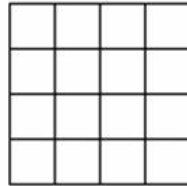


**Math Kangaroo 2003**  
**Level of grades 7 – 8**

Problems 3 points each

1. A segment of a length equal to 4 was divided with 4 points into segments of equal length. How long is each segment?  
 A) 0.4                      B) 1                      C) 0.8                      D) 0.5                      E) 0.6

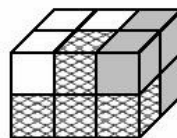


2. A square built of 16 small squares is cut with a line.  
 What is the greatest number of the little squares that the line can go through?  
 A) 3                      B) 4                      C) 6                      D) 7                      E) 8

3. When 29 is subtracted from the greatest 2-digit number and the difference is divided by the smallest 2-digit number, you receive:  
 A) 11                      B) 9                      C) 7                      D) 10                      E) 6

4. If  $\frac{x-3y}{y} = 12$ , then  $\frac{x}{y}$  is equal to  
 A) 9                      B) 2                      C) 10                      D) 3                      E) 15

5. Tomek saved 120 zł. One day he bought a present for his brother and he spent  $\frac{1}{3}$  of all his money. The next day he bought a book for himself and he spent  $\frac{1}{4}$  of the remaining money. How much money did he have left after shopping? (zł is a monetary unit in Poland like *dollar* in USA)



- A) 50 zł                      B) 80 zł                      C) 70 zł                      D) 20 zł                      E) 60 zł



6. A rectangular prism was made out of three blocks, each consisting of four cubes (see the picture). Which of the blocks below has the same shape as the white block?

7. There are 17 trees on one side of the street on Tomek's way from his house to school. One day Tomek marked these trees with white chalk in the following way: on the way from his house to the school he marked every other tree, starting with the

first one. On his way back home he marked every third tree, starting with the first one. How many trees were not marked?

- A) 4                      B) 5                      C) 6                      D) 7                      E) 8

8. In triangle ABC :  $DA = DB = DC$  (see the figure).

Then:

- A) Angle ACB is obtuse.  
B) Angle ACB is acute.  
C) Angle ACB is right.  
D) Angle ACB changes, depending on the lengths of the sides AC and BC.  
E) This kind of triangle ABC does not exist.

9. There were 5 parrots in a pet store. The average price of each of them was 600 zł. One day, the most beautiful parrot was sold. The average price of each of the remaining 4 birds was 500 zł. What was the price of the sold parrot? (zł is a monetary unit in Poland like *dollar* in USA)

- A) 100 zł                      B) 200 zł C) 550 zł D) 600 zł E) 1000 zł

10. What is the greatest number of inner right angles that a hexagon can have (not necessary a convex hexagon)?

- A) 2                      B) 3                      C) 4                      D) 5                      E) 6

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**Problems 4 points each**

11. How many integers are there, the squares of which are found between the numbers -100 and 100, inclusive?

- A) 11                      B) 22                      C) 21                      D) 20                      E) 10

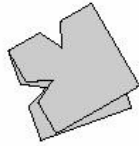
12. Five girls Ania, Beata, Celina, Dorota, and Ela, received the following assignment: they were supposed to draw four segments and to count all the points of intersection of these segments. After they finished, Ania said she counted 2 points, Beata 3 points, Celina 5 points, Dorota 6 points, Ela 7 points. Who made a mistake?

- A) Ania                      B) Beata                      C) Celina                      D) Dorota                      E) Ela

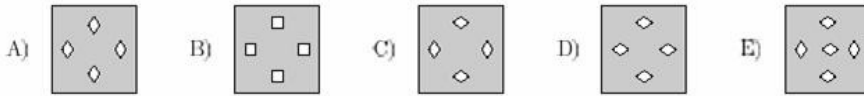
13. A cube was made from the given configuration (see the figure). Which wall will be opposite to the wall with the letter  $x$ ?

- A)  $a$                       B)  $b$                       C)  $c$                       D)  $d$                       E)  $e$

14. A square piece of paper is folded twice and cut in the way you can see in the picture. How will



the piece of paper look after unfolding?



15. In how many ways can you express the number 2003 as a sum of two prime numbers?

- A) 1    B) 2    C) 3    D) 4    E) This expression doesn't exist

16. Which of the following sums is equal to 2003?

- A)  $16^2 + 26^2 + 32^2$   
B)  $16^2 + 26^2 + 33^2$   
C)  $15^2 + 27^2 + 32^2$   
D)  $17^2 + 25^2 + 33^2$   
E)  $17^2 + 24^2 + 34^2$

17. An empty truck weighs 2000 kg. After the truck was loaded, freight made up 80% of the weight of the loaded truck. At the first stop one fourth of the freight was unloaded. What percent of the loaded truck's weight did the load make up after that? (Hint: freight = load.)

- A) 20%    B) 25%    C) 55%    D) 60%    E) 75%

18. The combined capacity of a bottle and a glass is equal to the capacity of a pitcher. The capacity of a bottle is equal to the combined capacity of a glass and a mug. The combined capacity of three mugs is equal to the combined capacity of two pitchers. How many glasses altogether have the capacity of one mug?

- A) 3    B) 4    C) 5    D) 6    E) 7

19. Michal has 42 identical cubical blocks, each one with an edge of 1 cm. From all of these blocks, he built a rectangular prism with a base perimeter equal to 18 cm. What is the height of the prism which he built?

- A) 1 cm    B) 2 cm    C) 3 cm    D) 4 cm    E) 5 cm

20. A fresh mushroom contains 90% water. How many kilograms of fresh mushrooms are needed in order to make 1 kg of dried mushrooms containing 11% water?

- A) 8.9    B) 79    C) 1.01    D) 8.18    E) 9.09

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Problems 5 points each

21. There are five men in a room. Each of them is either a liar that always lies or a knight that always tells the truth. Each of them was asked the question: "How many liars are among you?" The answers were: "one," "two," "three," "four," "five." How many liars were in that room?

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

22. In rectangle ABCD, points P, Q, R, S are respectively the midpoints of sides AB, BC, CD, and DA. Let T be the midpoint of segment SR. What part of the area of rectangle ABCD is the area of triangle PQT?

- A)  $\frac{5}{16}$     B)  $\frac{1}{4}$     C)  $\frac{1}{5}$     D)  $\frac{1}{6}$     E)  $\frac{3}{8}$

23. There are six segments with lengths: 1, 2, 3, 2001, 2002, 2003. In how many ways can we select three of these segments to build a triangle?

- A) 1                      B) 3                      C) 5                      D) 6                      E) 10

24. Six consecutive points were indicated on a number line in this order: A, B, C, D, E, and F. Regardless of the location of these points, if only  $AD = CF$  and  $BD = DF$ , then the following equation is true:

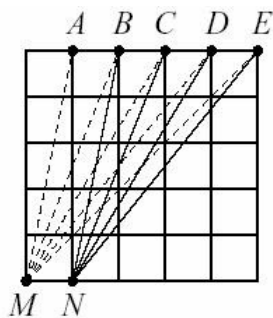
- A)  $AB = BC$     B)  $BC = DE$     C)  $BD = EF$     D)  $AB = CD$     E)  $CD = EF$

25. In the picture four squares are shown and the lengths of their sides are indicated. What is the difference between the combined area of the shaded regions and the combined area of the black regions?

- A) 25                      B) 36                      C) 44    D) 64                      E) 0

26. Which of the following numbers, after it is multiplied by 768, yields a product that ends with the largest number of zeros?

- A) 7,500                      B) 5,000                      C) 3,125                      D) 2,500                      E) 10,000



27. A square was divided into 25 identical small squares (see the picture). What is the sum of the measures of angles  $\angle DMAN$ ,  $\angle DMBN$ ,  $\angle DMCN$ ,  $\angle DMDN$ ,  $\angle DMEN$ ?

- A)  $30^{\circ}$                       B)  $45^{\circ}$                       C)  $60^{\circ}$                       D)  $75^{\circ}$                       E)  $90^{\circ}$

28. How many natural numbers  $n$  have such a property that out of all the positive divisors of number  $n$ , which are different from both 1 and  $n$ , the greatest one is 15 times greater than the smallest one?
- A) 1            B) 2            C) 3            D) There are no such numbers.    E) Infinitely many.
29. In a number with at least two digits, the last digit was deleted. The resulting number was  $n$  times smaller than the previous one. What is the greatest possible value of  $n$ ?
- A) 9            B) 10            C) 11            D) 19            E) 20
30. How many natural numbers  $n$  have the property that the remainder of dividing 2003 by  $n$  is equal to 23?
- A) 22            B) 19            C) 13            D) 12            E) 36

[Back to all problems](#)