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Cryptarithmetic

Solve
$$\begin{array}{r} SEND \\ +\ MORE \\ \hline MONEY \end{array}$$

Character	Code
S	9
E	5
N	6
D	7
M	1
O	0
R	8
Y	2

⟹ Given.

$$\begin{array}{cccccc} C_4 & C_3 & C_2 & C_1 & & \\ & S & E & N & D \\ + & M & O & R & E \\ \hline M & O & N & E & Y \end{array}$$

① $S+M+C_3=O$ gives carry C_4 i.e. M.

Two choice for $\cancel{M}$ $C_4 < {0 \atop 1}$.

M can not 0. So $\boxed{M=1}$

② $S+M+C_3=O+10$ $C_3 < {0 \atop 1}$

C_3 can be 0 or 1.

→ If we assum $C_3=0$

$S+1+0=O+10$ ← (carry for C_4)

$S=9$

So S+M becomes $9+1=10$. Thus O becomes 0.

$\boxed{S=9}$ $\boxed{O=0}$

(3) $E + O + C_2 = N.$

C_2 can take value of 0 or 1.

→ if $C_2 = 0.$

$E + 0 + 0 = N$ i.e. $E = N$ (which is not possible).

So C_2 must be 1.

$\therefore E + 0 + 1 = N.$ $\therefore \boxed{E + 1 = N}$

(4) $N + R + C_1 = E + C_2$

$\therefore (N) + R + C_1 = E + 10$

$E + 1 + R + C_1 = E + 10$

i.e. $C_1 + R = 9.$

Now if C_1 is 0 R becomes 9 (which is not possible because $S = 9$.).

So $C_1 = 1.$

$1 + R = 9.$ $\boxed{\therefore R = 8.}$

⑤ $D+E = Y+C_1$ —— ①

The value of E can be $\{7,6,5,4,3,2\}$

→ If you take $E=7$, then $N=8$.
(which is not possible as $R=8$)

→ If you take $E=6$ then $N=7$.
if we put in eq^n ①

$D+6 = 10+Y$

$D = 4+Y$

Here if we assum $Y=2$.
$D=6$ (which is not possible as $E=6$)
if $y=3$ (not possible because $N=7$).
$y=4$ (not possible beause $R=8$)
$y=5$ (" " " $S=9$).

Thus ~~$D=9$~~ $E=6$ → Not possible.

→ If you take $E=5$, then $N=6$.
Put in eq^n ①

$D+5 = 10+y$

$D = 5 + Y$ if. $Y = 2$, $\therefore D = 7$.

which is true.

So. $E = 5$, $N = 6$, $D = 7$, $Y = 2$.

eq^n become

$$
\begin{array}{r}
9\ 5\ 6\ 7 \\
+\quad 1\ 0\ 8\ 5 \\
\hline
1\ 0\ 6\ 5\ 2
\end{array}
$$