Po Leung Kuk

12th Primary Mathematics World Contest

Individual Contest 2008

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1. Four couples are eating oranges. Among the four wives, A has eaten 3 oranges, B has eaten 2 oranges, C has eaten 4 oranges and D has eaten only 1 orange. Among the husbands, R has eaten as many oranges as his wife has, S has eaten twice as many as his wife has, T has eaten 3 times as many as his wife has, and U has eaten 4 times as many as his wife has. If 32 oranges are eaten, who is T's wife?

2. There is a 5-digit number that is divisible by 9 and 11. If the first, the third and the fifth digits are removed, it becomes 35. If the first three digits are removed, it becomes a 2-digit number that is divisible by 9. If the last three digits are removed, it becomes a 2-digit number that is also divisible by 9. What is this number?

3. How many integers from 1 to 100 do not include the digit 1?

4. A man gives $\dfrac{1}{3}$ of his money to his son, $\dfrac{1}{5}$ of his money to his daughter and the remaining money to his wife. If his wife gets $35000, how much money did the man originally have?

5. Calculate $\dfrac{1 \times 2 \times 3 + 2 \times 4 \times 6 + 3 \times 6 \times 9 + \cdots + 2008 \times 4016 \times 6024}{3 \times 4 \times 5 + 6 \times 8 \times 10 + 9 \times 12 \times 15 + \cdots + 6024 \times 8032 \times 10040}$.

6. Three girls, A, B and C are running a 100 m race. Spectators D, E and F are discussing each girl's chance to win:

    D says A will be first.

    E says C will not be last.

    F says B will not be first.

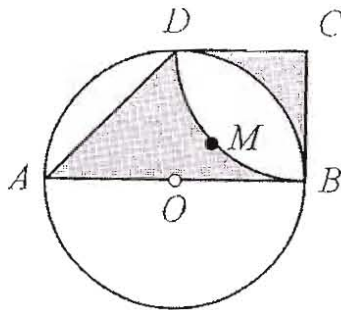   If only one spectator is right, then who will be first?

7. In the following figure, AB is the diameter of a circle with centre O. Point D is on the circle. In the trapezoid $ABCD$,

   i)   line segments AB and DC are both perpendicular to BC, and

   ii) $AB = 2CD$.

   Arc DMB is part of a circle with centre C.

   What is the ratio between the area of the shaded part and the area of the circle?

   (Take π as $\dfrac{22}{7}$)

8. Find the smallest positive integer, divisible by 45 and 4, whose digits are either 0 or 1.

9. Find the greatest value of $a + \dfrac{1}{b + \dfrac{1}{c}} + d + \dfrac{1}{e + \dfrac{1}{f}} + g + \dfrac{1}{h + \dfrac{1}{i}}$, where each letter represents a different non-zero digit.

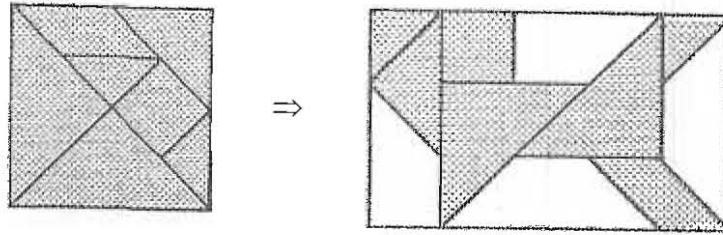10. In the two arithmetic problems below, the four different shapes

   represent exactly one of the numbers 1, 2, 4 or 6 but not necessary in that order. The symbol O is zero. What number does each shape represent so that both problems work?
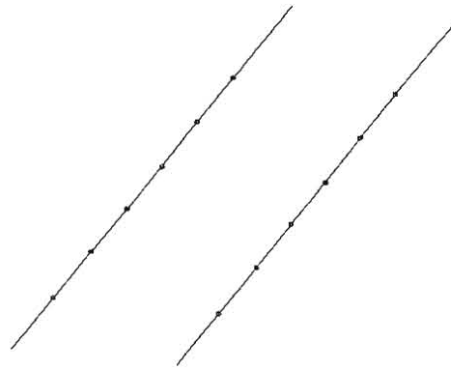
11. The figure on the right is a rectangle whose shaded area is made up of pieces of a square tangram having an area of 10 cm^2, as shown on the left. What is the area of the rectangle?

12. Find the remainder of $2^{2008} + 2008^2$ divided by 7.

13. Six different points are marked on each of two parallel lines. How many different triangles may be formed using 3 of the 12 points?

14. There are 12 identical marbles in a bag. Only two, three or four marbles may be removed at a time. How many different ways are there to remove all the marbles from the bag?

    For example, here are 3 different ways,
    i)   4 then 3 then 3 and then 2,
    ii)   2 then 3 then 3 and then 4,
    iii)   2 then 2 then 2 then 3 and then 3.

15. John walks from town A to town B. He first walks on flat land, and then uphill. He then returns to town A along the same route. John's walking speed on flat land is 4 km/h. He walks uphill at a speed of 3 km/h and he walks downhill at a speed of 6 km/h. If the entire journey took 6 hours, what is the distance from town A to town B?