

The numbers  $74AS2B1$  and  $326AB4C$  are both multiples of 3.

What are the possible values of  $C$ ?

If a number is divisible by 3 then its digits add up to a multiple of 3.

So we have

$$7 + 4 + A + 5 + 2 + B + 1 \equiv A + B + 1 \pmod{3}$$

$$\Rightarrow A + B + 1 = 3N \text{ For some } N \in \mathbb{Z}$$

$$\Rightarrow A + B = 3N - 1 \quad (*)$$

and

$$3 + 2 + 6 + A + B + 4 + C \equiv A + B + C \pmod{3}$$

$$\Rightarrow A + B + C = 3M \text{ For some } M \in \mathbb{Z}$$

Substituting  $(*)$  into the above equation,

we have

$$(3N - 1) + C = 3M$$

$$\Rightarrow C = 3(M + N) + 1$$

$\Rightarrow C$  is one more than a multiple of 3

$$\Rightarrow C = 1, 4 \text{ or } 7$$