

Proof: By Case

For any integer  $n$ , by the Division Theorem, it can be

$$n = 3q + r (q \in \mathbb{Z}, 0 \leq r \leq 2)$$

if  $r = 0$ ,  $n = 3q$ , so  $n$  is divisible by 3.

if  $r = 1$ ,  $n + 2 = 3q + 1 + 2 = 3(q+1)$ , so  $n + 2$  is divisible by 3.

if  $r = 2$ ,  $n + 4 = 3q + 2 + 4 = 3(q+2)$ , so  $n + 4$  is divisible by 3.

The argument has been proved.