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Po Leung Kuk

12th Primary Mathematics World Contest

Individual Contest 2008

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 $\frac{1}{3}$ of his money to his son, $\frac{1}{5}$ 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 $\dfrac{1\times2\times3+2\times4\times6+3\times6\times9+\cdots+2008\times4016\times6024}{3\times4\times5+6\times8\times10+9\times12\times15+\cdots+6024\times8032\times10040}$.

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*,

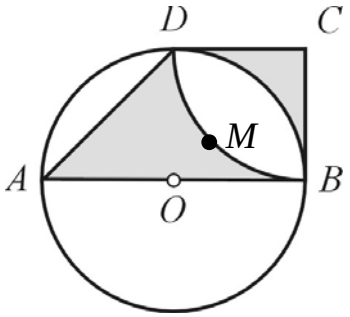
   i) line segments *AB* and *DC* are both perpendicular to *BC*, and

   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?

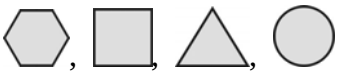
   (Take π as $\frac{22}{7}$)



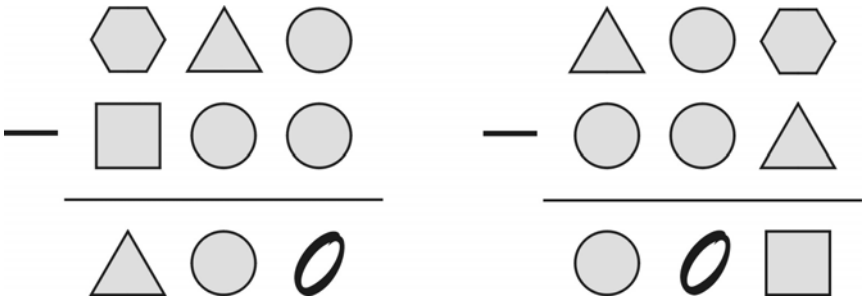
8. Find the smallest positive integer, divisible by 45 and 4, whose digits are either 0 or 1.

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

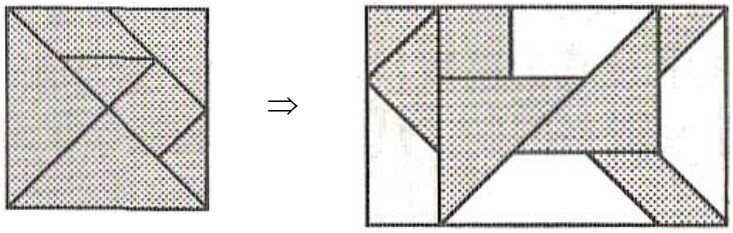
10. In the two arithmetic problems below, the four different shapes



represent exactly one of the numbers 1, 2, 4 or 6 but not necessary in that order. The symbol  is zero. What number does each shape represent so that both problems work?

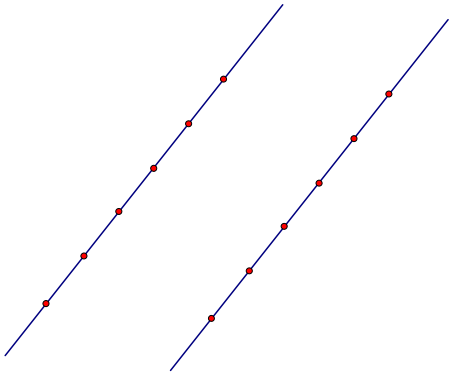


11. The figure on the right is a rectangle whose shaded area is made up of pieces of a square tangram having an area of 10 cm^2, as shown on the left. What is the area of the rectangle?



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?