Po Leung Kuk

9th Primary Mathematics World Contest

Individual Contest 2005

Question 1:
What is the greatest possible number one can get by discarding 100 digits, in any order, from the number 1234567891011121314151617…57585960?

Question 2:
Let $\dfrac{1}{a}+\dfrac{1}{b}+\dfrac{1}{c}=\dfrac{1}{2005}$, where a and b are different four-digit positive integers (natural numbers) and c is a five-digit positive integer (natural number). What is the number c?
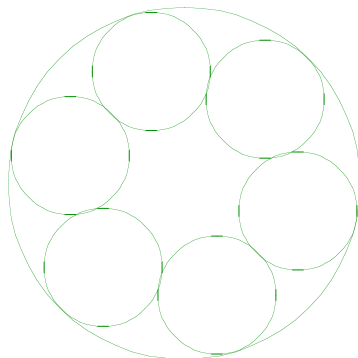
Question 3:
Let x be a fraction between $\dfrac{36}{35}$ and $\dfrac{183}{91}$. If the denominator of x is 455 and the numerator and denominator have no common factor except 1, how many possible values are there for x?

Question 4:
The larger circle has radius 12 cm. Each of the six identical smaller circles touches its two neighbours and the larger circle. What is the radius of the smaller circle?

Question 5:
Consider the following conditions on the positive integer (natural number) a:
1. $3a + 5 > 40$
2. $49a \geq 301$
3. $20a \leq 999$
4. $101a + 53 \geq 2332$
5. $15a - 7 \geq 144$

If only three of these conditions are true, what is the value of a?

Question 6:
A group of 100 people consists of men, women and children (at least one of each). Exactly 200 apples are distributed in such a way that each man gets 6 apples, each woman gets 4 apples and each child gets 1 apple. In how many possible ways can this be done?

Question 7:
How many numbers are there in the list 1, 2, 3, 4, 5, …, 10000 which contain exactly two consecutive 9's such as 993, 1992 and 9929, but not 9295 or 1999?

Question 8:
Some people in Hong Kong express 2/8 as 8th Feb and others express 2/8 as 2nd Aug. This can be confusing as when we see 2/8, we don't know whether it is 8th Feb or 2nd Aug. However, it is easy to understand 9/22 or 22/9 as 22nd Sept, because there are only 12 months in a year. How many dates in a year can cause this confusion?

Question 9:
There are four consecutive positive integers (natural numbers) less than 2005 such that the first (smallest) number is a multiple of 5, the second number is a multiple of 7, the third number is a multiple of 9 and the last number is a multiple of 11. What is the first of these four numbers?

Question 10:
A long string is folded in half eight times, then cut in the middle. How many pieces are obtained?
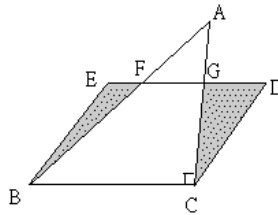
Question 11:
There are 4 men: A, B, C and D. Each has a son. The four sons are asked to enter a dark room. Then A, B, C and D enter the dark room, and each of them walks out with just one child. If none of them comes out with his own son, in how many ways can this happen?
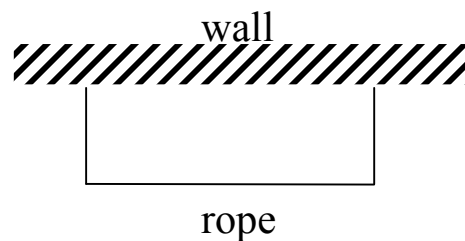
Question 12:
In the figure below, BCDE is a parallelogram, points F and G are on the segment ED, BCA is a right angled triangle, AC is perpendicular to BC.

Suppose that BC=8cm, AC=7cm, and the area of the shaded regions is 12cm^2 more than that of the triangle AFG. What is the length of CG?

Question 13:

Sixty metres of rope is used to make three sides of a rectangular camping area with a long wall used as the other side. The length of each side of the rectangle is a natural number. What is the largest area that can be enclosed by the rope and the wall?

Question 14:

On a balance scale, three green balls balance six blue balls, two yellow balls balance 5 blue balls and six blue balls balance four white balls. How many blue balls are needed to balance four green, two yellow and two white balls?

Question 15:

The sum of the two 3-digit integers, 6A2 and B34, is divisible by 18. What is the largest possible product of A and B?