Theorem: For any integer n, at least one of the integers n, n+2, n+4 is divisible by 3.

Proof:

Case 1:

Choose an arbitrary n such that n = 3m. Then n is divisible by 3.

Case 2:

Choose an arbitrary n such that n = 3m + 1, then using n+4:

$$3m+1=n+4$$
$$3m+1-4=n$$
$$3m+3=n$$
$$3(m+1)=n$$

This proves 3m+1 would be divisible by n+4.

Case 3:

Choose an arbitrary n such that n = 3m + 2, then using n+2:

$$3m+2=n+2$$
$$3m+2-2=n$$
$$3m=n$$

This proves 3m+2 would be divisible by n+2.

Case 4:

Since 3m+3 = 3p, where p = m+1, the cycle would restart by being divisible by n.

Since all cases show that any integer is divisible by 3, the theorem is proved.