**1123.** *Proposed by Mike Pinter, Belmont University, Nashville, TN*

This problem is in honor of the $300^{\text{th}}$ birthday of Benjamin Franklin. Consider the base 9 cryptarithm $K\ I\ T\ E + K\ E\ Y = S\ H\ O\ C\ K$. Find a solution that minimize the $S\ H\ O\ C\ K$.

*Solution by* **Rex H. Wu**, *Brooklyn, NY.*

$$\begin{array}{r} K\ I\ T\ E \\ +\quad K\ E\ Y \\ \hline S\ H\ O\ C\ K \end{array}$$

On the $9^3$ column, $K$ get a 1 from the $9^2$ column and 1 is carried to the $9^4$ column. Therefore, $S = 1, H = 0$ and $K = 8$.

On the $9^0$ column, $E + Y = K = 8$. Of the remaining digits, only $2 + 6 = 8$ or $3 + 5 = 8$.

To minimize the $SHOCK$, let $O = 2$. Since $I$ cannot be 2, this means $I = 3$. But then the $9^0$ column cannot be satisfied.

Let $O = 3$. Again, $I$ cannot be 2 since we have to leave 2 to the $9^0$ column. Therefore $I = 4$.

$I = 4$ implies the $9^1$ column cannot carry a 1 to the $9^2$ column. We are left with the digits $2, 5, 6$ and 7. 2 and 6 have to be used for the $9^0$ column. $E = 6$ leave no solution for the $9^1$ column. Therefore, $E = 2, Y = 6, T = 5$ and $C = 7$.

$K\ I\ T\ E + K\ E\ Y = 8\ 4\ 5\ 2 + 8\ 2\ 6 = 1\ 0\ 3\ 7\ 8 = S\ H\ O\ C\ K$.

■