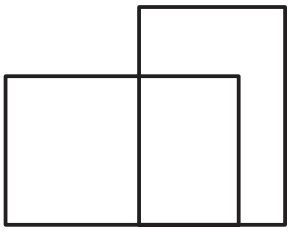
results and prizes will arrive at school in May

answers will be posted on the website March 27th

solutions will be posted on the website April 20th

wizBRAIN
havo 1, 2 & 3
vwo 1 & 2
vmbo 3 & 4 m.u.v. basisberoepsgerichte leerweg.

**1.** You can see a number of rectangles in the figure.
How many?



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

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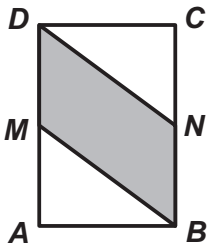
**2.** *ABCD* is a rectangle with area 10.
*M* and *N* are the midpoints of sides *AD* and *BC*.
What is the area of quadrilateral *MBND*?




**A.** 5 **B.** 5.5 **C.** 6 **D.** 7 **E.** 7.5

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**3.** Of two numbers we know the following:
If you add them you will get 37. If you multiply them you will get 36.
What is the difference between the two numbers?

**A.** 1 **B.** 4 **C.** 10 **D.** 26 **E.** 35

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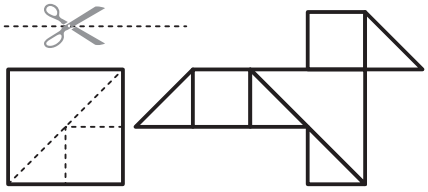
**4.** *Fiona* has a number of squared cutting papers, all with area 4. She cuts them along the dotted lines in squares and in right-angled triangles, as in the left figure. She uses a number of these pieces to make a 'bird' as in the right figure.
What is the area of this bird?



**A.** 4 **B.** 4.5 **C.** 5 **D.** 6 **E.** 8

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**5.** A bucket is half filled with water.
If you add 2 litres the bucket is filled for three quarters.
How many litres can the bucket contain?

**A.** 6 **B.** 8 **C.** 10 **D.** 12 **E.** 14

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**6.** Every year the Kangaroo contest is on the third Thursday in March.
What is the last possible date for the Kangaroo contest?

**A.** March 14 **B.** March 15 **C.** March 20 **D.** March 21 **E.** March 22

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**7.** What is the outcome of $2014 \times 2014 : 2014 - 2014$?

**A.** 0 **B.** 1 **C.** 2013 **D.** 2014 **E.** 4028

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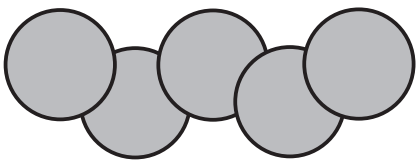
**8.** All circles in the figure have area 8 cm².
The common part of every two overlapping circles is 1 cm² .

How many cm² is the grey area?



**A.** 32 **B.** 35 **C.** 36 **D.** 38 **E.** 39

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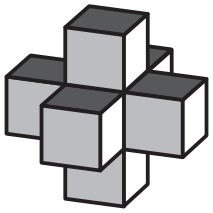
**9.** *Jack* has piano lessons twice a week, *Anna* has one lesson every two weeks.
The coming period *Jack* has 15 more lessons than *Anna*.
How many weeks does this period last?

**A.** 10 **B.** 15 **C.** 20 **D.** 25 **E.** 30

**10.** *Daniel* made the 'cross' alongside with little 1 by 1 by 1 cubes.
Now he wants to make a 3 by 3 by 3 cube out of it.
How many additional little cubes does he need then?



**A.** 8 **B.** 12 **C.** 16 **D.** 18 **E.** 20

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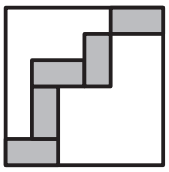
**11.** In a square with sides of 24 cm five equal rectangles are drawn,see figure.



How many cm² is the area of one such rectangle?

**A.** 12 **B.** 18 **C.** 24 **D.** 32 **E.** 64

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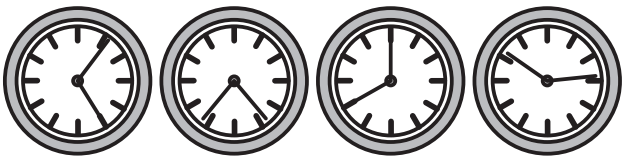
**12.** The minute hands and the hour hands of the four clocks in the picture are all of the same length. Therefore the time is difficult to read.



Which of the times below can *not* be read from any of the four clocks?

**A.** 2:51 **B.** 5:07 **C.** 7:37 **D.** 8:00 **E.** 10:14

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**13.** Which of the following multiplications has the largest outcome?

**A.** $44 \times 777$ **B.** $55 \times 666$ **C.** $77 \times 444$ **D.** $88 \times 333$ **E.** $99 \times 222$

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**14.** In the figure below you see a necklace with grey and white beads.

*Tim* wants to take as many white beads as possible. He may take a bead from one of the ends a number of times (it does not have to be the same end). He has to stop as soon as he has taken a grey bead for the fifth time.
How many white beads can *Tim* take at most?

**A.** 4 **B.** 5 **C.** 6 **D.** 7 **E.** 8

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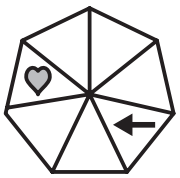
**15.** In the figure alongside the heart and the arrow are always moved simultaneously. The arrow is shifted three spaces clockwise every time. The heart shifts four spaces, but counterclockwise.



After how many times are the heart and the arrow in the same space for the first time?

**A.** 7 **B.** 8 **C.** 9 **D.** 10
**E.** that will never happen

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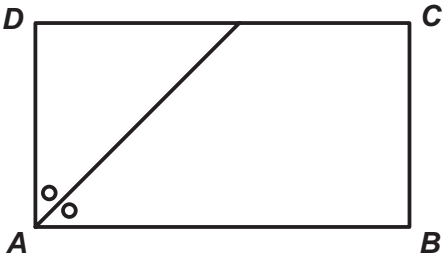
**16.** A rectangle has sides of 6 and 11 cm long.
The bisector (that is a line that divides an angle into two equal angles) of angle A is drawn. If you draw also the bisector of angle B, then the side CD will be divided in three pieces.
How many cm are the lengths of these three pieces?




**A.** 5, 1 and 5 **B.** 4, 3 and 4 **C.** 3, 5 and 3 **D.** 2, 7 and 2 **E.** 1, 9 and 1

**17.** Six boys live together in an apartment that has two bathrooms.
Each morning at 7:00 am they start showering.
There is never more than one boy in a bathroom.
It takes them respectively 8, 10, 12, 17, 21 and 22 minutes.
What is the earliest time they can all be ready?

**A.** 7:44 **B.** 7:45 **C.** 7:46 **D.** 7:47 **E.** 7:48

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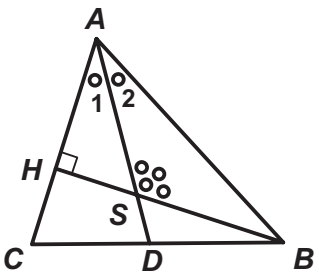
**18.** *BH* is perpendicular to *AC* in triangle *ABC*, and *AD* is the bisector (the line that divides an angle in two equal parts) of angle *A*.
The obtuse angle *S* between the line segments *BH* and *AD* is four times as large as angle $A_2$, see picture.




What is the size of the angles $A_1$ and $A_2$ together?

**A.** 30° **B.** 45° **C.** 60° **D.** 75° **E.** 90°

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**19.** Captain *Sparrow* and his pirates have dug up a number of gold coins.
These are being divided in a fair way: everybody gets the same number.
If there would have been 50 fewer gold coins then everybody would get 5 fewer gold coins.
If there would have been four fewer pirates then everybody would get 10 more gold coins.
How many gold coins did the gang dig up?

**A.** 80 **B.** 100 **C.** 120 **D.** 150 **E.** 250

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**20.** An old scale does not function well any more. A weight weighing less than 1000 grams is being weighed correctly. But if it is 1000 grams or more, then the scale indicates just any number above 1000. Five weights, A, B, C, D and E each weigh less than 1000 grams.
If you weigh them in pairs, then the scale indicates the following:
B + D = 1200, C + E = 2100, B + E = 800, B + C = 900 en A + E = 700.
Which of the weights is heaviest?

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

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**21.** *Andrea* writes the numbers 1, 2, 3, ..., 9 in the boxes of a 3 by 3 table. The numbers 1, 2, 3 and 4 are already there, see picture. Two numbers are called 'neighbours' if there boxes have a common edge. When *Andrea* has written down all numbers and adds the neighbours of nine, she gets 15.
What does she get when she adds the neighbours of 8?

| | | |
|---|---|---|
| 1 | | 3 |
| | | |
| 2 | | 4 |

**A.** 12 **B.** 18 **C.** 20 **D.** 26 **E.** 27

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**22.** We have got 4 equal cubes, see figure 1.
The cubes are being put together so that the top side looks like figure 2.

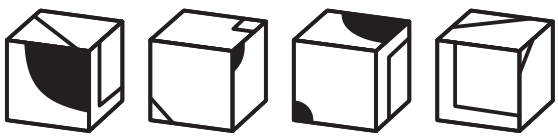
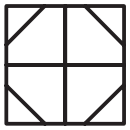
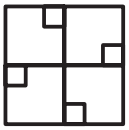
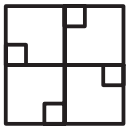


figure 1


figure 2

What will the down side look like?

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

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**23.** The average of two positive numbers is 30% less than the largest number.
How many per cent is the average larger than the smallest number?

**A.** 20 **B.** 25 **C.** 30 **D.** 70 **E.** 75

**24.** *Hafida* and *Els* join a puzzle contest.
They both get the same hundred puzzles.
For each puzzle the one who solves it first gets 4 points.
The other one will get only 1 point for a correct solution.
Each girl solved 60 puzzles. Together they got 312 points.
Some puzzles were solved by both girls; how many?

**A.** 53 **B.** 54 **C.** 55 **D.** 56 **E.** 57

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**25.** David rides his bike from home to school. He wants to be at school at half past eight exactly.
In $\frac{2}{3}$ of the time he did $\frac{3}{4}$ of the distance.
Then he slowed down so that he arrived exactly on time.
What is the ratio of the speed of the first and the second part?

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

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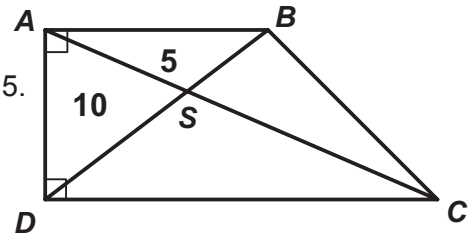
**26.** In the figure angles *A* and *D* are right, *B* and *C* are not.
*S* is the intersection point of *BD* and *AC*.
The area of triangle *ABS* is 10 and that of triangle *ABS* is 5.




What is the area of quadrilateral *ABCD*?

**A.** 30 **B.** 35 **C.** 40 **D.** 45 **E.** 50

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**27.** A group of 25 people consists of knights, servants and maidens.
Knights always tell the truth, servants always lie.
If a maiden answers a question truthfully, she will lie about the next question. And vice versa.
Everybody was asked: 'Are you a knight?' 17 times the answer was 'yes'.
After that everybody was asked: 'Are you a maiden?' 12 times the answer was 'yes'.
Finally everybody was asked: 'Are you a servant?' 8 times the answer was 'yes'.
How many knights are there in the group?

**A.** 4 **B.** 5 **C.** 9 **D.** 13 **E.** 17

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**28.** We want to write down a number of different positive whole numbers.
Exactly two of those have to be divisible by 2, exactly thirteen have to be divisible by 13.
We also want the largest of those numbers to be as small as possible.
What has to be that largest number, then?

**A.** 169 **B.** 260 **C.** 273 **D.** 299 **E.** 325

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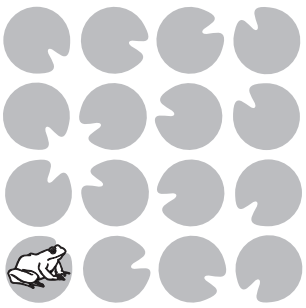
**29.** In a pond 16 leaves of waterlilies float in a square as in the picture.
A frog sits on a leaf in a corner. After a while the frog jumps several times from one leaf to another. Each jump is to the left, to the right, to the front or back. The frog skips at least one leaf every time and never jumps to a leaf where he already has been before.



What is the largest number of leaves on which the frog can sit down (the first leaf counts too)?

**A.** 6 **B.** 12 **C.** 14 **D.** 15 **E.** 16

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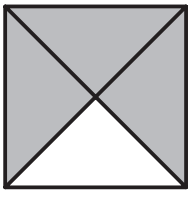
**30.** 25 tiles, as in the picture, are being put together to form a square.
Tiles can only border each other with the same colour.



What is the smallest number of grey triangles that will be on the outer edge?

**A.** 4 **B.** 5 **C.** 6 **D.** 7 **E.** 8