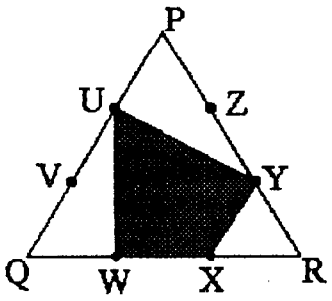
Po Leung Kuk

1st Primary Mathematics World Contest

Problems for Team Contest

T1. Let PQR be an equilateral triangle with sides of length 3 units. U, V, W, X, Y and Z divide the sides into unit lengths. Find the ratio of the area of the shaded quadrilateral UWXY to the area of the triangle PQR.



Ans. $\frac{4}{9}$.

T2. Evaluate

$$1\times(\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\frac{1}{7}+\frac{1}{8}+\frac{1}{9}+\frac{1}{10})+3\times(\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\frac{1}{7}+\frac{1}{8}+\frac{1}{9}+\frac{1}{10})+5\times(\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\frac{1}{7}+\frac{1}{8}+\frac{1}{9}+\frac{1}{10})+7\times(\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\frac{1}{7}+\frac{1}{8}+\frac{1}{9}+\frac{1}{10})+9\times(\frac{1}{5}+\frac{1}{6}+\frac{1}{7}+\frac{1}{8}+\frac{1}{9}+\frac{1}{10})+11\times(\frac{1}{6}+\frac{1}{7}+\frac{1}{8}+\frac{1}{9}+\frac{1}{10})+13\times(\frac{1}{7}+\frac{1}{8}+\frac{1}{9}+\frac{1}{10})+15\times(\frac{1}{8}+\frac{1}{9}+\frac{1}{10})+17\times(\frac{1}{9}+\frac{1}{10})+19\times\frac{1}{10}.$$

Ans. **55.**

T3. To type all the integers from 1 to 1997 using a typewriter on a piece of paper, how many times of the key '9' needed to be pressed?

Ans. **595.**

T4. In one morning, a ferry travelled from Hong Kong to Kowloon and another ferry travelled from Kowloon to Hong Kong at a different speed. They started at the same time and met first time at 8:20. The two ferries then sailed to their destinations, stopped for 15 minutes and return. The two ferries met again at 9:11. Suppose the two ferries travelled at uniform speed throughout the whole journey, what time did the two ferries start their journey ?

Ans. **8:02.**

T5. During recess, one of five pupils wrote something nasty on the chalkboard. When questioned by the class teacher, the following ensued:

'A': It was 'B' or 'C'
'B': Neither 'E' nor I did it.
'C': You are both lying.
'D': No, either A or B is telling the truth.
'E' : No, 'D', that is not true.

The class teacher knows that three of them never lie while the other two cannot be trusted. Who was the culprit?

Ans. **C.**

T6. During a rebuilding project by contractors 'A', 'B' and 'C', there was a shortage of tractors. The contractors lent each other tractors as needed. At first, 'A' lent 'B' and 'C' as many tractors as they each already had. A few months later, 'B' lent 'A' and 'C' as many as they each already had. Still later, 'C' lent 'A' and 'B' as many as they each already had. By then each contractor had 24 tractors. How many tractors did each contractor originally have?

Ans: **'A' : 39,** **'B' : 21,** **'C' : 12.**

T7. Colour the surfaces of a cube of dimension 5×5×5 red, and then cut the cube into smaller cubes of dimension 1×1×1. Take out all the smaller cubes which have at least one red surface and fix a cuboid, keeping the surfaces of the cuboid red. Now what is the maximum possible volume of the cuboid?

Ans: **96.**

T8. Among the integers 1, 2, ..., 1997, what is the maximum number of integers that can be selected such that the sum of any two selected number is not a multiple of 7.

Ans. **858.**

T9. Find the two 10-digit numbers which become nine times as large if the order of the digits is reversed

Ans. **1089001089 and 1098910989.**

T10. The twelve integers 1, 2, 3,..., 12 are arranged in a circle such that the difference of any two adjacent numbers is either 2, 3 or 4. What is the maximum number of the difference '4' can occurr in any such arrangement ?

Ans. **7.**