

Cal Poly Department of Mathematics

Puzzle of the Week

Feb 5-11, 2010

In the sum below each letter represents a different digit, and no leading digit is 0.

$$\begin{array}{r} S \ U \ P \\ E \ R \ B \\ + \ O \ W \ L \\ \hline Z \ Z \ Z \end{array}$$

Which digit is represented by Z ?

Solutions should be submitted to Morgan Sherman:

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before next Friday. Those with correct and complete solutions will have their names listed in next week's email announcement. Anybody is welcome to make a submission.

Solution:

The digit Z must be 9. To see this look at the equation $SUP + ERB + OWL = ZZZ$ modulo 9: since all the digits are distinct, and the sum of the digits 0 through 9 is 45 we get $45 - Z = 3Z$ or $4Z = 0$ modulo 9. Thus 9 must divide Z and we see that $Z = 9$ is the only possibility.

We should verify that there is at least one solution:

$$\begin{array}{r} 1 \ 0 \ 8 \\ 2 \ 5 \ 4 \\ + \ 6 \ 3 \ 7 \\ \hline 9 \ 9 \ 9 \end{array}$$

There are many others.