Math Kangaroo 2002
Level of grades 7 - 8

Problems 3 points each:

1. This year the International Competition in Mathematics "Kangaroo" takes places on March 21st. How many prime numbers divide the number 21?

   A) 2   B) 3   C) 4   D) 1   E) 21

2. Which of the fractions below is the greatest?

   A) $\dfrac{7}{8}$ B) $\dfrac{66}{77}$ C) $\dfrac{555}{666}$ D) $\dfrac{4444}{5555}$ E) $\dfrac{33333}{44444}$

3. You count from 1 to 100 and you clap while saying the multiples of the number 3 and the numbers that are not the multiples of three but have 3 as the last digit. How many times will you clap your hands?

   A) 30   B) 33   C) 36   D) 39   E) 43

4. On July 1st in Newbury the sun will rise at 4:53 A.M. and set at 9:25 P.M. In the middle of that period of time there is so called *local noon*. At what time will the *local noon* be in Newbury on July 1st?

   A) At 12:00 P.M.   B) At 12:39 P.M.   C) At 1:09 P.M.   D) At 4:32 P.M.   E) At 11:08 A.M.

5. Points K, L, M, N are the midpoints of the sides of rectangle ABCD and points O, P, R, S are the midpoints of the sides of rhombus KLMN. The ratio of the shaded figure's region and the area of rectangle ABCD is equal to:
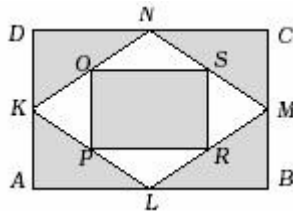
   A) $\dfrac{3}{5}$ B) $\dfrac{2}{3}$ C) $\dfrac{5}{6}$ D) $\dfrac{3}{4}$ E) $\dfrac{5}{7}$

6. Ada has 7 gray balls, 4 white balls and 3 black balls in a bag. What is the least number of the balls she has to take out of her bag, having her eyes covered, to make sure that she took out at least one ball of each color?

   A) 12   B) 11   C) 10   D) 4   E) 3

7. A certain charity organization decided to buy 2002 notebooks. The warehouse was selling boxes of 24 notebooks. What is the least number of boxes that the warehouse should buy in order to have 2002 notebooks, and by what number will the number of 2002 notebooks be exceeded?

   A) 83 boxes, 10 notebooks   B) 84 boxes, 10 notebooks   C) 83 boxes, 14 notebooks
   D) 84 boxes, 16 notebooks   E) 84 boxes, 14 notebooks

8. Which of the expressions below cannot have the value of 2002, if a and b represent the natural numbers?

A) 7a + 7b   B) 13a + 13b   C) 17a + 17b   D) 11(2a + 7b)   E) 28a + 14b

9. Each boy: Mietek, Mirek, Pawel and Zbyszek has exactly one of four animals: a cat, a dog, a gold fish and a canary. Mirek has an animal with fur, Zbyszek has an animal with four legs, Pawel has a bird and Mietek and Mirek don't like cats. Which of the statements below is not true?

A) Zbyszek has a dog   B) Pawel has a canary   C) Mietek has a gold fish
D) Zbyszek has a cat   E) Mirek has a dog

10. A basket of oranges costs 20 zloty, a basket of pears costs 30 zloty and a basket of kiwi fruits costs 40 zloty. Eight baskets of these fruits were bought for 230 zloty. What is the largest possible number of baskets of kiwi fruits that were bought?

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

Problems 4 points each:

11. If $a : b = 9 : 4$ and $b : c = 5 : 3$ then $(a - b) : (b - c)$ is equal to:

A) 4 : 1   B) 25 :8   C) 7:12   D) 5 : 2   E) It cannot be determined

12. Before going to a summer camp, the scouts from Torun packed provisions that were sufficient for them for 30 days. At the last minute 15 scouts from Bydgoszcz wanted to go to the summer camp with the scouts from Torun. Now the provisions already made were sufficient for just 25 days provided the daily amount of food allotted for one scout would not change. How many scouts from Torun were planning to go for that summer camp?

A) 15   B) 20   C) 55   D) 70   E) 75

13. There were 25% boys and 75% girls among all the students taking part in the school event. Half of the boys and 20% of the girls, together 99 students, had blue eyes. How many students were taking part in the school event?

A) 360   B) 340   C) 240   D) Other answer   E) It cannot be determined

14. Points P and Q are the centers of two outside tangent circles (see the picture.) The line going through points
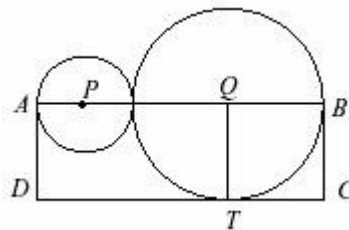
P and Q intersects these circles at points A and B.
If the area of rectangle ABCD is 15 then what is the area of triangle PQT ?

A) 4   B) 15/4   C) $\frac{\pi}{2}$ D) 5   E) $2\sqrt{5}$

15. The weight of each possible pair of boys from a group of 5 was recorded. The following results were obtained: 90 kg, 92 kg, 93 kg, 94 kg, 95 kg, 96 kg, 97 kg, 98 kg, 100 kg and 101 kg. The total weight of the five boys equals to:

A) 225 kg   B) 230 kg   C) 239 kg   D) 240 kg   E) 250 kg

16. Four daughters, Ania, Basia, Celina and Danusia, bought together a single present for their dad. One of the girls hid the present. Mom asked which of them had done it. Ania and Basia said: "I did not do it." Celina: "Danusia did it." Danusia: "Basia did it." It turned out that only one of the girls lied. Who of them hid the present?

A) Ania   B) Basia   C) Celina   D) Danusia   E) It cannot be
determined

17. In one country a part of the residents can speak English only, a part can speak French only and the rest can speak both languages. It is known that 85% residents can speak English, 75% can speak French. What percent of the residents of this country can speak both English and French?

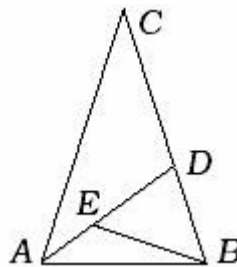A) 50%   B) 57%   C) 25%   D) 60%
E) 40%

18. The symbols P, Q, R, S indicate the total weight of the figures drawn above them (see the picture):

It is known that any two figures of the same shape have the same weight. If P<Q<R then:

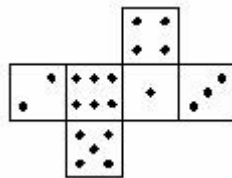A) P<S<Q   B) Q<S<R   C) S<P   D) R<S   E) R = S

19.

Triangle ABC is an isosceles triangle, $\div AC\div = \div BC\div$, ÐACB = 36°. Triangles *BDA* and *EBD* are also isosceles triangles and $\div AB\div = \div AD\div$, $\div DE\div = \div DB\div$. What is the measure of Ð*DEB* ?

A) 90° B) 18° C) 36° D) 54° E) 72°

20. Out of the net shown in the picture the cube was made. The greatest sum of the dots on three sides with a common vertex is equal to:

A) 15   B) 14   C) 13   D) 12   E) Other answer

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Problems 5 points each:

21. It is known that the positive whole number n is divisible by 21and by 9. Which of the answers below can be the number of divisors of the number n?

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

22. In some of the segments of the rectangular diagram with the dimensions 2 x 9 (see the picture below) there are coins.

Each of the segment either has a coin in it or has a side common with the segment containing a coin. The number of coins in this diagram has to be equal at least to:
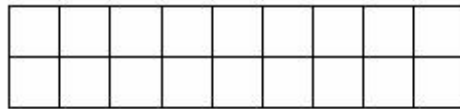
A) 5   B) 6   C) 7   D) 8   E) 9

23. In one month three Sundays were on even dates. What day of the week was the 20th day of the month?

    A) Monday   B) Tuesday   C) Wednesday   D) Thursday   E) Saturday

24. The front face of the clock cracked into three parts in such a way that in each part the sum of the numbers indicating the hours was the same. Knowing that none of the lines along which the crack happened divides the digits


of the number we can say that:
   A)   12 and 3 are not in the same part
   B)   8 and 4 are in the same part
   C)   7 and 5 are not in the same part
   D)   11, 1 and 5 are in the same part
   E)   2, 11 and 9 are in the same part

25. Following the teacher's assignment, the students were drawing two circles and three lines on the piece of paper. After that each of them was counting the points of the intersection of these lines. The biggest possible number which could be obtained that way was equal to:

    A) 18   B) 17   C) 16   D) 15   E) 14

26. A square piece of paper was folded into a pentagon in the following way: first we fold the square in a way so that the vertices B and D would go into one point laying on the diagonal AC (see picture 2), and then we fold the resulting quadrilateral in a way so that point C would go into point A (see picture 3.) What is the measure of the
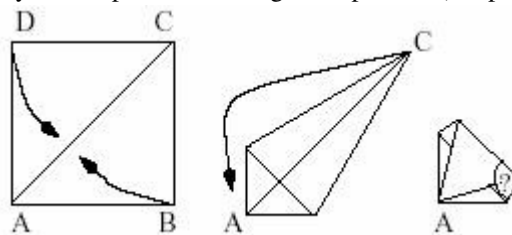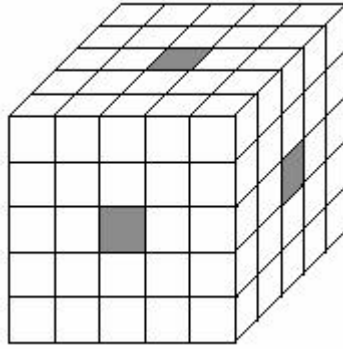

angle with the question mark?
                    Picture 1   Picture 2   Picture 3

    A) 104° B) 106° 30'   C) 108° D) 112° 30'   E) 114° 30'

27. A solid was made out of 112 identical cubes. The solid is a cube with three tunnels drilled through it as you can

see in the picture. After the glue dried the solid was dipped into a dish with paint. How many little cubes have exactly one side painted?

A) 30   B) 26   C) 40   D) 48   E) 24

28. With the digits 1, 2, 3, 4 all possible four-digit numbers with all different digits were made. The sum of all these numbers is equal to:

A) 55,550   B) 99,990   C) 66,660   D) 100,000   E) 98,760

29. In the picture DC = AC = 1 and CB = CE = 4. If the area of triangle ABC is equal to S then the area of the quadrilateral AFDC is equal to:
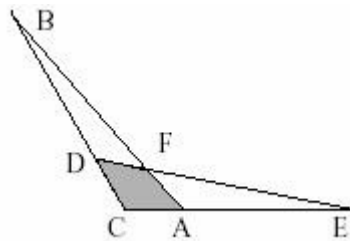
A) $\dfrac{S}{2}$ B) $\dfrac{S}{4}$ C) $\dfrac{S}{5}$ D) $\dfrac{2S}{5}$ E) $\dfrac{2S}{3}$

30. During math class the teacher wrote number 1 on the board and asked Tomek to write down any other natural number. Then other students were coming up to the board and each of them wrote a number that was the sum of all the numbers written before. At some point Piotr wrote the number 1000. Which of the numbers below could not Tomek write?

A) 999   B) 499   C) 299   D) 249   E) 124

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