PROBLEM OF THE MONTH (2010 series)

16 Sept 10 due 22 Sept 10
CAN YOU GIVE US THE ANSWER?

Problem No. J1 (F.1-F.3)
The room number of Tom consists of 4 digits. When he stands upside down, he sees the room number as another 4-digit number which is larger than the room number by 4872. What is his room number?
Note: Only 0, 1, 6, 8, 9 are possible digits.

Problem No. S1 (F.4-F.7)
Tom wants to write the expression $2^9$, but he wrongly writes it as a 4-digit number $\overline{2x9y}$. However, the two numbers have the same value. What are $x$ and $y$?

The Mathematics Department publishes two challenging problems once a month and invites Lamwooers to submit answers. The objective of this is to stimulate and cultivate interest in mathematics among Lamwooers. Answers are due within one week from the date of publication. They must be sent by eClass email to Mr Chu LF. The names of those who submitted correct answers will be posted. Every Lamwooer who submits three correct answers will receive a book coupon of $50. A grand prize will be distributed to who have contributed at least six correct answers for the total 2010 series.
PROBLEM OF THE MONTH (2010 series)

SOLUTION

Problem No. J1 (F.1-F.3)
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number as another 4-digit number which is larger than the room number by 4872. What is his room
number?
Note: Only 0, 1, 6, 8, 9 are possible digits.

Let $\overline{ABCD}$ be the room number and $\overline{XYZW}$ be the upside down room number.

So $\overline{ABCD} + 4872 = \overline{XYZW}$.
As $A + 4 = X$ and $A$ can only be 1, 6, 8, 9, we have $A = 1$.
So $W = 1$.
So $D = 9$.
So $X = 6$.
But $Z$ is the unit digit when $C + 7 + 1$, so $C$ can be 0, 1, 8.
When $C = 0$, $Z = 8$ and $B = 8$. But $1809 + 4872 = 6681$, rejected.
When $C = 1$, $Z = 9$ and $B = 6$. But $1619 + 4872 = 6491$, rejected.
When $C = 8$, $Z = 6$ and $B = 9$. Then $1989 + 4872 = 6861$, so the room number is 1989.

Problem No. S1 (F.4-F.7)
Tom wants to write the expression $2^9 y$, but he wrongly writes it as a 4-digit number $\overline{2x9y}$.
However, the two numbers have the same value. What are $x$ and $y$?

Since $2000 < 2^9 y < 3000$ and $9^1 = 9$, $9^2 = 81$, $9^3 = 729$ and $9^4 = 2916$, $y = 0,1,2,3$.
We can also find that $x \neq 0$, thus $\overline{2x9y}$ is an even number. So $y = 2$.
Then $81 \times 2^3 = 2x92$.
It is not difficult to see that $x = 5$.

Solvers
HUNG TSZ FUNG (1D-24)
YEE YEUK LAM (2D-11)
CHAN SIU KAN KEN (2D-17)
CHO TZE HEI (2D-19)
HO NGAN HANG (2D-23)
LI CHAK SANG (2D-25)
WONG TAI PONG (2D-37)
BUT HO YIN LEO (3D-23)
DU CHUN KIT (3D-26)
CHAN YUK TING (4E-3)
CHAN HO HEI (4E-19)
LEUNG GA WAI (4E-29)
CHANLOKYIN (5D-1)
LEE SHING CHI (5E-29)
LEE FAT KEI (6H-23)
CHOI SHING HAY (6L-19)
YUNG CHUN YUEN (6L-39)
Totally 17 students submitted