Test Flight Q5

Prove that for any integer n, at least one of the integers n, n + 2, n + 4 is divisible by 3.

Case 1 n divisible by 3:

Let n be divisible by 3. The statement is true. Also, $n+3$ will be divisible by 3. This leaves two case to prove: $n+1$ and $n+2$.

Case 2: n+2 is divisible by 3
Let n be divisible by 3. If the integer is equal to $n+1$, it is not divisible by 3, but by adding 2 to it equals $n+3$ which is divisible by 3. Thus the statement for $n+2$ will be true for certain integers.

Case 3: $n+4$ is divisible by 3
Let n be divisible by 3. If the integer is equal to $n+2$, it is not divisible by 3, but by adding 4 to it equals $n+6$ which is divisible by 3. Thus the statement for $n+4$ will be true for certain integers.

Since the choice of n is arbitrary, the results are true for all consecutive integers $n, n+1, n+2$ and the statement "that for any integer n, at least one of the integers n, n + 2, n + 4 is divisible by 3" is true.