wizPROF 2008

EUROPESE
KANGOEROE
REKEN- EN
WISKUNDEWEDSTRIJD

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www.math.ru.nl/kangoeroe

Good luck
and most of
all have fun.

calculator not allowed

you may use 75 minutes

scrap paper is allowed

results and awards at school at the end of May

15th April the answers will be on the website

wizPROF
the Netherlands: 3, 4, 5 & 6 havo/vwo
Flanders: 2nd & 3rd degree tso/aso

WiZPROF 2008

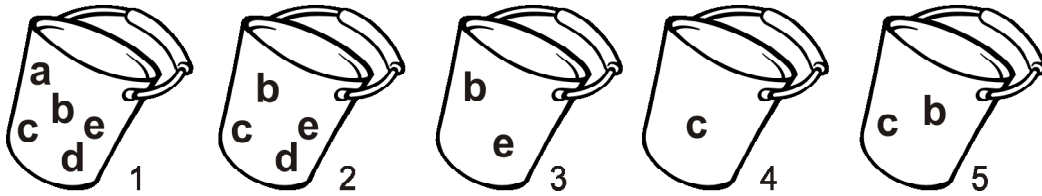**1.** Below you see five buckets with letters. Alex gets letters out of the buckets.
He would like to keep one letter in every bucket, in each bucket a different letter.
Which letter remains in bucket 1?

A. a   **B**. b   **C**. c   **D**. d   **E**. e

2. Bernie and Alex run 200 metres. Alex takes half a minute to finish, and Bernie a hundredth part of an hour.
Who wins and by how much?

A. Bernie by 4 seconds   **B**. Bernie by 24 seconds   **C**. Alex by 6 seconds
D. Alex by 36 seconds   **E**. Both take the same time to finish

3. Five exercises in arithmetic: $2 - (-4) = ...$, $(-2) \cdot (-3) = ...$, $2 - 8 = ...$, $0 - (-6) = ...$, $(-12) : (-2) = ...$.
How many answers are unequal to 6?

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

4. Each square has side 1.
What is the length of *AB*?
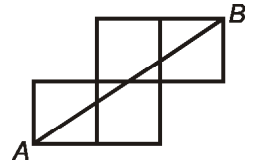
A. $\sqrt{5}$ **B**. $\sqrt{10}$ **C**. $\sqrt{13}$ **D**. $\sqrt{5} + \sqrt{2}$ **E**. 5

5. Alex would like to erase a number of letters from the Dutch word "KANGOEROE", in such a way that the remaining letters are in alphabetical order, without repeats.
How many letters does Alex have to erase at least?

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

6. Look at the addition in the picture. The same letters stand for the same digits, different letters are different digits.
Which digit is E?

$$\begin{array}{r} EH \\ + HE \\ \hline AHA \end{array}$$

**A**. 0   **B**. 1   **C**. 2   **D**. 8   **E**. 9

7. Elsie and Fiona both cut a rectangular sheet of paper in two. Elsie obtains two rectangles with 40 cm perimeter each.
Fiona also obtains two rectangles, but hers have a perimeter of 50 cm each.
Yet, both have cut identical sheets of paper.
What was the perimeter of the sheet of paper they started with?

A. 40 cm   **B**. 50 cm   **C**. 60 cm   **D**. 80 cm   **E**. 90 cm

8. On January 1, Daisy wore a T-shirt with **2008** on it.
She and Alex are in front of a mirror. Daisy does a handstand (with her head down).
What does Alex see in the mirror?

A. 2008   **B**. 5008   **C**. 8002   **D**. 8005   **E**. 2005

9. The corners of a cube are being cut off.
How many edges does the remaining shape have?
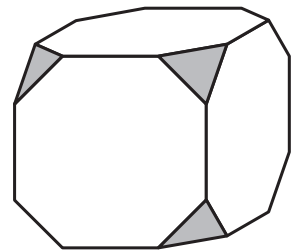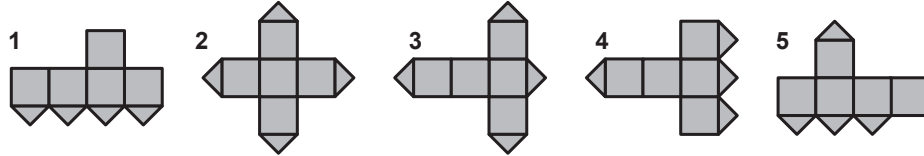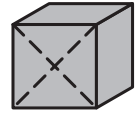

A. 24   **B**. 30   **C**. 36   **D**. 40   **E**. 48

10. Ismael plays the same game several times. The first time he scores 1 point.
After that he scores 5 points each time. His average is now 4 points per game.
How many times did Ismael play the game?

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

11. One of the faces of a cube is cut along the dotted diagonals.
Which of the following nets cannot be a net of that cube?

1   **2**   **3**   **4**   **5**

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

12. Judy has ten cards marked 3, 8, 13, 18, 23, 28, 33, 48, 53 and 68. She will pick a number of cards.
The numbers on these cards should add up to 100 exactly.
At least how many cards does Judy have to pick?

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

13. A box contains seven cards. The cards are numbered 1 through 7. Gerard takes three cards at random.
Then Hafida takes two cards. There are two cards left in the box now.
Gerard can tell from the numbers on his cards that the sum of the two numbers on Hafida's cards has to be even.
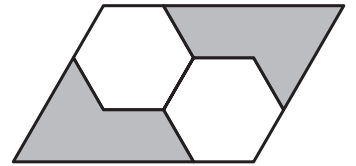What is the sum of the numbers on Gerard's cards?

A. 6   **B**. 9   **C**. 10   **D**. 12   **E**. 15

14. The circle intersects rectangle *ABCD* in points *E*, *F*, *G* and *H*.
AE = 4 cm, *EF* = 5 cm and *DH* = 3 cm.
How many cm is *GH*?
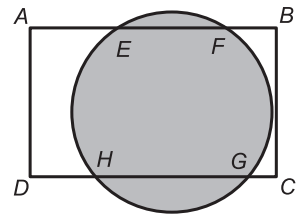
A. 6   **B**. $6\frac{2}{3}$ **C**. 7   **D**. 8   **E**. 9

15. The two regular hexagons are equal.
What part of the parallelogram is grey?

A. $\frac{1}{6}$ **B**. $\frac{1}{5}$ **C**. $\frac{1}{4}$ **D**. $\frac{1}{3}$ **E**. $\frac{1}{2}$

16. The marks on the number line below indicate consecutive numbers.
At least two of the numbers *a*, *b*, *c*, *d*, *e* and *f* are divisible by 3.
Moreover, at least two of those numbers are divisible by 5.

Which of these numbers are divisible by 15?

**A**. *e*   **B**. *a* and *f*   **C**. *b* and *d*   **D**. *c* and *e*   **E**. all of them

17. Seven dwarfs were born in seven consecutive years, on the same date.
The youngest three dwarfs together are 42 years of age.
How many years of age are the eldest three together?

A. 51   **B**. 54   **C**. 57   **D**. 60   **E**. 63

18. The number 200820082008……….20082008 consists of a thousand digits.
Alex wants to erase as many digits as possible. The sum of the remaining digits should equal 2008.
How many digits can Alex erase at most?

A. 246   **B**. 254   **C**. 564   **D**. 601   **E**. 746

19. Triangle ABC is isosceles with *AC* = *BC*. *AD* bisects angle *A*. ∠*D* = 105°.
What is the size of angle *A*?
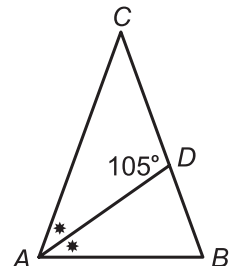
A. 60°   **B**. 65°   **C**. 66,5°   **D**. 70°   **E**. 72,5°

20. We are looking for two numbers a and b, such that all three of a + b, a × b and a : b are equal.
How many such pairs of a and b do exist?

A. 0   **B**. 1   **C**. 2   **D**. 4   **E**. 8

21. We make a six-digit number. The third digit, and every digit after that, is the sum of the previous two digits. How many six-digit numbers can be made this way?

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

**22**. A wooden cube has three blue and three red faces.
The cube is sawn into 3 x 3 x 3 = 27 small cubes, all of the same size.
How many small cubes have both a blue and a red face?

A .6   **B**. 12   **C**. 14   **D**. 16
E. depends on which faces of the large cube were blue and red

23. If you multiply 1, 2, 3, …..up to n (inclusive), the result is $2^{15} \cdot 3^6 \cdot 5^3 \cdot 7^2 \cdot 11 \cdot 13$.
Which number is n?

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

24. Three circles, of radius 1, 2 and 3 cm, touch each other.
What is the length of the bold arc with the question mark?
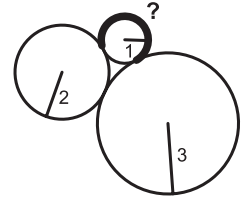
A. $\frac{1}{2}\pi$ **B**. $\frac{2}{3}\pi$ **C**. $\frac{5}{4}\pi$ **D**. $\frac{3}{2}\pi$ **E**. $\frac{5}{3}\pi$

25. We distribute the numbers 2 to 9 over the faces a to h of an octahedron.
At each vertex we sum the four numbers around it.
This should give the same result at each vertex.
In the net shown, the numbers 3, 5 and 9 have been placed already.
What is b + e equal to?
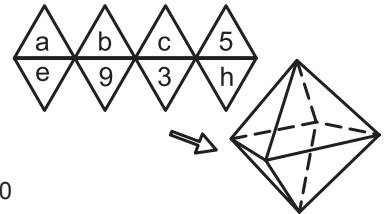
A. 6   **B**. 7   **C**. 8   **D**. 9   **E**. 10

26. A 3-pyramid consists of 3 layers of balls that together form a "pyramid".
The picture shows the bottom layer, the middle layer, and the top layer.
Similarly, for 4-pyramids (4 layers), 5-pyramids (5 layers), etcetera.
All balls on the outside of an 8-pyramid (including the bottom) are black,
all other balls are white.
What kind of object do the white balls form?
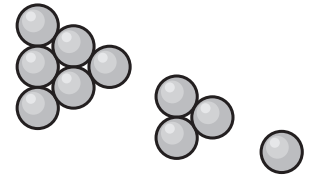
A. 3-pyramid   **B**. 4-pyramid   **C**. 5-pyramid   **D**. 6-pyramid   **E**. 7-pyramid

27. Every jump Kanga makes is either 1 metre or 3 metres far. Kanga wants to jump exactly 8 metres.
There are many possibilities, for example 3 + 3 + 1 + 1 or 3 + 1 + 3 + 1.
How many different possibilities does Kanga have?

A. 13   **B**. 15   **C**. 18   **D**. 20   **E**. 24

28. The picture shows a square $ABCD$ with sides of length 1.
Also shown are four quarter circles of radius one with a vertex as centre.
P and Q are two points of intersection of these quarter circles.
What length is PQ?
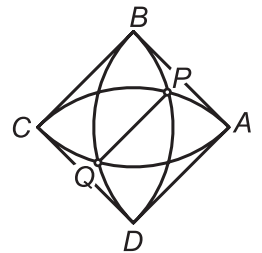
A. $\frac{1}{3}\sqrt{3}$ **B**. $2 - \sqrt{2}$ **C**. $\sqrt{3} - 1$ **D**. $\frac{3}{4}$ **E**. $\sqrt{5} - \sqrt{2}$

29. We are looking for numbers of 2008 digits. Of these numbers, every pair of consecutive digits must form a number from the table of multiplication of 17 or the table of multiplication of 23.
How many numbers of this kind do exist?

A. 5   **B**. 6   **C**. 7   **D**. 9   **E**. more than 9

30. We have a triangle of area 1. The three heights of the triangle are added up.
This sum is then multiplied by the perimeter of the triangle.
Which statement about the product is not true?

A. The product is certainly greater than 6   **B**. The product can be smaller than 12
C. In a right-angled triangle the product is greater than 16   **D**. The product can be 18
E. The product can be greater than 1000

Tick the answer you think will be answered *best* and tick the one you think will be answered *worst*.